Governor's Marijuana Impact Assessment Council

Review of Literature
And Subcommittee Reports

Governor Matt Mead, State of Wyoming
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Governor's Marijuana Impact Assessment Council

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Preface

Marijuana legalization has been a polarizing discussion for many years across the United States. The recent legalization of marijuana, in parts of Colorado, and other states, creates an environment where it is important for Wyoming to have access to unbiased scientific information and reports from reliable sources on the subject. With that in mind, Governor Matthew Mead created the Governors Marijuana Impact Assessment Council (GMIAC) in July of 2015. Many highly qualified people including legislators, division directors, doctors, physicians, law enforcement personnel, executive directors, statisticians, professors, research scientists and others from Wyoming were asked to participate in the research and preparation of this report for the purpose of assisting legislators and the public in making informed decisions concerning varying levels of marijuana legalization.

This report was created through a cooperative effort by members of the Governor's Marijuana Impact Assessment Council (GMIAC). The report is a literature review intended to inform the governor, legislature, and the citizens of Wyoming, of the potential impacts which could result from varying levels of marijuana legalization. Areas of possible impact include education, health, agriculture, revenue, criminal justice and more. The literature review offers no specific recommendations as to whether Wyoming should change its existing laws or create new laws, but it does contain the most recent information available providing those in decision making positions an opportunity to make fact-based decisions. It is our hope that researchers use this report as a starting point for furthering research on this subject.

We would like to acknowledge the participation of the members of the GMIAC and their staff for their dedication to the research and work that went into this report. Hopefully, the report will be useful for continuing research into the impact varying levels of marijuana legalization has had in other states and the long-term decisions—currently or in the near future—facing other states.

Executive Summary

History and Recent Status of Marijuana Laws in the United States

The controversial discussion of state-level marijuana laws is intensifying in the United States. Of the 23 states with medical marijuana laws, 11 states legalized through statewide ballot initiatives and 12 states passed bills through their state legislatures. All the states allowing recreational marijuana were achieved through ballot initiatives (Colorado, Washington, Oregon, Alaska). Wyoming is listed as one of the states with a potential ballot initiative for medical marijuana in 2016—the Peggy A. Kelley Wyoming Cannabis Act.

Although the Peggy A. Kelley Act petition circulators did not get the requisite number of signatures to place the initiative on the 2016 ballot, state statute permits collection of signatures until early February 2017. If enough registered voter signatures are collected by that date (~25,000), the initiative could appear on the 2018 Wyoming statewide ballot.

RAND Corporation in its research report *Considering Marijuana Legalization: Insights for Vermont and Other Jurisdictions,* provides a succinct history of marijuana in the United States:

> Marijuana prohibition was universal across the United States through the 1960s, and those convicted of growing, possessing, or selling marijuana could receive sentences of incarceration. Then, in the 1970s, 12 states removed or substantially reduced criminal penalties for possession of small amounts of marijuana.[1] Many observers then believed that it was just a matter of time until the nation legalized the drug. Instead, the movement toward liberalization came to a sudden halt in 1978. One state (South Dakota) reversed its decriminalization, and no state initiated decriminalization in the subsequent 20 years. The end of the 1970s liberalization is often associated with the so-called parents' movement, itself a response to the rapid rise in frequent marijuana use among junior and senior high school pupils and the associated harms; in 1979, about one out of every ten high school seniors reported daily use of marijuana.
>
> In recent years, a handful of states, including California in 2011 and Vermont in 2013, have fully decriminalized possession of small amounts of marijuana. Vermont and more than 20 other states now allow marijuana to be used for medicinal purposes, but there is

[1] The 12 states were Alaska, California, Colorado, Maine, Minnesota, Mississippi, Nebraska, New York, North Carolina, Ohio, Oregon, and South Dakota. There is a lot of debate about what decriminalization actually means (see Pacula, MacCoun, et al., 2005, and MacCoun, Pacula, et al., 2009). For example, California has generally been considered a decriminalization state, but possession of small amounts for personal use was not exclusively a noncriminal offense until January 2011.

tremendous variation in how that marijuana is supplied and the uses that are allowed. California and Colorado receive a lot of attention in medical-marijuana debates, but they represent one end of a broad spectrum. They allow brick-and-mortar medical-marijuana stores (called dispensaries) and have very expansive definitions of what conditions justify obtaining a medical recommendation (Pacula, Chriqui, et al., 2002; Pacula, Powell, et al., 2015).

In some other states, including Vermont, the medical-marijuana system is more controlled, serving more as an adjunct to the health system than as a loophole for recreational users. Indeed, 11 (mostly southern) states in 2014 passed even more-restrictive medicinal laws, allowing only high-cannabidiol (CBD) and low–delta-9-tetrahydrocannabinol (THC) marijuana for medicinal purposes (Ingold, 2014c).

Why the new momentum for legalization? Certainly public sentiment has changed. Gallup has asked the same question about marijuana legalization since 1969: "Do you think the use of marijuana should be legal or not?" Support rose from 12 percent in 1969 to 28 percent in 1978, decreased to 23 percent in 1985, and then steadily rose; by 2013, 58 percent answered positively. (RAND, 2014)

The ballot initiative effort in Wyoming was no doubt encouraged by a public opinion poll of registered voters in October of 2014. The Wyoming Survey & Analysis Center (WYSAC) conducted a statewide election survey for University of Wyoming's Political Science Department. Questions on attitudes toward marijuana were included. Seventy-two percent of Wyoming residents supported adult use of marijuana if prescribed by a physician while only 25% opposed. Although Wyoming residents do not support legalization of marijuana for personal use, a majority responded in favor of reduced penalties for those found in possession of marijuana. Nearly two-thirds of those surveyed, 62 percent, believe the penalty for marijuana possession should not include time in jail; 32 percent support jail sentences. The 2014 WYSAC survey is the first scientifically sound statewide survey to ask Wyoming registered voters about opinions on marijuana laws (95% confidence interval, +/- 4%).

The Peggy A. Kelly Wyoming Cannabis Act of 2016, would be very prescriptive as to how the medical marijuana system in Wyoming would be implemented, monitored and taxed. The medical conditions and symptoms for which doctors can recommend marijuana treatments are explicit and have extensive implications. Below are key features of the Act.

- The Kelly Act states that a Wyoming-licensed physician can issue a medical marijuana certification for a debilitating medical condition defined as "cancer, glaucoma, positive status for human immunodeficiency virus, or acquired immune deficiency syndrome, hepatitis C, amyotrophic lateral sclerosis, Crohn's disease, sickle cell anemia, ulcerative colitis, dementia, Alzheimer's disease, or treatment for such conditions, which produces, for a specific patient, one or more of the following, and which, in the professional opinion of the patient's physician, foreseeably may be alleviated by the use of medical

marijuana: cachexia, post-traumatic stress disorder, severe pain, severe nausea, seizures, including those that are characteristic of epilepsy, or persistent muscle spasms, including those that are characteristic of multiple sclerosis."

- The Kelly Act permits distribution and retail sales of medical marijuana through privately held, state-regulated dispensaries. The Act states that dispensaries selling marijuana and marijuana-infused products "…shall be subject to any state commercial activities tax, including any applicable sales, use or excise tax as applied to businesses in general and all other local taxes, assessments, fees and charges as applied to businesses in general, but shall not be subject to any special taxes, assessments, fees and charges, other than the licensure fees set forth herein."
- The Kelley Act "…vests the Wyoming Department of Revenue Liquor Division to regulate the state's medical marijuana industry in a manner similar to the state's regulation of alcohol."
- The Kelly Act states "…medical marijuana establishments may be established in each locality within the State of Wyoming pursuant to this chapter and regulations set by Liquor Division."
- The Kelley Act allows a person with a valid medical marijuana certification to "possess, grow, process, or transport no more than six (6) medical marijuana plants, with three or fewer being mature, flowering plants." Under the act, growers with valid medical marijuana cards would also be able to transfer up to three ounces to other cardholders without remuneration. On average, a single mature marijuana plant can yield around one pound or more or dried marijuana.

Under federal law, marijuana possession, distribution and production is still illegal. The U.S. Department of Justice (DOJ) in 2013 issued the "Cole Memo," which provides guidelines to federal prosecutors. It is important to remember that the legalization structures in Colorado or other states are not approved by DOJ. RAND's *Considering Marijuana Legalization* reminds that "Any administration could withdraw these guidelines at any time" (RAND, 2014).

<u>From the 2013 Cole Memo:</u>

The Department of Justice is committed to enforcement of the Controlled Substances Act… The Department is also committed to using its limited investigative and prosecutorial resources to address the most significant threats in the most, effective, consistent and rational way. In furtherance of those objectives, as several states enacted laws relating to the use of marijuana for medical purposes, the Department in recent years has focused its efforts on certain enforcement priorities that are particularly important to the federal government:

- Preventing the distribution of marijuana to minors.

- Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs, and cartels.
- Preventing the diversion of marijuana from states where it is legal under state law in some form to other states.
- Preventing state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity.
- Preventing violence and the use of firearms in the cultivation and distribution of marijuana.
- Preventing drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use.
- Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands.
- Preventing marijuana possession or use on federal property.

Medical Benefits and Consequences of Marijuana Use

What does the current scientific literature tell us about the health and behavioral consequences associated with marijuana consumption? A great deal of research has been published on this topic, especially in recent years, and as a result we can identify some clear acute and chronic health effects, especially of frequent, high-dose marijuana use. Acute risks include traffic crashes and impaired cognitive functioning while intoxicated, as well as anxiety, dysphoria, and panic. These effects have been demonstrated using controlled laboratory experiments as well as more naturalistic observations.

The most concerning problem associated with longer-term use is dependence, with roughly 10% of users at risk of addiction. Also, there is substantial evidence that chronic heavy use increases the risk of chronic bronchitis. Research on people using different amounts of marijuana has a fundamental limitation; although marijuana use is *correlated* with many adverse outcomes, it is much harder to ascertain whether marijuana use *causes* those outcomes. For example, there is evidence that those adolescents who begin using marijuana are more likely to already have a history of both behavioral and academic problems in school, so it is unclear to what degree marijuana use contributes to the development or exacerbation of these problems.

Rates of marijuana use have been found to correlate with a wide variety of problems, such as psychotic symptoms, cardiovascular disease, male testicular cancers, lower IQ, cognitive difficulties, small differences in brain structure, lung cancer, and lower workplace productivity.

The current state of the scientific literature in each of these areas is insufficient to determine the extent to which marijuana use is causally linked to any of these outcomes. For example,

although the literature showing a relationship between marijuana use and crime is extensive, there is little evidence that use itself increases criminal behavior, so one would not expect legalization to have important effects on nondrug crime.

Most of the research to date has been based on use of smoked marijuana, containing largely unmeasured amounts of cannabinoids (therefore unknown potency levels). Medical marijuana dispensaries in other states contain a wide variety of additional products, and so some of the prior research might not apply directly.

On the topic of emerging new state marijuana models, the encyclopedic RAND report produced for the state of Vermont titled *Considering Marijuana Legalization: Insights for Vermont and Other Jurisdictions* is used extensively throughout this report. Permission to quote their research liberally was graciously given by Dr. Beau Kilmer, coauthor of the report and co-director of the RAND Drug Policy Research Center.

> In addition, the effects of marijuana use in the past, under prohibition, might not accurately predict the effects of marijuana use in the future under some alternative legal regime. To date, researchers have based their findings largely on observational data that reflect use of a substance containing largely unmeasured amounts of cannabinoids. Furthermore, no one knows precisely how legalization will affect use—specifically, the extent to which heavy or harmful use will rise, which is directly relevant for understanding the public-health and safety consequences. Nor can one know how the product might change (e.g., potency, mode of use) or how these changes might influence the relationships between use and harms identified here. Thus, it is difficult to say whether the associations identified in the past accurately assess those that will exist in the future.
>
> Can we just look to Colorado and Washington to determine whether legalization is a good idea? Unfortunately, it is too early to know how the new regulatory regimes in Colorado and Washington will fare in the short and long runs. Industry structure and behavior will take years, if not decades, to mature, and consumer responses will develop over similar periods. (RAND, 2014)

According to the (inexact) estimates from the National Survey on Drug use and Health, in 2002-03 6.2% of those aged 12 and over reported using marijuana within the 30 days prior to the survey. This national figure compares to 5.5% in Wyoming (below the U.S. average) and 8.5% in Colorado (above the U.S. average, even before medical marijuana was introduced). By 2013-14, the U.S. figure had risen 29%, to 8%. Colorado, which had introduced medical (using a very liberal model) and was beginning to sell recreational marijuana, rose by 75% over that same period (to 14.9%), while Wyoming's rate had increased only by 16%, to 6.3%. These estimates indicate the complexity of trying to determine the effects of any law change in Wyoming. If Wyoming had adopted the same law changes as Colorado at the same times,

would we also have experienced a larger-than average increase in usage? Or, are there simply fewer people in Wyoming interested in using marijuana?

Traditional smoked marijuana is not an FDA-approved medication and it is unlikely that it ever could achieve that status, for at least four reasons. First is continuing opposition from those seeking to continue federal prohibition of marijuana. Second, medicines based on plants themselves ("botanicals") were historically important but began to go out of favor around 100 years ago as they were replaced by pure chemicals extracted from those plants (e.g. morphine from opium, digitalis from foxglove). Marijuana plants contain a variety of cannabinoid chemicals in varying concentrations, making it difficult to understand effects from one sample to the next. The FDA would be unlikely to favor such a variable product. Third, the long-term safety of any plant product designed to be burned and smoked would be a serious impediment given our history with tobacco. Fourth, virtually all new FDA drug approvals are based on a company's willingness to invest about 10 years and perhaps billions of dollars conducting the required research to demonstrate safety and effectiveness, in exchange for an exclusive 20-year patent through which the company earns back its investment[2].

Since the first use of marijuana as a medicine was over 4000 years ago, it would be difficult to obtain a patent on any given strain or variety of a cannabis plant, and therefore nearly impossible to recover the necessary investment. Thus, in those states that have legalized medical use of marijuana, its status is more akin to that of "herbal supplements" (e.g. ginko biloba or St. John's wort). These products are not treated as drugs by the FDA, there is no requirement that they be demonstrated to be effective, and they vary widely in chemical composition. Physicians in those states may recommend that their patients try marijuana or derived products, but they do not prescribe it.

Nevertheless, there is considerable evidence supporting the idea that various constituents of marijuana could be useful in treating a wide variety of disorders. Dronabinol (Marinol), made from THC synthesized in a laboratory, has been available throughout the U.S. as a prescription medication since 1985. Its approved uses are to reduce nausea and to stimulate appetite. Nabilone, a slightly different synthetic cannabinoid, was also approved for these uses in 1985 but not marketed in the U.S. until 2006. In addition, pharmaceutical companies in the U.S. and other countries have been in the process of testing various marijuana extracts as well as other newly-synthesized drugs designed to act at one of the known types of cannabinoid

[2] The final cost of bringing one product to the market depends on a number of variables, including the amount of time needed to obtain promising treatments, the number of subjects enrolled in each phase of the clinical trials, the complexity of the product delivery, the disease being treated, time needed for data assessment, and other considerations. However, various sources indicate that it can cost more than $1 billion to bring one product to the market, including approximately $50-840 million to bring treatments through the stages of Basic Research/Drug Development and Pre-Clinical/Translational Research, and approximately $50-970 million to complete the Clinical Trials (Phases 1, 2, and 3). (BrightFocus Foundation).

receptors. Cannabidiol oil, a non-psychoactive extract from marijuana, has been suggested to treat intractable seizure disorders in children, and Wyoming has recently legalized its use. Epidiolex, a highly purified CBD extract, is currently in clinical trials with seizure patients, but has not received approval for sale in any country. Sativex, a cannabis extract containing both THC and CBD, has been approved in 15 countries (not the U.S.) to treat muscle spasms in multiple sclerosis. It has also been in trials for treating pain in cancer patients, but apparently with less success.

Both, anecdotal and limited clinical research, indicate the possibility cannabinoids might provide some relief from other disorders, such as migraines, irritable bowel syndrome, fibromyalgia. However none of these potential uses has been sufficiently demonstrated to be considered a valid claim at this time.

Some advocates claim there is evidence that cannabis products can "cure cancer." Several studies have grown isolated cultures of human cancer cells in petri dishes and have demonstrated that when cannabinoids are added directly to the tissue culture the growth of the cells is slowed (not stopped). However, it is not clear that when cannabis products are consumed the cannabinoids would reach the target tissue at a sufficient concentration to slow tumor growth. In this literature review, we did not find any published research in which cannabinoids consumed by actual patients resulted in slowing or halting tumor growth.[3]

In summary, there is little doubt that if medical marijuana were available in Wyoming some individuals would experience a degree of symptom relief after using it. But it is impossible to estimate either the number or percentage of Wyoming residents who might be thus benefitted.

> We hope that readers now understand why findings like this are not as straightforward as often discussed, not because of any failings by the researchers but because of the inherent ambiguity that accompanies nonexperimental findings on complex human phenomena involving many potential causal pathways. It is premature to argue that long-term cognitive impairment has been clearly established, but just as premature to argue that the risks are nonexistent. (RAND, 2014)

Youth and Wyoming's Educational System

> Even the most ardent supporters of liberalized marijuana laws do not wish to see widespread recreational use of cannabis by young people. The two most important areas of concern for young people are an increased risk of dependence and interference with

[3] From the National Cancer Institute website: The U.S. Food and Drug Administration has not approved Cannabis as a treatment for cancer or any other medical condition. The potential benefits of medicinal cannabis for people living with cancer include antiemetic effects, appetite stimulation, pain relief, and improved sleep. Although few relevant surveys of practice patterns exist, it appears that physicians caring for cancer patients in the United States who recommend medicinal cannabis do so predominantly for symptom management.

success in school. Individuals who begin cannabis use during adolescence are approximately twice as likely to develop cannabis dependence, compared to those who begin use after the age of 25. Numerous studies point to the negative relationship between cannabis use and school performance. The causal nature of this relationship cannot be established scientifically, because there is evidence that those who begin using cannabis at earlier ages are already more likely to have both behavioral and academic problems in school.

A persistent inferential problem, even in strong observational studies, involves the classic difficulty of differentiating among three interpretations of any observed association:

- A can cause B (e.g., marijuana use can cause some health outcome).
- B can cause A (e.g., people with the health problem seek out more marijuana, e.g., to self- medicate)
- Some third variable C can cause both A and B (e.g., the children of neglectful parents are more likely both to start using cannabis at younger ages and to do badly in school), making the A–B correlation spurious.

So, almost certainly, some of the observed associations between marijuana use and poor outcomes are not causal. But it is much harder to judge whether that means that 90 percent of the association is causal, or only 10 percent, or even none at all. To raise these concerns is not to diminish the seriousness of the potential harms associated with marijuana. Readers will differ in their sense of where the burden of proof lies; should we err on the side of assuming that marijuana causes the associations until proven otherwise (a sort of precautionary principle)? Should we assume the opposite? Or should we split the difference and assume expected harms that have been discounted for uncertainty?

In the abstract, the situation is similar to that posed by correlational evidence linking tobacco and cancer. Health experts were willing to act on a causal interpretation (tobacco causes cancer) well before it could be established rigorously—a decision that seems wise and prudent when considered today. However, for marijuana, there is a plausible hypothesis that its use is a form of self-medication for people coping with other health and behavioral problems. (As we note below, researchers are beginning to test this hypothesis; so far, it does not appear to be a major part of the associations, but more research is needed.)

Scientists and activists alike vigorously debate the claim that marijuana use produces cognitive impairment, much like earlier arguments about an amotivational syndrome. Even if one is convinced about the acute effects, establishing that there are chronic, cumulative effects—possibly even irreversible effects—is much more challenging. Science is working hard to try to answer this question but cannot definitively answer it at this time. Even if any impairment is limited to the period of heaviest use (usually late

adolescence), however, there might be long-term consequences due to processes that are social or developmental rather than neurological. For example, even a few years of poor academic performance during high school can have cascading effects on college and career prospects. (RAND, 2014)

Any time young people are exposed to powerful psychoactive drugs, legal or not, over a long period of time, we should be concerned about the potential for effects on the brain's neurochemical development. Like being under the influence of alcohol, being under the influence of marijuana at school or work can impede development for some people by making it harder to learn and concentrate. And if intoxication leads users to skip school or work, or, in the case of school, not complete their homework, this could have a negative effect on future performance. Because THC is fat-soluble and can stay in the system long after a use episode, there is concern about the residual effects of marijuana on cognitive functioning. (RAND, 2014)

At the present time, our best evidence is that approximately 6% of 12-17 year olds in Wyoming report using marijuana within the past month, which is below the national average. Among college students at the University of Wyoming, the most recent data found 17% reported past-month usage. The question then becomes whether, and to what extent, use among these young people would increase after the implementation of legal medical marijuana in Wyoming. As with other impacts, the specifics of the law and how it would be implemented would play a large role in determining any such effects. There is some evidence from Colorado that usage rates there have increased more rapidly than the national average, and also a report indicating some underage users were obtaining marijuana that was diverted from the medical market.

An issue for all schools is that the federal Drug Free Schools And Communities Act requires a zero-tolerance policy for illicit drugs, including all forms of cannabis. Therefore, schools would need to develop clear policies prohibiting on-campus cannabis use by students or staff, even those otherwise allowed to use medical cannabis.

Criminal Activity

There is a long-established positive correlation between marijuana and crime (Dembo et al., 1987; Dawkins, 1997; Baker, 1998). People who commit criminal acts are more likely than those who do not to use marijuana (Taylor and Bennett, 1999; Makkai and Fitzgerald, 2000), and people who use more marijuana commit more criminal acts than those who use less marijuana (McRostie, Castle, and Marshall, 2001). Still, most experts believe that the correlation could be due to common risk-seeking or delinquency factors that generate a spurious association between marijuana use and crime. (RAND, 2014)

Numerous studies have examined the relationship between marijuana use and crime. But as discussed throughout this report, a "causal link" is extremely hard to establish. Was the crime

committed while the person was intoxicated on marijuana or was the offender identified and arrested days later? And to take it a step further, would the same person in the same situation, not intoxicated on marijuana have made a different decision? Longitudinal analyses of cohorts provide the clearest evidence (Arseneault et al., 2000; Markowitz, 2005), "but even when a statistically significant association remains in these studies, the studies have never been able to demonstrate that the people being studied were actually under the influence of marijuana at the time of the offense (suggesting that intoxication was a direct cause). Thus, they never completely eliminate the possibility that a third unobserved factor is causing the statistical association" (RAND 2014).

> For example, a paper by Green et al. (2010) identified a link between marijuana use and property crime by applying propensity-score matching to a longitudinal community cohort of blacks in Chicago. After matching, the two groups were similar in important observable characteristics (measured from the survey), including personality traits (such as aggression), family situation (such as mother's use of discipline), and elementary school adaption and achievement (such as teacher's rating of conduct problems). Using these matched groups, heavy marijuana use in adolescence was associated with crime generally, but, when the authors decomposed their findings by different types of crimes, they found that the association held for drug-related crime and property crime, not violent crime. (RAND 2014)

Speaking of the early crime report results in Denver and the discrepancies between sources, the RAND Vermont report states:

> They cite sources suggesting that total crime in Denver actually went up 7 percent in the first six months of 2014 from rates in 2013 (see, e.g., Thurstone, 2014). The story depends on what offenses are being considered, what data sources are used, and whether crime reports are being combined with arrest statistics. After commissioning a similar study of crime in Denver, the head of the National Association of Drug Court Professionals noted that "we are promoting the position that the question remains open, and at best we can say there is contradictory evidence when trying to draw conclusions about the effect marijuana legalization has had on crime" (as quoted in Thurstone, 2014). To make any sense of crime statistics in Colorado or Washington State, a more comprehensive multivariate analysis is needed, including crime trend data from non-legalization states. The implementation of legalization in Alaska, Oregon, and Washington, D.C., will provide additional evidence. Unfortunately, a convincing study will require a longer post-change period, so we might not know more for several years. (RAND, 2014)

Marijuana a substitution or complement for other substances?

> Suppose that legalization led to a doubling of marijuana consumption of all sorts, including not only a doubling of controlled recreational use but also a doubling of

compulsive abuse and dependence. One might well view this as a net bad because of all of the marijuana-related harms discussed above.

However, the total social cost associated with alcohol abuse is very much larger than all costs and outcomes related directly to marijuana use. So if the doubling of marijuana use came about because all these new marijuana users switched from drinking alcohol, that could be a net win from a public-health perspective, particularly if these people would otherwise have been binge drinking (Caulkins, Hawken, Kilmer, and Kleiman, 2012). Indeed, Caulkins, Hawken, Kilmer, and Kleiman (2012) found that even a 10-percent reduction in alcohol abuse accompanying the doubling in marijuana use could be a net win for society.

Doubling of marijuana use would not lead to even a halving of all drinkers, because there are nearly ten times more drinkers than people who use marijuana. According to the 2013 NSDUH, there were 136.9 million past-month alcohol users and only 19.8 million past-month marijuana users (unadjusted for underreporting). Indeed, there were three times more binge drinkers in 2013 (60.1 million) than there were marijuana users. So a doubling of marijuana users—even if all the new users had been binge drinkers and became teetotalers—would reduce the social cost of binge drinking by only about one-third.

If marijuana and alcohol proved to be complements, and legalization led to any sizable increase in alcohol use and abuse, then legalization would be a net loss. Even if all marijuana-related costs magically disappeared, that could not offset the harm caused by a 10-percent increase in alcohol-related problems.

Consider the one substance that could cause even greater social harms than alcohol—namely, tobacco. The overlap between marijuana and tobacco use is at least as strong as the overlap between marijuana and alcohol use. Past-month marijuana users are three times as likely as nonusers to smoke cigarettes (59 percent versus 19 percent), a ratio that rises to 6:1 for those under the age of 21 (53 percent to 9 percent). Ninety-five percent of marijuana users report using tobacco at some point in their lives. In Europe, mixing tobacco with marijuana or hashish in the same cigarette or joint has long been the norm (Leggett, 2006); it is not hard to imagine tobacco companies wanting to promote that practice in the United States after legalization.

Suppose that legalizing marijuana caused even a 1-percent increase in tobacco smoking. Because tobacco kills well over 400,000 people in the United States every year, then, in that hypothetical, legalizing marijuana might—in the long run—cause 4,000 additional pre-mature deaths per year, an outcome that could outweigh any plausible benefits of marijuana legalization.

> Legalization could also affect the use and abuse of other illegal drugs. Long ago, there was great concern that trying marijuana could be a gateway that caused users to go seek stronger and stronger highs. Those fears arose from the combination of conditional probabilities (children who use marijuana are much more likely to progress to harder drugs) and sequential order (marijuana usually predates use of harder drugs). But those facts together do not imply causality. Various observers (e.g., Morral, McCaffrey, and Paddock, 2002) have shown that the same patterns could emerge if third variables (e.g., broken homes, risk-seeking personalities) cause use of both marijuana and hard drugs, and marijuana gets used first simply because it becomes available to children first.
>
> But, showing that the data does not imply that a causal version of the gateway hypothesis holds, is not the same as showing that there is no causal effect. Third variables could account for some but not all of the correlation. Furthermore, the connection need not be purely bio-chemical. For example, use of marijuana could lead teens to spend more time with others who use marijuana… and those marijuana-using peers might have more-positive attitudes toward use of other drugs or know how to obtain those other drugs. Likewise, marijuana use might lead the individual to self-identify and to be identified by others (labeling) as being the sort of person who uses drugs of all kinds.
>
> So there could be a causal path from greater marijuana use to use of hard drugs that is social or psychological, even if there is no biochemical link. Hence, although confidence in the old-fashioned version of the gateway hypothesis went beyond the empirical evidence, confidence in the irrelevance of the gateway hypothesis might be equally naïve.
>
> It is also worth noting that the vast majority of initiation into the use of any of these drugs, including marijuana but also other illegal drugs, alcohol, and tobacco, occurs before the age of 21, so the legal status of most potential initiates would not change. What would change is the supply, variety, price, and availability of marijuana products.
>
> One goal of the either–or discussion in the preceding paragraphs is to shake readers from any strong prior convictions that they can just know that legalizing marijuana will increase or that it will decrease use or abuse of this or that other substance. It is easy to assemble deductive arguments in either direction, as advocates on both sides of the marijuana-legalization debate routinely do. (RAND, 2014)

RAND conducted a literature review that "captures the gist of this complicated literature in the simplest possible terms, distinguishing along just two dimensions: (1) size of the literature underpinning the estimates and (2) degree of consensus among those studies" (RAND, 2014). The results are presented in the table below.

Summary of Literature on the Extent to Which Marijuana Is a Substitute for or Complement with Other Drugs

Substance	Studies	Agreement Among Studies	Finding
Alcohol	Many	No consensus	Unknown
Tobacco	Many	High consensus	Complementarity
Prescription opioids	Few	Consensus	Substitution
Illegal drugs	Few	No consensus	Unknown

Models of Implementation, Monitoring & Taxing

RAND in *Options and Issues Regarding Marijuana Legalization* states that

> …marijuana policy should not be viewed as a binary choice between prohibition and the for for-profit commercial model we see in Colorado and Washington State; several intermediate supply options could be considered, particularly given the variety of different goals a jurisdiction might be hoping to accomplish by changing the policy. The supply option for a jurisdiction focused on revenue enhancement might be fundamentally different from that of a jurisdiction focused on eliminating the black market or individual harm reduction.

The Peggy A. Kelly Wyoming Cannabis Act of 2016, is quite specific in defining implementation, monitoring and taxation. The medical conditions for which doctors can recommend marijuana treatments are explicit and have extensive implications. Unlike the Peggy Kelly Act proposed in Wyoming, Vermont (similar in population and rural/urban split) has a circumscribed medical marijuana model although in 2013 they decriminalized one ounce of marijuana or less ($200 fine for first offence). Vermont's medical marijuana program is managed by the Department of Public Safety. Eligibility is contingent on having a debilitating medical condition.

> The original statute limited the number of registered patients to 1,000, but this changed with the passage of S. 247 in May 2014; as of this writing, there are now 1,600 patients on the registry (Wells, 2014). Vermont's first dispensary opened in June 2013, only four may exist at any one time, and each patient must register with one specific dispensary. Each registered patient or registered caregiver may cultivate indoors "up to two mature marijuana plants, seven immature plants, and [possess] two ounces of usable marijuana" (RAND, 2014)

When people use the term *legalize* without further elaboration, they might often have in mind what might be called the standard commercial model, leaving production, distribution, and sale to the competitive private market, subject both to the standard laws and regulations that apply to all economic activity and to some additional rules specific to that product. For marijuana, these additional rules mostly pertain to the following:

- who can use (e.g., anyone over 21)
- quality control (e.g., testing requirements)
- packaging (e.g., requiring certain labeling)
- industry structure (e.g., requiring or banning vertical integration between producers, distributors, and retailers)
- product selection (e.g., whether to allow the sale of concentrates and edibles, whether to restrict potency)
- retail operations (e.g., rules that keep a minimum distance between stores and sensitive locations, such as schools; require vendor training; ban special sales and volume discounts; limit amount either per transaction or per user per day or month) (RAND, 2014)

Some states allow adults to grow their own plants with limits on the number of mature and immature plants in development. For example, the Peggy Kelley Act would allow a person with a valid medical marijuana certification to "possess, grow, process, or transport no more than six (6) medical marijuana plants, with three or fewer being mature, flowering plants." Under the Kelley Act growers with valid medical marijuana cards would also be able to transfer up to three ounces to other cardholders without remuneration. A single mature marijuana plant can yield around one pound or more of dried marijuana with the primary constraint on size determined by wattage of the lights used to grow plants. Strictly grow-your-own and share models do not produce much revenue for government, and one has to consider the costs for government to monitor/regulate growers and then enforce those regulations. The Kelly Act includes dispensary distribution.

A government run supply chain has its benefits and risks. While diversion of marijuana products would be less likely if production and distribution were controlled by government, there is risk that the state and its employees could be in violation of federal law (Mikos, 2013 as cited in RAND, 2014). A hybrid supply model could have a public authority authorized by legislation for the express purpose of operating the supply chain: "Under a public-authority model, the state would not itself possess or distribute marijuana." Yet another alternative would have the state chartering non-profit organizations to operate in the public interest. Finally, a state could license a small number of closely monitored for-profit organizations to run the supply chain. (RAND, 2014)

The Colorado model does not limit the number of dispensary licensees. Neither does the Peggy Kelly Act limit the number of dispensaries, but unlike Colorado's law that permits counties or towns to prohibit establishment of dispensaries within their boundaries, every "locality" in Wyoming *would have to permit dispensaries*. From the Peggy Kelley Act: "All provisions of this chapter shall apply in equal force to all localities within the State of Wyoming, whereby medical marijuana establishments may be established in each locality within the State of Wyoming pursuant to this chapter and regulations set by Liquor Division." The Peggy Kelly Act would prohibit local control over whether communities do or do not want medical marijuana dispensaries.

Taxes and Other Sources of Income

Marijuana can be taxed through several methods including ad valorem tax (sales tax), tax on gross weight, tax per unit of THC. Each has advantages and disadvantages.

- An ad valorem tax—meaning one based on sales value, as with a typical sales tax—is simple to implement but will fall if market prices fall. If the policy goal is to keep the after-tax price at some target level, ad valorem taxation is not the way to go.
- A tax on the gross weight of marijuana produced or sold creates an incentive for producers to pack as much intoxicating power as possible into as little plant material as possible. This gives a market advantage to highly potent forms of marijuana. For those who believe that those forms are more dangerous than other forms, that count as a disadvantage of taxation on gross weight.
- Taxation per unit of THC has attractive features but depends on accurate and honest testing procedures.
- Policymakers also need to decide how to tax concentrates and edibles, as opposed to herbal marijuana; those product forms have been growing in market share in states with medical dispensaries or commercial sales. A combination of strategies is also possible, such as taxing THC or weight for some products at the production stage and taxing value at the retail stage. (RAND, 2014)

The Peggy Kelley Act states that dispensaries selling marijuana and marijuana-infused products "…shall be subject to any state commercial activities tax, including any applicable sales, use or excise tax as applied to businesses in general and all other local taxes, assessments, fees and charges as applied to businesses in general, but shall not be subject to any special taxes, assessments, fees and charges, other than the licensure fees set forth herein."

Additionally, the Kelley Act states: "This chapter vests the Wyoming Department of Revenue Liquor Division to regulate the state's medical marijuana industry in a manner similar to the state's regulation of alcohol."

The Wyoming Department of Revenue and Department of Agriculture were tasked with evaluating the requirements of the Peggy Kelley Act (also called the Wyoming Cannabis Act of

2016). They analyzed "marijuana testing requirements, labeling of products, product standards, auditing requirements, budgetary requirements, licensing and revenue generation" (GMIAC revenue subcommittee report). Additionally, the Departments explored the Liquor Division's requirements: regulation of the acquisition, growth, cultivation, extraction production, processing manufacture, testing distribution, retail sales, licensing and taxation of medical marijuana.

Key findings of the Revenue Report below are taken from the report unedited (other than bolded text):

- The department assumes that the staffing of the Marijuana Division will be similar to that of Colorado scaled to represent our relative population but recognizing the similar duties. The Division would be staffed with 18 employees divided between two sections, Accounting and Compliance.
- Start-up costs would include office space, furniture and computer equipment and vehicles for the field staff. Estimated cost to begin operations is $2,724,693. Ongoing budget for administration of the program are estimated at $1,737,800 annually.
- Revenue from the administration and sale of medical marijuana are projected to come from two sources; licensing fees for dispensaries, cultivation, marijuana infused products facilities and testing facilities and from sales taxes paid on the retail sale of medical marijuana.
- In the current projection the department is assuming that licensing fees will be similar to what is already charged for liquor licenses. Currently local governments impose a $1,500 annual fee for liquor licenses. We're assuming that there will be 23 dispensaries opening in the state and 23 cultivation facilities. Marijuana infused products facilities are estimated at 5 in the state and possibly 2 testing facilities. Total annual licensing revenue from the facilities is estimated at $79,500.
- Revenue from sales taxes will depend on the number of patients registered for medical use and the amount of product sold. The department reviewed the number of patients registered in Colorado and adjusted that figure based on Wyoming's population relative to Colorado. We assumed that there would be 10,000 patients registered in Wyoming for the purposes of estimating the product sold.
- Average price in Colorado for an ounce of marijuana was $160/ounce. This does vary by strain sold but is a reasonable average. The average dosage prescribed varies widely depending on the source of information but an ounce of product per month looked to be a reasonable estimate. We estimated that 120,000 ounces of product would be sold annually. The estimated revenue generated would be $529,920 in state general fund revenue from sale of medical marijuana. The local taxes distributed to the counties would be $504,960.
- **Based on the assumptions made, the revenue generated from licensing and sales will not be sufficient to pay for the administration of the program.**

- **Without further revenue support the program administration would be funded by other state revenue.**

Because the Kelley Act is written to limit revenue generation through taxation of medical marijuana sales, it appears that fees might be the only route to keep medical marijuana from becoming a drain on general fund revenues. RAND discusses fee strategies in states with various forms of legal marijuana: "In Vermont, applicants to run medical-marijuana businesses pay a $2,500 nonrefundable fee. Successful applicants then pay a "registration fee of $20,000 for the first year of operation, and an annual fee of $30,000 in subsequent years… Colorado collects a fee from marijuana businesses that depends on the number of their plants" (RAND, 2014).

Introduction

Coauthors of Academic Literature Review, pp 22-53: Steve Butler, Dr. Charles Ksir & Dr. Stephen Bieber

"We emphasize that the relevant policy question is not whether marijuana's current harms outweigh its benefits but whether and how legalization might change those harms and benefits and in which direction." (*Options and Issues Regarding Marijuana Legalization*, RAND Corporation, 2015)

The controversial discussion of state-level marijuana laws is intensifying in the United States. Of the 23 states with medical marijuana laws, 11 states legalized through statewide ballot initiatives and 12 states passed bills through their state legislatures. All the states allowing recreational marijuana were achieved through ballot initiatives (Colorado, Washington, Oregon, Alaska). Ballotpedia currently reports 60 ballot measures related to sales, taxes, use, growth and penalties imposed for possession of cannabis/hemp that could go before voters in 21 states in 2016 (if receiving enough signatures).[4] Wyoming is listed as one of the states with a potential ballot initiative for medical marijuana in 2016—the Peggy A. Kelley Wyoming Cannabis Act.

Although the Peggy A. Kelley Act petition circulators did not get the requisite number of signatures to place the initiative on the 2016 ballot, the statute permits collection of signatures until early February 2017. If enough registered voter signatures (~25,000) are collected by that date, the initiative could appear on the 2018 Wyoming statewide ballot.

HISTORY OF PROHIBITION AND LEGALIZATION

RAND Corporation in its research report *Considering Marijuana Legalization: Insights for Vermont and Other Jurisdictions,* provides a succinct history of marijuana in the United States:

> Marijuana prohibition was universal across the United States through the 1960s, and those convicted of growing, possessing, or selling marijuana could receive sentences of incarceration. Then, in the 1970s, 12 states removed or substantially reduced criminal

[4] The initiatives are mostly from states that already have some form of cannabis legalization. California alone has 18 ballot initiatives. Many are related to forming regulatory bodies, restructuring distribution and/or taxes, etc.

penalties for possession of small amounts of marijuana.[5] Many observers then believed that it was just a matter of time until the nation legalized the drug. Instead, the movement toward liberalization came to a sudden halt in 1978. One state (South Dakota) reversed its decriminalization, and no state initiated decriminalization in the subsequent 20 years. The end of the 1970s liberalization is often associated with the so-called parents' movement, itself a response to the rapid rise in frequent marijuana use among junior and senior high school pupils and the associated harms; in 1979, about one out of every ten high school seniors reported daily use of marijuana.

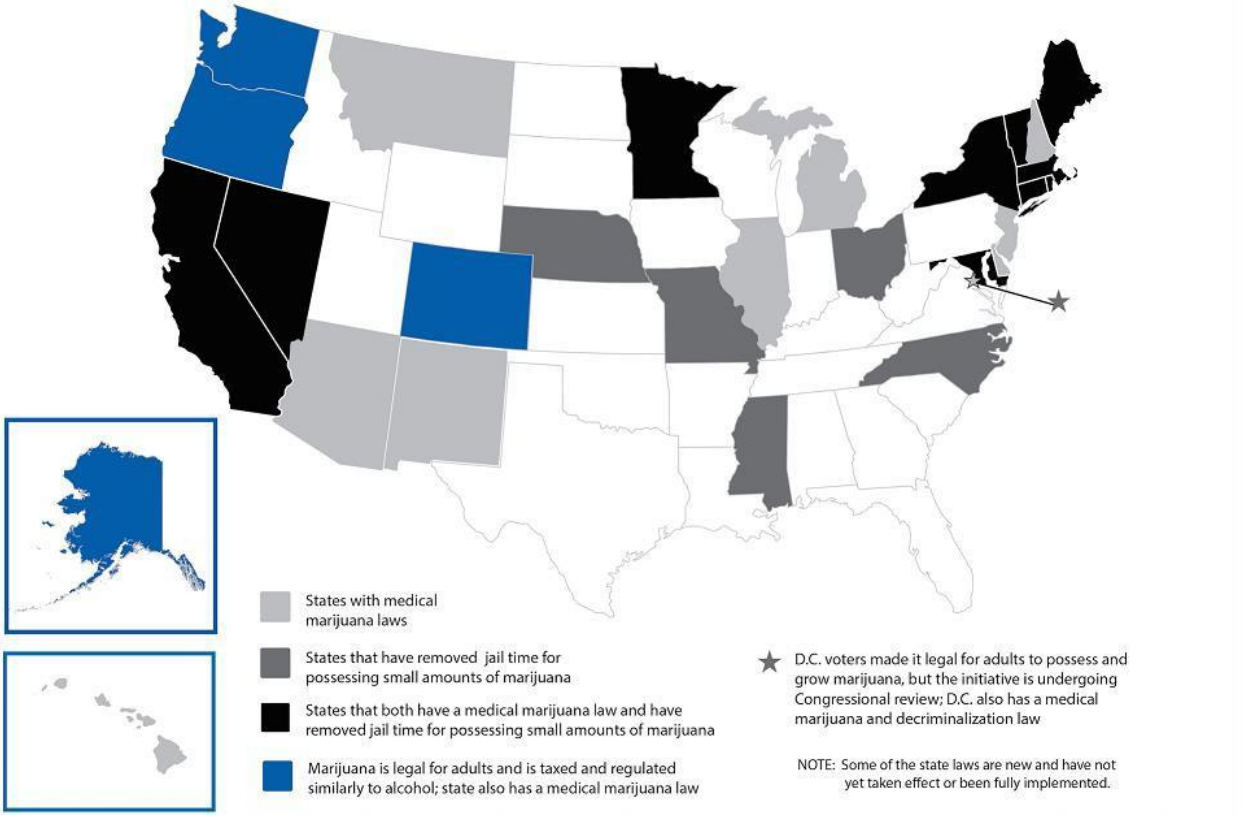
In recent years, a handful of states, including California in 2011 and Vermont in 2013, have fully decriminalized possession of small amounts of marijuana. Vermont and more than 20 other states now allow marijuana to be used for medicinal purposes, but there is tremendous variation in how that marijuana is supplied and the uses that are allowed. California and Colorado receive a lot of attention in medical-marijuana debates, but they represent one end of a broad spectrum. They allow brick-and-mortar medical-marijuana stores (called dispensaries) and have very expansive definitions of what conditions justify obtaining a medical recommendation (Pacula, Chriqui, et al., 2002; Pacula, Powell, et al., 2015). In some other states, including Vermont, the medical-marijuana system is more controlled, serving more as an adjunct to the health system than as a loophole for recreational users. Indeed, 11 (mostly southern) states in 2014 passed even more-restrictive medicinal laws, allowing only high-cannabidiol (CBD) and low–delta-9-tetrahydrocannabinol (THC) marijuana for medicinal purposes (Ingold, 2014c).

The near passage of a ballot initiative in California in 2010 that would have gone beyond legalization of medical marijuana to allow large-scale commercial production for recreational use helped trigger a new round of legal liberalization. That initiative attracted the support of 46.5 percent of the voters, even though it was a midterm election with low turnout among youthful voters, who tend to favor legalization. Encouraged by that result and by public opinion polls showing that a majority of the population nationally now favored legalizing marijuana use, in 2012, Colorado and Washington voters passed legalization initiatives, and Oregon nearly did so. In November 2014, voters in Alaska, Oregon, and Washington, D.C., also passed initiatives to legalize marijuana. We expect other states, including California, to consider legalization in coming years via propositions or legislation. In particular, 2016, a presidential election year, is likely to see more states voting on legalization (Hughes, 2014).

[5] The 12 states were Alaska, California, Colorado, Maine, Minnesota, Mississippi, Nebraska, New York, North Carolina, Ohio, Oregon, and South Dakota. There is a lot of debate about what decriminalization actually means (see Pacula, MacCoun, et al., 2005, and MacCoun, Pacula, et al., 2009). For example, California has generally been considered a decriminalization state, but possession of small amounts for personal use was not exclusively a noncriminal offense until January 2011.

Why the new momentum for legalization? Certainly public sentiment has changed. Gallup has asked the same question about marijuana legalization since 1969: "Do you think the use of marijuana should be legal or not?" Support rose from 12 percent in 1969 to 28 percent in 1978, decreased to 23 percent in 1985, and then steadily rose; by 2013, 58 percent answered positively. Other polls confirm that the increase in support has been particularly large after 2010 (Galston and Dionne, 2013); however, some 2014 polls show support below 50 percent (see McGraw, 2014). The Gallup figure fell back down sharply to 51 percent in 2014, but it is unclear whether this was all a true decline or whether the 58-percent figure in 2013 was somehow a fluke (Saad, 2014). (RAND, 2014)

FIGURE 1. STATE MARIJUANA LAWS AS OF FEBRUARY 2015



The ballot initiative effort in Wyoming was no doubt encouraged by a public opinion poll of registered voters in October of 2014. The Wyoming Survey & Analysis Center (WYSAC) conducted a statewide election survey for University of Wyoming's Political Science Department. Questions on attitudes toward marijuana were included. Seventy-two percent of Wyoming residents supported adult use of marijuana if prescribed by a physician while only 25% opposed. Although Wyoming residents do not support legalization of marijuana for personal use, a majority responded in favor of reduced penalties for those found in possession of marijuana. Nearly two-thirds of those surveyed, 62 percent, believe the penalty for marijuana possession should not include time in jail; 32 percent support jail sentences. The 2014 WYSAC

survey is the first scientifically sound statewide survey to ask Wyoming registered voters about opinions on marijuana laws (95% confidence interval, +/- 4%).

During the 2015 Wyoming legislative session a bill was introduced to decriminalize possession of small quantities, but was defeated. A narrowly structured bill to legalize hemp cannabinoid (CBD) passed. The statue defines CBD as hemp extracts that contain less than 0.3% of the psychoactive compound tetrahydrocannabinol (THC), and contain at least 5% CBD by weight. Wyoming residents who suffer from intractable epilepsy or seizure disorders can legally possess CBD. A neurologist must prescribe the CBD after determining that a patient did not respond other treatment options. Some sources consider this "medical marijuana" legislation, others do not.

The Peggy A. Kelly Wyoming Cannabis Act of 2016 is very prescriptive as to how the medical marijuana system in Wyoming would be implemented, monitored and taxed. The medical conditions and symptoms for which doctors can recommend marijuana treatments are explicit and have extensive implications. Below is a brief summary of key elements of the Act.

- The Kelly Act states that a Wyoming-licensed physician can issue a medical marijuana certification for a debilitating medical condition defined as "cancer, glaucoma, positive status for human immunodeficiency virus, or acquired immune deficiency syndrome, hepatitis C, amyotrophic lateral sclerosis, Crohn's disease, sickle cell anemia, ulcerative colitis, dementia, Alzheimer's disease, or treatment for such conditions, which produces, for a specific patient, one or more of the following, and which, in the professional opinion of the patient's physician, foreseeably may be alleviated by the use of medical marijuana: cachexia, post-traumatic stress disorder, severe pain, severe nausea, seizures, including those that are characteristic of epilepsy, or persistent muscle spasms, including those that are characteristic of multiple sclerosis."

- The Kelly Act permits distribution and retail sales of medical marijuana through privately held, state-regulated dispensaries. The Act states that dispensaries selling marijuana and marijuana-infused products "…shall be subject to any state commercial activities tax, including any applicable sales, use or excise tax as applied to businesses in general and all other local taxes, assessments, fees and charges as applied to businesses in general, but shall not be subject to any special taxes, assessments, fees and charges, other than the licensure fees set forth herein."

- The Kelley Act "…vests the Wyoming Department of Revenue Liquor Division to regulate the state's medical marijuana industry in a manner similar to the state's regulation of alcohol."

- The Kelly Act states "…medical marijuana establishments may be established in each locality within the State of Wyoming pursuant to this chapter and regulations set by Liquor Division."

- The Kelley Act allows a person with a valid medical marijuana certification to "possess, grow, process, or transport no more than six (6) medical marijuana plants, with three or fewer being mature, flowering plants." Under the act, growers with valid medical marijuana cards would also be able to transfer up to three ounces to other cardholders without remuneration. On average, a single mature marijuana plant can yield around one pound or more of dried marijuana.

Under federal law, marijuana is still illegal—possession, distribution and production. The U.S. Department of Justice (DOJ) in 2013 issued the "Cole Memo," which provides guidelines to federal prosecutors. It is important to remember that the legalization structures in Colorado or other states are not approved by DOJ. RAND's *Considering Marijuana Legalization* reminds that "Any administration could withdraw these guidelines at any time" (RAND, 2014).

<u>From the 2013 Cole Memo:</u>

The Department of Justice is committed to enforcement of the Controlled Substances Act… The Department is also committed to using its limited investigative and prosecutorial resources to address the most significant threats in the most, effective, consistent and rational way. In furtherance of those objectives, as several states enacted laws relating to the use of marijuana for medical purposes, the Department in recent years has focused its efforts on certain enforcement priorities that are particularly important to the federal government:

- Preventing the distribution of marijuana to minors.
- Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs, and cartels.
- Preventing the diversion of marijuana from states where it is legal under state law in some form to other states.
- Preventing state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity.
- Preventing violence and the use of firearms in the cultivation and distribution of marijuana.
- Preventing drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use.
- Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands.
- Preventing marijuana possession or use on federal property.

An additional memo from the U.S Department of Treasury Financial Crimes Enforcement Network (Cole, 2014), and another with a DOJ memo in December 2014, advise states on what

will be tolerated. Cole 2014 provides guidance on marijuana-related financial crimes based on the same eight priorities of Cole Memo 2013 in enforcing the Controlled Substances Act. "The provisions of the money laundering statutes, the unlicensed money remitter statute, and the Bank Secrecy Act remain in effect with respect to marijuana-related conduct. Financial transactions involving proceeds generated by marijuana-related conduct can form the basis for prosecution under the money laundering statutes, the unlicensed money transmitter statute, and the Bank Secrecy Act."

Medical Benefits and Consequences of Marijuana Use

Social and Medical Consequences

What does the current scientific literature tell us about the health and behavioral consequences associated with marijuana consumption? A great deal of research has been published on this topic, especially in recent years, and as a result we can identify some clear acute and chronic health effects, especially of frequent, high-dose marijuana use. Acute risks include traffic accidents and impaired cognitive functioning while intoxicated, as well as anxiety, dysphoria, and panic. These effects have been demonstrated using controlled laboratory experiments as well as more naturalistic observations.

The most concerning problem associated with longer-term use is dependence, with roughly 10% of users at risk of addiction. Also, there is substantial evidence that chronic heavy use increases the risk of chronic bronchitis. Research on people using different amounts of marijuana has a fundamental limitation; although marijuana use is *correlated* with many adverse outcomes, it is much harder to ascertain whether marijuana use *causes* those outcomes. For example, there is evidence that those adolescents who begin using marijuana are more likely to already have a history of both behavioral and academic problems in school, so it is unclear to what degree marijuana use contributes to the development or exacerbation of these problems.

Rates of marijuana use have been found to correlate with a wide variety of problems, such as psychotic symptoms, cardiovascular disease, male testicular cancers, lower IQ, cognitive difficulties, small differences in brain structure, lung cancer, and lower workplace productivity.

The current state of the scientific literature in each of these areas is insufficient to determine the extent to which marijuana use is causally linked to any of these outcomes. For example, although the literature showing a relationship between marijuana use and crime is extensive, there is little evidence that use itself increases criminal behavior, so one would not expect legalization to have important effects on nondrug crime.

Most of the research up to now has been based on use of smoked marijuana, containing largely unmeasured amounts of cannabinoids (unknown potency levels). Medical marijuana dispensaries in other states contain a wide variety of additional products, and so some of the prior research might not apply directly. For example, it appears that edible products have been responsible for many of the panic attacks leading to hospitalization. The long delay from ingestion to noticeable effects leads inexperienced users to consume additional doses; also,

because the oral route is much less efficient than inhalation, the total doses in edible products tend to be higher. Extracts such as oils or waxes designed to be heated and inhaled might reduce some of the bronchial issues associated with burning marijuana leaves. On the other hand, the plant products in these dispensaries are often highly potent, which might increase the likelihood of some of the health consequences. Efforts to estimate changes in health consequences due to legalization also depend upon a reasonable estimation of the changes in rates and patterns of marijuana use as a result of the changed legal status.

On the topic of emerging new state marijuana models, the encyclopedic RAND report produced for the state of Vermont titled *Considering Marijuana Legalization: Insights for Vermont and Other Jurisdictions* is used extensively throughout this report. Permission to quote their research liberally was graciously given by Dr. Beau Kilmer, coauthor of the report and co-director of the RAND Drug Policy Research Center.

> In addition, the effects of marijuana use in the past, under prohibition, might not accurately predict the effects of marijuana use in the future under some alternative legal regime. To date, researchers have based their findings largely on observational data that reflect use of a substance containing largely unmeasured amounts of cannabinoids. Furthermore, no one knows precisely how legalization will affect use—specifically, the extent to which heavy or harmful use will rise, which is directly relevant for understanding the public-health and safety consequences. Nor can one know how the product might change (e.g., potency, mode of use) or how these changes might influence the relationships between use and harms identified here. Thus, it is difficult to say whether the associations identified in the past accurately assess those that will exist in the future.
>
> Can we just look to Colorado and Washington to determine whether legalization is a good idea? Unfortunately, it is too early to know how the new regulatory regimes in Colorado and Washington will fare in the short and long runs. Industry structure and behavior will take years, if not decades, to mature, and consumer responses will develop over similar periods. Furthermore, given data lags, it will take some additional time before high-quality evaluations are available. The fact that both Colorado and Washington had fairly open marijuana availability under the medical marijuana rubric also complicates any sort of outcome measurement. This does not mean that there is nothing to learn from these experiences, but the bulk of the early insights are about regulations and implementation instead of outcomes. (Rand, 2015)

Efforts to estimate changes in health consequences due to legalization also depend upon a reasonable estimation of the changes in rates and patterns of marijuana use as a result of the changed legal status. This is also a complex issue, as a comparison in usage changes over time in Wyoming and Colorado will show. According to the (inexact) estimates from the National Survey on Drug use and Health, in 2002-03 6.2% of those aged 12 and over reported using marijuana within the 30 days prior to the survey. This national figure compares to 5.5% in

Wyoming (below the U.S. average) and 8.5% in Colorado (above the U.S. average, even before medical marijuana was introduced). By 2013-14, the U.S. figure had risen 29%, to 8%. Colorado, which had introduced medical (using a very liberal model) and was beginning to sell recreational marijuana, rose by 75% over that same period (to 14.9%), while Wyoming's rate had increased only by 16%, to 6.3%. These estimates indicate the complexity of trying to determine the effects of any law change in Wyoming. If Wyoming had adopted the same law changes as Colorado at the same times, would we also have experienced a larger-than average increase in usage? Or, are there simply fewer people in Wyoming interested in using marijuana?

The potential health benefits that might be derived by individuals under a medical marijuana scheme are also quite difficult to estimate with accuracy. Traditional smoked marijuana is not an FDA-approved medication and it is unlikely that it ever could achieve that status, for at least four reasons. First is continuing opposition from those seeking to continue federal prohibition of marijuana. Second, medicines based on plants themselves ("botanicals") were historically important but began to go out of favor around 100 years ago as they were replaced by pure chemicals extracted from those plants (e.g. morphine from opium, digitalis from foxglove). Marijuana plants contain a variety of cannabinoid chemicals in varying concentrations, making it difficult to understand effects from one sample to the next. The FDA would be unlikely to favor such a variable product. Third, the long-term safety of any plant product designed to be burned and smoked would be a serious impediment given our history with tobacco. Fourth, virtually all new FDA drug approvals are based on a company's willingness to invest about 10 years and perhaps billions of dollars conducting the required research to demonstrate safety and effectiveness, in exchange for an exclusive 20-year patent through which the company earns back its investment[6].

Since the first use of marijuana as a medicine was over 4000 years ago, it would be difficult to obtain a patent on any given strain or variety of a cannabis plant, and therefore nearly impossible to recover the necessary investment. Thus, in those states that have legalized medical use of marijuana, its status is more akin to that of "herbal supplements" (e.g. ginko biloba or St. John's wort). These products are not treated as drugs by the FDA, there is no requirement that they be demonstrated to be effective, and they vary widely in chemical composition. Physicians in those states may recommend that their patients try marijuana or derived products, but they do not prescribe it.

[6] The final cost of bringing one product to the market depends on a number of variables, including the amount of time needed to obtain promising treatments, the number of subjects enrolled in each phase of the clinical trials, the complexity of the product delivery, the disease being treated, time needed for data assessment, and other considerations. However, various sources indicate that it can cost more than $1 billion to bring one product to the market, including approximately $50-840 million to bring treatments through the stages of Basic Research/Drug Development and Pre-Clinical/Translational Research, and approximately $50-970 million to complete the Clinical Trials (Phases 1, 2, and 3). (BrightFocus Foundation).

Nevertheless, there is considerable evidence supporting the idea that various constituents of marijuana could be useful in treating a wide variety of disorders. Dronabinol (Marinol), made from THC synthesized in a laboratory, has been available throughout the U.S. as a prescription medication since 1985. Its approved uses are to reduce nausea and to stimulate appetite. Nabilone, a slightly different synthetic cannabinoid, was also approved for these uses in 1985 but not marketed in the U.S. until 2006. In addition, pharmaceutical companies in the U.S. and other countries have been in the process of testing various marijuana extracts as well as other newly-synthesized drugs designed to act at one of the known types of cannabinoid receptors. Cannabidiol oil, a non-psychoactive extract from marijuana, has been suggested to treat intractable seizure disorders in children, and Wyoming has recently legalized its use. Epidiolex, a highly purified CBD extract, is currently in clinical trials with seizure patients, but has not received approval for sale in any country. Sativex, a cannabis extract containing both THC and CBD, has been approved in 15 countries (not the U.S.) to treat muscle spasms in multiple sclerosis. It has also been in trials for treating pain in cancer patients, but apparently with less success.

Both anecdotal and limited clinical research indicate the possibility that cannabinoids might provide some relief from other disorders, such as migraines, irritable bowel syndrome, fibromyalgia. However, none of these potential uses has been sufficiently demonstrated to be considered a valid claim at this time.

Some advocates claim there is evidence that cannabis products can "cure cancer." Several studies have grown isolated cultures of human cancer cells in petri dishes and have demonstrated that when cannabinoids are added directly to the tissue culture the growth of the cells is slowed (not stopped). However, it is not clear that when cannabis products are consumed the cannabinoids would reach the target tissue at a sufficient concentration to slow tumor growth. We did not find any published research in which cannabinoids consumed by actual patients resulted in slowing or halting tumor growth.[7]

In summary, there is little doubt that if medical marijuana were available in Wyoming some individuals would experience a degree of symptom relief after using it. Some of these experiences would be due to a placebo effect, and some would perhaps be a true therapeutic effect. It is impossible with our current state of knowledge to assess whether or not their overall long-term well-being would be enhanced, and it is impossible to estimate either the number or percentage of Wyoming citizens who might be thus benefitted.

[7] From the National Cancer Institute website: The U.S. Food and Drug Administration has not approved Cannabis as a treatment for cancer or any other medical condition. The potential benefits of medicinal *Cannabis* for people living with cancer include antiemetic effects, appetite stimulation, pain relief, and improved sleep. Although few relevant surveys of practice patterns exist, it appears that physicians caring for cancer patients in the United States who recommend medicinal *Cannabis* do so predominantly for symptom management.

We hope that readers now understand why findings like this are not as straightforward as often discussed, not because of any failings by the researchers but because of the inherent ambiguity that accompanies nonexperimental findings on complex human phenomena involving many potential causal pathways. It is premature to argue that long-term cognitive impairment has been clearly established, but just as premature to argue that the risks are nonexistent. (RAND, 2014)

Youth and Wyoming's Educational System

Even the most ardent supporters of liberalized marijuana laws do not wish to see widespread recreational use of cannabis by young people. The two most important areas of concern for young people are an increased risk of dependence and interference with success in school. Individuals who begin cannabis use during adolescence are approximately twice as likely to develop cannabis dependence, compared to those who begin use after the age of 25. Numerous studies point to the negative relationship between cannabis use and school performance. The causal nature of this relationship cannot be established scientifically, because there is evidence that those who begin using cannabis at earlier ages are already more likely to have both behavioral and academic problems in school.

A persistent inferential problem, even in strong observational studies, involves the classic difficulty of differentiating among three interpretations of any observed association:

- A can cause B (e.g., marijuana use can cause some health outcome).
- B can cause A (e.g., people with the health problem seek out more marijuana, e.g., to self- medicate)
- Some third variable C can cause both A and B (e.g., the children of neglectful parents are more likely both to start using cannabis at younger ages and to do badly in school), making the A–B correlation spurious.

The "B can cause A" account is plausible given that people seek out marijuana as medicine fora variety of conditions, but it is usually at least partially testable by examining whether the condition preceded the marijuana use. The "C can cause A and B" third-variable possibility is much more difficult to rule out. For example, marijuana use is strongly associated with dropping out of high school, but low attachment to conventional norms and roles might cause both marijuana use and dropping out. Multivariate studies can control for situational and personal characteristics that are measured, but it is not possible to rule the effect of unobserved factors in the absence of random assignment. There is very strong evidence for a shared risk propensity for substance use, delinquency, school problems, accidents, and mental health problems (see Elliott, Huizinga, and Menard, 1989; Kessler et al., 2005). So almost certainly some of the observed associations between marijuana use and poor outcomes are not causal. But it is much harder to judge whether that means that 90 percent of the association is causal, or only 10 percent, or even none at all.

To raise these concerns is not to diminish the seriousness of the potential harms associated with marijuana. Readers will differ in their sense of where the burden of proof lies; should we err on the side of assuming that marijuana causes the associations until proven otherwise (a sort of precautionary principle)? Should we assume the opposite? Or should we split the difference and assume expected harms that have been discounted for uncertainty?

In the abstract, the situation is similar to that posed by correlational evidence linking tobacco and cancer. Health experts were willing to act on a causal interpretation (tobacco causes cancer) well before it could be established rigorously—a decision that seems wise and prudent when considered today. But the analogy to the current marijuana debate is problematic. In the case of tobacco, there were not compelling reasons to believe that cancer (or some genetic propensity to cancer) somehow caused people to smoke tobacco.

However, for marijuana, there is a plausible hypothesis that its use is a form of self-medication for people coping with other health and behavioral problems. (As we note below, researchers are beginning to test this hypothesis; so far, it does not appear to be a major part of the associations, but more research is needed.) More important is the fact that the tobacco industry's accounts of how smoking and cancer might both be attributable to various third variables were not scientifically persuasive (see Michaels and Monforton, 2005). In contrast, there are very strong reasons to believe that marijuana use and various health and behavioral problems might share common causal antecedents—personality traits, emotional problems, poor coping and self-control mechanisms, bad peer influences, and disordered families and neighborhoods.

But observing that the evidence is not as strong as it was for tobacco is not, in some sense, terribly reassuring; tobacco use was killing hundreds of thousands of people per year. Harms can reach a threshold for alarm far before reaching that level.

Scientists and activists alike vigorously debate the claim that marijuana use produces cognitive impairment, much like earlier arguments about an amotivational syndrome. Even if one is convinced about the acute effects, establishing that there are chronic, cumulative effects—possibly even irreversible effects—is much more challenging. Science is working hard to try to answer this question but cannot definitively answer it at this time. Even if any impairment is limited to the period of heaviest use (usually late adolescence), however, there might be long-term consequences due to processes that are social or developmental rather than neurological. For example, even a few years of poor academic performance during high school can have cascading effects on college and career prospects. (RAND, 2014)

And there is ample evidence for memory impairment while people are under the influence of cannabis, so it is to be expected that continued use might interfere with learning throughout a student's educational career. Finally, concern has been expressed by many

about the impact on the developing brain. Many studies have reported small differences in some aspect of brain structure or function between cannabis users and nonusers, but a scientific consensus has not developed pointing to any specific region or chemical system that consistently is altered outside the normal range of variation. However, any time young people are exposed to powerful psychoactive drugs, legal or not, over a long period of time, we should be concerned about the potential for effects on the brain's neurochemical development.

> Like being under the influence of alcohol, being under the influence of marijuana at school or work can impede development for some people by making it harder to learn and concentrate. And if intoxication leads users to skip school or work, or, in the case of school, not complete their homework, this could have a negative effect on future performance. Because THC is fat- soluble and can stay in the system long after a use episode, there is concern about the residual effects of marijuana on cognitive functioning.
>
> The challenge for researchers is trying to figure out whether regular or heavy marijuana use has any lasting effects on education or employment outcomes, or what economists often refer to as human capital development. There are strong correlations between frequency of marijuana use and many education and employment outcomes, but here we run into the same selection issues that we have mentioned throughout this chapter. (RAND, 2014)

At the present time, our best evidence is that approximately 6% of 12-17 year olds in Wyoming report using marijuana within the past month, which is below the national average. Among college students at the University of Wyoming, the most recent data found 17% reported past-month usage. The question then becomes whether, and to what extent, use among these young people would increase after the implementation of legal medical marijuana in Wyoming. As with other impacts, the specifics of the law and how it would be implemented would play a large role in determining any such effects. There is some evidence from Colorado that usage rates there have increased more rapidly than the national average, and also a report indicating some underage users were obtaining marijuana that was diverted from the medical market.

An issue for all schools is that the federal Drug Free Schools and Communities Act requires a zero-tolerance policy for illicit drugs, including all forms of cannabis. Therefore, schools would need to develop clear policies prohibiting on-campus cannabis use by students or staff, even those otherwise allowed to use medical cannabis.

> It is unclear whether recent changes in Vermont's marijuana laws have affected the efficacy of interventions intended to prevent or reduce marijuana use. During our discussions with prevention officials in Vermont in the fall of 2014, some expressed concerns that youth conflated marijuana decriminalization with legalization and assumed that marijuana must be safe if it is legal. It was also noted that some children perceive marijuana as safe because it could be used as a medicine. Disentangling perceived harm

> and policy changes to predict variation in consumption is a tough empirical task, but these comments highlight the possibility that prevention messaging and programming might have to change…(RAND, 2014)

The Education Subcommittee pointed out the possibility that increased youth use would lead to increased numbers of students sent to the Wyoming Boys and Girls Schools. However, this would depend a great deal on responses by law enforcement and the juvenile justice system concerning juvenile cannabis infractions.

Criminal Activity

> There is a long-established positive correlation between marijuana and crime (Dembo et al., 1987; Dawkins, 1997; Baker, 1998). People who commit criminal acts are more likely than those who do not to use marijuana (Taylor and Bennett, 1999; Makkai and Fitzgerald, 2000), and people who use more marijuana commit more criminal acts than those who use less marijuana (McRostie, Castle, and Marshall, 2001). Still, most experts believe that the correlation could be due to common risk-seeking or delinquency factors that generate a spurious association between marijuana use and crime (RAND, 2014).

Numerous studies have examined the relationship between marijuana use and crime. But as discussed throughout this report, a "causal link" is extremely hard to establish. Was the crime committed while the person was intoxicated on marijuana or was offender identified and arrested days later? And to take it a step further, would the same person in the same situation, not intoxicated on marijuana have made a different decision? Longitudinal analyses of cohorts provide the clearest evidence (Arseneault et al., 2000; Markowitz, 2005), "but even when a statistically significant association remains in these studies, the studies have never been able to demonstrate that the people being studied were actually under the influence of marijuana at the time of the offense (suggesting that intoxication was a direct cause). Thus, they never completely eliminate the possibility that a third unobserved factor is causing the statistical association" (RAND, 2014).

> For example, a paper by Green et al. (2010) identified a link between marijuana use and property crime by applying propensity-score matching to a longitudinal community cohort of blacks in Chicago. Heavy adolescent marijuana users (defined as those who had used 20 or more times in their lifetimes) were matched with non-heavy marijuana users based on variables that would confound the relationship between drugs and crime. After matching, the two groups were similar in important observable characteristics (measured from the survey), including personality traits (such as aggression), family situation (such as mother's use of discipline), and elementary school adaption and achievement (such as teacher's rating of conduct problems). Using these matched groups, heavy marijuana use in adolescence was associated with crime generally, but, when the authors decomposed their findings by different types of crimes, they found that the association held for drug-related crime and property crime, not violent crime… (RAND 2014)

> The crime rate in Colorado has been a topic of discussion post-legalization, with advocates on all sides of the debate arguing that the evidence does not support their opponents' positions. For example, comparing Denver crime data from the first six months of 2013 and those from the first six months of 2014, *The Huffington Post* noted that rates of property crime, as well as homicide, sexual assault, and robbery, were all down; only aggravated assault was up (by 2.2 percent). The author noted, "Correlation does not

> imply causation, regardless of which way the crime data move, and after just six months, it may be too early to identify any strong social trends. But evidence of a crime wave simply has not materialized—despite numerous dire warnings prior to legalization" (Ferner, 2014).
>
> Similarly, a *Washington Pos*t argued, "So perhaps we should hold off on the panicky stories about pot-fueled crime waves for a bit—especially since the early data show that crime has actually dropped" (Balko, 2014).
>
> On the other side, opponents of legalization argued that evidence of a crime drop in Colorado comes from those who wanted to "cook up numbers they wished to see" (Sabet, 2014). They cite sources suggesting that total crime in Denver actually went up 7 percent in the first six months of 2014 from rates in 2013 (see, e.g., Thurstone, 2014). The story depends on what offenses are being considered, what data sources are used, and whether crime reports are being combined with arrest statistics. After commissioning a similar study of crime in Denver, the head of the National Association of Drug Court Professionals noted that "we are promoting the position that the question remains open, and at best we can say there is contradictory evidence when trying to draw conclusions about the effect marijuana legalization has had on crime" (as quoted in Thurstone, 2014).
>
> To make any sense of crime statistics in Colorado or Washington State, a more comprehensive multivariate analysis is needed, including crime trend data from non-legalization states. The implementation of legalization in Alaska, Oregon, and Washington, D.C., will pro- vide additional evidence. Unfortunately, a convincing study will require a longer post-change period, so we might not know more for several years. (RAND, 2014)

An important element of the discussion around both illegal and legal marijuana is whether it could be a substitution for other legal or illegal substances or whether it could have a complementary relationship with substances. Marijuana is most often discussed in terms of co-use with alcohol. RAND poses an interesting "what if?"

> Suppose that legalization led to a doubling of marijuana consumption of all sorts, including not only a doubling of controlled recreational use but also a doubling of compulsive abuse and dependence. One might well view this as a net bad because of all of the marijuana-related harms discussed above.
>
> However, the total social cost associated with alcohol abuse is very much larger than all costs and outcomes related directly to marijuana use. So if the doubling of marijuana use came about because all these new marijuana users switched from drinking alcohol, that could be a net win from a public-health perspective, particularly if these people would otherwise have been binge drinking (Caulkins, Hawken, Kilmer, and Kleiman, 2012). Indeed, Caulkins, Hawken, Kilmer, and Kleiman (2012) found that even a 10-percent

reduction in alcohol abuse accompanying the doubling in marijuana use could be a net win for society.

Doubling of marijuana use would not lead to even a halving of all drinkers, because there are nearly ten times more drinkers than people who use marijuana. According to the 2013 NSDUH, there were 136.9 million past-month alcohol users and only 19.8 million past-month marijuana users (unadjusted for underreporting). Indeed, there were three times more binge drinkers in 2013 (60.1 million) than there were marijuana users. So a doubling of marijuana users—even if all the new users had been binge drinkers and became teetotalers—would reduce the social cost of binge drinking by only about one-third.

Alas, that story of increased marijuana use being a *substitute* for alcohol use is not the only possibility. It is also possible for two consumer goods to be *complements*, such that, when market conditions change in ways that promote greater use (and abuse) of one, that might lead to greater—not lesser—use (and abuse) of the other.

If marijuana and alcohol proved to be complements, and legalization led to any sizable increase in alcohol use and abuse, then legalization would be a net loss. Even if all marijuana-related costs magically disappeared, that could not offset the harm caused by a 10-percent increase in alcohol-related problems.

Nor is alcohol the only substance with which there could be important interactions. Consider the one substance that could cause even greater social harms than alcohol—namely, tobacco. The overlap between marijuana and tobacco use is at least as strong as the overlap between marijuana and alcohol use. Past-month marijuana users are three times as likely as nonusers to smoke cigarettes (59 percent versus 19 percent), a ratio that rises to 6:1 for those under the age of 21 (53 percent to 9 percent). Ninety-five percent of marijuana users report using tobacco at some point in their lives. And again, concurrent use is common. More than half of marijuana users under the age of 35 report smoking a blunt (a hollowed-out cigar filled with marijuana) within the past 30 days (more than three-quarters among blacks). In Europe, mixing tobacco with marijuana or hashish in the same cigarette or joint has long been the norm (Leggett, 2006); it is not hard to imagine tobacco companies wanting to promote that practice in the United States after legalization.

Suppose that legalizing marijuana caused even a 1-percent increase in tobacco smoking. Because tobacco kills well over 400,000 people in the United States every year, then, in that hypothetical, legalizing marijuana might—in the long run—cause 4,000 additional pre- mature deaths per year, an outcome that could outweigh any plausible benefits of marijuana legalization.

Legalization could also affect the use and abuse of other illegal drugs. Long ago, there was great concern that trying marijuana could be a gateway that caused users to go seek

stronger and stronger highs. Those fears arose from the combination of conditional probabilities (children who use marijuana are much more likely to progress to harder drugs) and sequential order (marijuana usually predates use of harder drugs). But those facts together do not imply causality. Various observers (e.g., Morral, McCaffrey, and Paddock, 2002) have shown that the same patterns could emerge if third variables (e.g., broken homes, risk-seeking personalities) cause use of both marijuana and hard drugs, and marijuana gets used first simply because becomes available to children first.

But showing that the data do not imply that a causal version of the gateway hypothesis holds is not the same as showing that there is no causal effect. Third variables could account for some but not all of the correlation. Furthermore, the connection need not be purely bio-chemical. For example, use of marijuana could lead teens to spend more time with others who use marijuana (birds of feather flock together or, more formally, homophily), and those marijuana-using peers might have more-positive attitudes toward use of other drugs or know how to obtain those other drugs. Likewise, marijuana use might lead the individual to self-identify and to be identified by others (labeling) as being the sort of person who uses drugs of all kinds.

So there could be a causal path from greater marijuana use to use of hard drugs that is social or psychological, even if there is no biochemical link. Hence, although confidence in the old-fashioned version of the gateway hypothesis went beyond the empirical evidence, confidence in the irrelevance of the gateway hypothesis might be equally naïve. It is also worth noting that the vast majority of initiation into the use of any of these drugs, including marijuana but also other illegal drugs, alcohol, and tobacco, occurs before the age of 21, so the legal status of most potential initiates would not change. What would change is the supply, variety, price, and availability of marijuana products.

One goal of the either–or discussion in the preceding paragraphs is to shake readers from any strong prior convictions that they can just know that legalizing marijuana will increase or that it will decrease use or abuse of this or that other substance. It is easy to assemble deductive arguments in either direction, as advocates on both sides of the marijuana-legalization debate routinely do.

RAND conducted a literature review that "captures the gist of this complicated literature in the simplest possible terms, distinguishing along just two dimensions: (1) size of the literature underpinning the estimates and (2) degree of consensus among those studies" (RAND, 2014). The results are presented in the table below. (RAND, 2014)

Summary of Literature on the Extent to Which Marijuana Is a Substitute for or Complement with Other Drugs

Substance	Studies	Agreement Among Studies	Finding
Alcohol	Many	No consensus	Unknown
Tobacco	Many	High consensus	Complementarity
Prescription opioids	Few	Consensus	Substitution
Illegal drugs	Few	No consensus	Unknown

Models of Implementation, Monitoring & Taxing

RAND in *Options and Issues Regarding Marijuana Legalization* states that

> …marijuana policy should not be viewed as a binary choice between prohibition and the for for-profit commercial model we see in Colorado and Washington State; several intermediate supply options could be considered, particularly given the variety of different goals a jurisdiction might be hoping to accomplish by changing the policy. The supply option for a jurisdiction focused on revenue enhancement might be fundamentally different from that of a jurisdiction focused on eliminating the black market or individual harm reduction.

Like Wyoming, Vermont is predominately a rural state with a population of 625,741, and also like Wyoming, has relatively little racial diversity (Table 1).

Table 1. Vermont Population by Race, 2014 - 2015

Race	Population	% of Total
Total Population	625,741	100
White	596,292	95
Two or More Races	10,753	1
Hispanic or Latino	9,208	1
Asian	7,947	1
Black or African American	6,277	1
American Indian	2,207	Below 1%
Some Other Race	2,105	Below 1%
Three or more races	610	Below 1%
Native Hawaiian Pacific Islander	160	Below 1%

The Peggy A. Kelly Wyoming Cannabis Act is very detailed and prescriptive as to how the medical marijuana system in Wyoming would be implemented, monitored and taxed. The medical conditions for which doctors can recommend marijuana treatments are explicit and have extensive implications. Unlike the Peggy Kelley Act proposed in Wyoming, Vermont has a circumscribed medical marijuana model although in 2013 they decriminalized one ounce of marijuana or less ($200 fine for first offence). Vermont's medical marijuana program is managed by the Department of Public Safety. Eligibility is contingent on having a debilitating medical condition.

> The original statute limited the number of registered patients to 1,000, but this changed with the passage of S. 247 in May 2014; as of this writing, there are now 1,600 patients on the registry (Wells, 2014). Vermont's first dispensary opened in June 2013, only four may exist at any one time, and each patient must register with one specific dispensary. Each registered patient or registered caregiver may cultivate indoors "up to two mature marijuana plants, seven immature plants, and [possess] two ounces of usable marijuana" (RAND, 2014)

Looking at models across the country RAND has classified marijuana "supply architectures" into 12 approaches within three groups:

- the two options most commonly discussed in the United States
  - Retain prohibition but decrease sanctions.
  - Implement an alcohol-style commercial model
- eight options that find a middle ground between those commonly discussed
  - Allow adults to grow their own.
  - Allow distribution only within small co-ops or buyers' clubs.
  - Permit locally controlled retail sales (the Dutch coffee-shop model).
  - Have the government operate the supply chain (government monopoly).
  - Have a public authority operate the supply chain.
  - Permit only nonprofit organizations to sell.
  - Permit only for-benefit companies to sell.
  - Have very few closely monitored for-profit licensees.
- two extreme options
  - Increase sanctions.
  - Repeal the state's prohibition without creating any new, product-specific regulations.

Described below is a model much like that which Colorado adopted where commercial distribution of recreational marijuana is regulated like alcohol.

When people use the term *legalize* without further elaboration, they might often have in mind what might be called the standard commercial model, leaving production, distribution, and sale to the competitive private market, subject both to the standard laws and regulations that apply to all economic activity and to some additional rules specific to that product. For marijuana, these additional rules mostly pertain to the following:

- who can use (e.g., anyone over 21)
- quality control (e.g., testing requirements)
- packaging (e.g., requiring certain labeling)
- industry structure (e.g., requiring or banning vertical integration between producers, distributors, and retailers)
- product selection (e.g., whether to allow the sale of concentrates and edibles, whether to restrict potency)
- retail operations (e.g., rules that keep a minimum distance between stores and sensitive locations, such as schools; require vendor training; ban special sales and volume discounts; limit amount either per transaction or per user per day or month) (RAND, 2014)

Of great interest is how this commercial model will drive product development? Most sources agree that marijuana potency will increase (as it already has over the past few years while market prices for pot have declined) to super-potency products. Concentrates for vaping (like electronic cigarettes) and edibles are growing in type and variety. A Denver medical and recreational dispensary makes and sells a Chapstick-type product with THC. One would assume that governments at some point will regulate marijuana potency. RAND notes that "the biggest wild card of all is the potential development of new products based on systematic extraction and blending of the hundreds of possibly psychoactive chemicals in the cannabis plant, of which today only two (THC and CBD) have reasonably well-characterized activity (RAND, 2014)."

The marijuana plant contains dozens of cannabinoids and another 300 possibly active chemicals, many with unknown effects and interactions. To date, two cannabinoids have received the greatest attention: delta-9 THC (commonly known as THC) and CBD. THC is the main psychoactive compound in marijuana that causes people to feel high, while CBD is a naturally occurring counterbalance to that compound that, when present in sufficient amounts, can reduce the sensation of feeling high and reduce anxiety, which THC sometimes promotes. Cannabinoid receptors are found throughout the body, and both THC and CBD have other properties that make them potentially medically useful (Hermann and Schneider, 2012 taken from Rand, 2014).

The middle-ground supply architecture options are shown in Figure 2.

Figure 2. Middle-ground Supply Architecture Options

Some states allow adults to grow their own plants with limits on the number of mature and immature plants in development. For example, the Peggy Kelley Act would allow a person with a valid medical marijuana certification to "possess, grow, process, or transport no more than six (6) medical marijuana plants, with three or fewer being mature, flowering plants." Under the Kelley Act growers with valid medical marijuana cards would also be able to transfer up to three ounces to other cardholders without remuneration. A single mature marijuana plant can yield around one pound or more or dried marijuana with the primary constraint on size determined by wattage of the lights used to grow plants. Strictly grow-your-own and share models do not produce much revenue for government, and one has to consider the costs for government to monitor/regulate growers and then enforce those regulations. The Kelly Act includes dispensary distribution.

> There is considerable experience with allowing users to grow their own marijuana, and overall the effects of doing so seem not to be very dramatic. MacCoun (2013a) reviewed the scarce and conflicting evidence concerning Alaska's home-growing policy changes and concluded that there was no compelling evidence that they affected use appreciably. Alaska has one of the nation's highest rates of marijuana use, but it is not clear that permission for home growing increased that rate. Washington, D.C., Initiative 71, allows multiple adults within a single residence to each have a set of plants. (RAND, 2014).

A government run supply chain has its benefits and risks. While diversion of marijuana products would be less likely if production and distribution were controlled by government, there is risk that the state and its employees could be in violation of federal law (Mikos, 2013). A hybrid supply model could have a public authority authorized by legislation for the express purpose of operating the supply chain. "Under a public-authority model, the state would not itself possess or distribute marijuana" (RAND, 2014). Yet another alternative would have the state chartering non-profit organizations to operate in the public interest. Finally, a state could license a small number of closely monitored for-profit organizations to run the supply chain.

The Colorado model does not limit the number of licenses. Neither does the Peggy Kelly Act limit the number of dispensaries, but unlike Colorado's law that permits counties or towns to prohibit establishment of dispensaries within their boundaries, every "locality" in Wyoming would have to permit dispensaries. From the Peggy Kelley Act: "All provisions of this chapter shall apply in equal force to all localities within the State of Wyoming, whereby medical marijuana establishments may be established in each locality within the State of Wyoming pursuant to this chapter and regulations set by Liquor Division (p. 12)." Local control over whether a community does or does not want a medical marijuana dispensary in their community would be prohibited.

The last discussion on supply architecture by Rand is what they term the extreme options—complete prohibition with strict laws or removal of all state marijuana prohibition laws. As unlikely as it sounds, there was an attempt in Michigan to gather signatures for a ballot initiative to repeal-without-regulation. It did not gather enough signatures to reach the ballot. More important than the initiative was the strategy behind it.

> First, there is no conflict with the Controlled Substances Act because the repeal creates no positive action. To simplify, federal laws preempt state laws when there is a positive conflict making it impossible for someone to comply with both. But states are under no obligation to actively participate in prohibition. Second, the amendment creates no marijuana-specific regulations, taxes, or licensing. Presumably, a business that sought to sell marijuana would have to follow the common rules and regulations that pertain to all businesses… (RAND, 2014)

Below, tables 2 and 2.1 provide a two-page summary of some of the key ideas of supply architecture to help the reader organize information presented in this section.

Table 2. Key Insights Concerning Supply Alternatives to Status Quo Prohibition

	1	2	3	4	5	6	7	8	9	10	11	12
	Alternative	Popular Name	Jurisdictions Pursuing This for Marijuana	Examples for Other Products	Production Cost Without Fees, Taxes, or Regulations	Product Quality Assurance and Labeling	Incentive for Legal Suppliers to Promote Use Harmful to Public Health	Government Ability to Restrain Suppliers' Promotion of Harmful Use	Likelihood to Promote Harmful Use	Cost or Effort of Government Control Efforts	Ability to Generate State Revenue	Conflict with CSA
1	Increase sanctions	Incarcerate our way out of the problem		Recent proposal for selling heroin in Ky.	Highest	Bad	Status quo	Debated but probably high	None	Highest	Very low; depends on seizures and fines	None
2	Retain prohibition but decrease the expected sanction	Mend it; don't end it	Medical marijuana in Calif.	U.S. federal efforts to reduce drug sentences	Highest	Bad	Status quo	Debated but probably high	None	High	Very low; depends on seizures and fines	None
3	Allow adults to grow their own	Grow your own	Alaska	All countries that allow gardening	Highest	Bad	Status quo	Not applicable	None	High on the rest of the market	Very low; depends on seizures and fines	Effectively none
4	Allow distribution only within small co-ops or buyers' clubs	Co-op or buyer's-club model	Spain, Uruguay	All countries that allow gardening	Highest	Okay	None	Low or not applicable	None	High on remaining market	Very low; depends on seizures and fines	Little
5	Permit locally controlled retail sales	Dutch coffee-shop model	Netherlands		Fairly high	Fair	Mixed	Low	Low	High on wholesale market	Low	Medium
6	Have the government operate the supply chain	Government monopoly		Lotteries; liquor wholesale in 11 states	Low or medium	Very good	Low	Best	Low or medium (see lotteries)	High	Best	Highest

Source: Rand 2014

TABLE 2.1. CONT. KEY INSIGHTS CONCERNING SUPPLY ALTERNATIVES TO STATUS QUO PROHIBITION

		1	2	3	4	5	6	7	8	9	10	11	12
Strategy	**Alternative**	**Popular Name**	**Jurisdictions Pursuing This for Marijuana**	**Examples for Other Products**	**Production Cost Without Fees, Taxes, or Regulations**	**Product Quality Assurance and Labeling**	**Incentive for Legal Suppliers to Promote Use Harmful to Public Health**	**Government Ability to Restrain Suppliers' Promotion of Harmful Use**	**Likelihood to Promote Harmful Use**	**Cost or Effort of Government Control Efforts**	**Ability to Generate State Revenue**	**Conflict with CSA**
7	Have a public authority operate the supply chain	Near monopoly		VEDA	Low or medium	Very good	Low	High	Low	Low to medium	Good	High
8	Permit only nonprofit organizations to sell	Nonprofits		Blood banks, YMCA clubs	Low	Very good	Low	Low	Low	Low to medium	Fair to good	High
9	Permit only for-benefit companies to sell	Sustainable businesses		Ben and Jerry's; Seventh Generation	Low	Very good	Low	Low	Low	Low to medium	Fair to good	High
10	Have very few closely monitored for-profit licensees	Structured oligopoly	Medical marijuana in the Netherlands	Opium processing in Tasmania	Low	Very good	Very high	High	Low	Medium	Good	High
11	Implement an alcohol-style commercial model	Regulate like alcohol	Colo.; Wash.	Alcohol and tobacco in most of the United States	Very low	Good	Very high	Low	Very high	Low	Fair	High
12	Repeal the state's prohibition without creating any new, product-specific regulations	N.Y. State alcohol policy in the 1920s		Alcohol in N.Y. State in the 1920s	Lowest	Bad	Extreme	None	Extreme	Zero	Zero	Effectively none

Source: Rand 2014

Taxes and Other Sources of Income

> Taxes and fees are often thought of primarily as revenue raising devices, but in the case of marijuana, the collateral consequences, for good and ill—reduced heavy use and use by minors and reduced risks of export on the one hand and increased risk of in-state black-market activity on the other—could outweigh revenue in importance. Both revenue and collateral consequences will depend on setting of tax levels, a task complicated by the possibility that increasing [marijuana] firm size and technological innovation will drive pretax production costs for basic product forms down dramatically over time. The mix of product types could also evolve in ways that are difficult to foresee, e.g., with vaping gaining market share at the expense of traditional joints and bongs or the industry promoting products that contain both nicotine (tobacco) and THC (marijuana).
>
> High taxes would work against some undesirable side effects. For instance, high taxes would tend to limit consumption and reduce a specific kind of black-market problem about which the federal government has warned: leakage to other states. Low taxes would tend to allow a nascent market to compete with local black and gray markets; to provide a low-cost product to consumers; to limit regressivity; and to increase compliance with tax laws, thus reducing enforcement and collection costs. But low taxes and low prices can increase underage use, substance-use disorders, and exports to other states substantially, while benefiting casual users only trivially—because, by definition, those casual users are not spending that much on marijuana anyway.
>
> **Regulations present opportunities for shaping who consumes, what they consume, where they consume, and how they consume** (RAND, 2015. Options and Issues Regarding Marijuana Legalization).

Marijuana can be taxed through several methods including ad valorem tax (sales tax), tax on gross weight, tax per unit of THC. Each have advantages and disadvantages.

- An ad valorem tax—meaning one based on sales value, as with a typical sales tax—is simple to implement but will fall if market prices fall. If the policy goal is to keep the after-tax price at some target level, ad valorem taxation is not the way to go.
- A tax on the gross weight of marijuana produced or sold creates an incentive for producers to pack as much intoxicating power as possible into as little plant material as possible. This gives a market advantage to highly potent forms of marijuana. For those who believe that those forms are more dangerous than other forms, that counts as a disadvantage of taxation on gross weight.

- Taxation per unit of THC has attractive features but depends on accurate and honest testing procedures.
- Policymakers also need to decide how to tax concentrates and edibles, as opposed to herbal marijuana; those product forms have been growing in market share in states with medical dispensaries or commercial sales. A combination of strategies is also possible, such as taxing THC or weight for some products at the production stage and taxing value at the retail stage. (RAND, 2014)

The Peggy Kelley Act states that dispensaries selling marijuana and marijuana-infused products "…shall be subject to any state commercial activities tax, including any applicable sales, use or excise tax as applied to businesses in general and all other local taxes, assessments, fees and charges as applied to businesses in general, but shall not be subject to any special taxes, assessments, fees and charges, other than the licensure fees set forth herein."

Additionally, the Kelley Act states: "This chapter vests the Wyoming Department of Revenue Liquor Division (the "Liquor Division") to regulate the state's medical marijuana industry in a manner similar to the state's regulation of alcohol" (Peggy Kelley Act).

The Wyoming Department of Revenue and Department of Agriculture were tasked with evaluating the requirements of the Peggy Kelley Act (also called the Wyoming Cannabis Act of 2016). They analyzed "marijuana testing requirements, labeling of products, product standards, auditing requirements, budgetary requirements, licensing and revenue generation" (GMIAC revenue subcommittee report). Additionally, the Departments explored the Liquor Division's requirements: regulation of the acquisition, growth, cultivation, extraction production, processing manufacture, testing distribution, retail sales, licensing and taxation of medical marijuana.

Key findings of the Revenue Report below are taken from the report unedited other than bolded text:

- The department assumes that the staffing of the Marijuana Division will be similar to that of Colorado scaled to represent our relative population but recognizing the similar duties. The Division would be staffed with 18 employees divided between two sections, Accounting and Compliance.
- Start-up costs would include office space, furniture and computer equipment and vehicles for the field staff. Estimated cost to begin operations is $2,724,693. Ongoing budget for administration of the program are estimated at $1,737,800 annually.
- Revenue from the administration and sale of medical marijuana are projected to come from two sources; licensing fees for dispensaries, cultivation, marijuana infused products facilities and testing facilities and from sales taxes paid on the retail sale of medical marijuana.
- In the current projection the department is assuming that licensing fees will be similar to what is already charged for liquor licenses. Currently local governments impose a

$1,500 annual fee for liquor licenses. We're assuming that there will be 23 dispensaries opening in the state and 23 cultivation facilities. Marijuana infused products facilities are estimated at 5 in the state and possibly 2 testing facilities. Total annual licensing revenue from the facilities is estimated at $79,500.

- Revenue from sales taxes will depend on the number of patients registered for medical use and the amount of product sold. The department reviewed the number of patients registered in Colorado and adjusted that figure based on Wyoming's population relative to Colorado. We assumed that there would be 10,000 patients registered in Wyoming for the purposes of estimating the product sold.
- Average price in Colorado for an ounce of marijuana was $160/ounce. This does vary by strain sold but is a reasonable average. The average dosage prescribed varies widely depending on the source of information but an ounce of product per month looked to be a reasonable estimate. We estimated that 120,000 ounces of product would be sold annually. The estimated revenue generated would be $529,920 in state general fund revenue from sale of medical marijuana. The local taxes distributed to the counties would be $504,960.
- **Based on the assumptions made, the revenue generated from licensing and sales will not be sufficient to pay for the administration of the program.** It is certainly possible to adjust the licensing fees to cover the administration. It is also important to note that if more dispensaries and cultivation facilities are licensed, more revenue could be generated from licensing.
- **Without further revenue support the program administration would be funded by other state revenue.**

Because of the way the Kelley Act is written it appears that fees might be the only route to keep medical marijuana from becoming a drain on general fund revenues. Rand discusses fee strategies in states with various forms of legal marijuana.

> In Vermont, applicants to run medical-marijuana businesses pay a $2,500 nonrefundable fee.
> Successful applicants then pay a "registration fee of $20,000 for the first year of operation, and an annual fee of $30,000 in subsequent years" (18 V.S.A. Chapter 86). Those are sizable fees. Because there are approximately 1,500 medical-marijuana patients spread across four dispensaries, those fees, in total, approach $100 per patient per year. Colorado collects a fee from marijuana businesses that depends on the number of their plants ("New Retail Marijuana
> Establishments Licensed Pursuant to 12-43.4.-104[1][b][II],"undated).
>
> The annual fee amount should relate somehow to a benefit to the payer or a cost to the government. The state could impose flat license fees on all marijuana businesses. Business privilege licenses are a standard tool for identifying market participants, so as to regulate

them. Fees for the out-years could be scheduled to increase to reflect the likelihood that other producer costs will drop—like a tax holiday. The out-year increase in the Vermont medical-marijuana business fee already follows that model.

If one wants a relatively small number of outlets for law enforcement to monitor, charginga fairly large fixed fee will tend to limit the applicant pool. Using a substantial fee as a barrier to entry could reduce the difficulty of dealing with appeals from applicants who do not succeed in obtaining licenses. Fees need not necessarily be per business. Fees could pay for weighing or potency testing. Vermont, like Colorado, could impose a fee based on number of plants to complement a regulatory scheme that tracks plants—recognizing that, if the fee were too large, growers would tend to shift to tree-like plants.

Governments routinely sell property, including intangible rights, at auction. In 1993, for electromagnetic spectrum, Congress authorized the Federal Communications Commission (FCC) "to use competitive bidding to choose from among two or more mutually exclusive applications for an initial license…"

Vermont could auction off licenses to produce marijuana, more plausibly as a complement
to taxation than as a complete replacement. Auctions could raise revenue by selling permanent or annual quotas. An auction method of allocating licenses could avoid arbitrariness and cronyism, which are problems that turn up when on-the-merits allocation goes wrong.

An auction would allow the market, rather than government, to allocate a scarce resource—the privilege to sell recreational marijuana legally. Fee-setting requires guesses by government about what the market will bear; an auction method lets the market speak for itself. An auction of quotas, like a tax, could capture some of the economic rents of legalized marijuana commerce. An auction could sell the right to grow (1) on a number of square feet, (2) an amount by weight (or eventually THC content), or, more simply, the right to operate a store.

Auctions could yield permanent or temporary quotas. Instead of permanent licenses, annual licenses could be auctioned. (Auctions could sell off licenses for any number of years; we consider one year as an example.) A series of annual auctions might, like nimble taxes, yield increasing revenue over time.

An auction process produces revenue in the short run that does not depend on the fortunes of private enterprise or the vagaries of the market. That is, an auction requires businesses to pay a set amount of revenue, possibly collected up front, whether the

industry has a good year or a bad year, so it removes some uncertainty from the state's budgetary process, though only for one year. An auction shifts the risk from the state's budget to the private bidders, who could reflect that risk by bidding less than their best guess about the most likely value of the license.

Revenue is not the only goal, and maybe not even the primary goal, of a tax scheme. In the case of marijuana, an upsurge of problem use and underage use in the wake of legalization could create social, educational, and health damage that would outweigh all the revenue collected from even the most ambitious tax plan. The dangers of such an upsurge ought to dominate decisions about the level and form of taxation (RAND, 2014)

Key Findings of GMIAC Subcommittee Reports

Note that what is presented in this chapter are selected highlights from the excellent work that the GMIAC subcommittees produced. The complete subcommittee reports can be found in Appendix A of this document.

Department of Agriculture

Several statutory problems exist that the Wyoming Department of Agriculture, with assistance of the state legislature, would have to confront and solve for legalization of marijuana and hemp in Wyoming. This is not to imply that these problems cannot be overcome, but the administration and staff at the Department of Agriculture did a thorough job of identifying rules and statutes that directly conflict with Wyoming legalization. Substantial additional funding will be necessary to handle marijuana and hemp testing/monitoring. Increased staffing and workspace will be necessary. Sophisticated analytical equipment will need to be purchased. Presented here are highlights; a full text of the Department of Agriculture report is in the appendices to this report.

There are two separate agricultural commodities for consideration with regards to legalization of marijuana. The first commodity is marijuana and its by-products and the second is industrial hemp. Both of these commodities require separate regulatory mechanisms as they are quite varied in their growth, processing, distribution and uses.

There are a number of statutory obligations carried out by the Technical Services Division that may be influenced by the legalization of marijuana including:

- Wyoming Pesticide Control Act (W.S. §35-7-350 through 375)
- Weights and Measures (W.S. §40-10-117 through 136)
- Seeds (W.S. §11-12-101 through 125)
- Seed Laboratory (W.S. §11-12-115)
- Commercial Feed (W.S. §11-113-101 et seq.)

Federal law for the application of pesticides under the Agricultural Worker Protection Standard (WPS) is aimed at reducing the risk of pesticide poisoning and injury among agricultural workers and pesticide handlers.

LACK OF FEDERALLY-APPROVED PESTICIDES

Because marijuana is still illegal at the federal level, the Environmental Protection Agency will not approve any pesticide for use on marijuana. No risk assessments for residues or contaminants have been conducted.

The issue of using pesticides in the marijuana industry has proven challenging for Colorado, and a number of lawsuits have been filed, both from the application and use of pesticides, and from residues present in the consumption in edibles.

IMPORTATION & INTERSTATE MOVEMENT SEEDS

The Agricultural Act of 2014 (U.S. Farm Bill) provided for the "Legitimacy of Hemp Research." However, a readily available supply of seeds is non-existent. Seed for hemp must be native in the state, or must be imported from foreign markets. Seed cannot be transported over state boundaries as it is still regulated under the Drug Enforcement Agency as a Schedule 1 controlled substance. A willing foreign supplier of seed would need to be secured. Canada will not export seed. Italy appears to be one of the very few who will export.

SUMMARY OF REGULATORY AND FISCAL IMPACTS

If marijuana/hemp is legalized and Consumer Health Services is required to perform inspections, it would tax our inspectors with an already increasing workload. Depending on the risk of these plants, there could be multiple inspections during a year.

Based on wording in the Wyoming Food Drug and Cosmetic Safety Act and the Wyoming Food Safety Rule, marijuana/hemp could not be added to any food product that would be sold to the public through a licensed and inspected food establishment.

INCREASED SAMPLE REQUIREMENTS FOR LABORATORY

Potency of Edibles

Many patients choose edible products containing marijuana because they cannot or chose not to smoke it. Edibles come in many different varieties including: tinctures (alcohol and glycerin based extractions), cooking oils, baked goods, drinks, snack foods, candies (gummy bears, chocolate), and even chewing gum. The potency of marijuana varies amongst the diverse types of products. Manufacturing processes of edibles can also impact the potency, such as cooking temperatures that went too high for too long. Potency testing is important to ensure that the correct/advertised concentration of active cannabinoids is found in each product. Potency testing on edibles is performed to ensure customer safety.

In a laboratory setting the diverse type of edible products makes potency testing a challenge. Each edible type must be treated differently to ensure proper sample preparation and analysis. A one-size-fits-all sample prep approach does not work. One challenge for baked goods is ensuring that the edible is homogenized, digested or adequately extracted to permit the sample

to be correctly analyzed while preserving the character of the active ingredient. For every different category of edibles, a different preparation procedure method will have to be developed. Also, brownies, gummy bears and other edible products are full of sugars, fats and other compounds that can gum up laboratory instrumentation.

Researchers have identified over 70 cannabinoid compounds in marijuana, but marijuana contains over 300 other compounds. Most laboratories are currently testing for 7-11 common active compounds or cannabinoids. As research continues to reveal new compounds of interest, laboratories will be required to expand the scope of testing to ensure that marijuana is appropriately characterized. This will be a moving target for laboratories testing potency and will have financial impacts. Potency is measured using High Performance Liquid Chromatography and/or Liquid chromatography–Mass Spectrometry.

Homogenization of ingredients in edibles

Homogeneity ensures that THC or the active ingredient is spread throughout a product evenly and not concentrated in any area. As an example, Colorado requires that no more than 20% of the total THC may be located within 10% of the entire product. It is critical that products are tested to ensure potency is defined per portion and to ensure body responses are natural and safe.

Homogeneity is performed on all cannabis infused products. To test products for homogeneity, laboratories are taking multiple samples from different areas of a single edible to test for potency. This increases the testing load on laboratories because each edible must be run in multiples to test for even distribution of the active ingredient throughout the edible.

Contaminants

Residual Solvent Testing: Laboratories are testing to identify the presence of harmful solvents, impurities, and/or other added odorants or chemicals present in super-concentrated forms of cannabis. More consumers are seeking out super-concentrated forms of cannabis (ie: wax, hash oil, hemp oil, shatter, amber glass, crumble, budder, etc.). Concentrates are produced using a solvent such as acetone, butane, C02, propane, ethanol, heptane, etc. to extract cannabinoids and terpenoids from plant material. Laboratory testing is required to ensure that solvents have been properly purged from concentrated products and that products are safe for the consumer.

Other contaminants that need to be screened for are insect parts, foreign matter, and heavy metals. Microscopy is one method to visualizer foreign matter or insect parts. Heavy metals are digested using a microwave system and analyzed using ICP-MS.

Microbial screening

Microbial contamination refers to the non-intended or accidental introduction of infectious material like bacteria and fungi (molds/yeasts) into a product. Cannabis can become contaminated at any time during growing, harvest, storage, processing, distribution, handling

or preparation processes. Primary sources of microbial contamination are soil, air, animal feed and by-products, plant surfaces, sewage and food processing machinery as well as being introduced by humans.

AUTHORITY TO PERFORM TESTING

Authority for the laboratory to perform testing will have to be detailed by the legislature or other means.

NECESSARY INFRASTRUCTURE TO PERFORM TESTING

Instrumentation

Instrumentation to test marijuana will be a large cost outlay. Instrument required will be:

- High Performance Liquid Chromatography (HPLC),
- Liquid Chromatography –Mass Spectrometry (LC-MS),
- Gas Chromatography with Mass Spectrometry (GC-MS), Headspace GC-MS, and other detectors (FID, ECD),
- Rapid Pathogen Testing through PCR
- Microscopy with digital imaging
- Sample Preparation—homogenizers, automated extraction system, blenders, grinders, centrifuges, analytical balances, digestion microwave
- Other technologies currently being developed such as Infrared (IR) spectroscopy.

Equipment will have to be purchased to perform this testing. The instrumentation (LC-MS, HPLC, GC) currently being used by ASL is 10-15 years old and outdated for much of the testing being proposed. Along with getting new instrumentation, laboratory staff will have to be properly trained to operate this equipment and be taught how to develop the marijuana testing methods for this instrumentation.

Staff

Laboratory staff at ASL is struggling to perform the regulator testing currently mandated and to keep our result turnaround times reasonable. More staff will have to be appropriated if the laboratory is to take on marijuana testing. The testing is complex and time-consuming and will require additional staff. The amount of staff may have to be determined by the scale of regulatory testing that is proposed/mandated. If additional staff is not appropriated for ASL and marijuana testing assumes a high priority, then other program testing (meat, milk, water, animal feed, pesticide complaints, fertilizer and forage) requested by inspectors and consumers

will not be performed. Adding marijuana testing to this small laboratory will exceed our capacity very quickly.

Safety

Safety is a topic that is of concern when adding testing such as this to ASL. With marijuana testing comes a range of safety issues for employees to deal with.

Space

Laboratory space is a big concern when discussing adding marijuana testing to the current ASL testing menu. The laboratory building is getting old and more difficult to add air filtering system to it. Also, we are running out of space. With the advent of more equipment and staff, adding laboratory space will have to be a consideration.

SUMMARY

The Analytical Services Laboratory would likely be very involved in assisting with the regulation and consumer protection with the legalization of marijuana and industrial hemp commodities. It will require additional infrastructure, equipment and staff training to accommodate the need of legalizing either commodity.

RECOMMENDATIONS AND FUTURE DIRECTIONS FROM THE DEPARTMENT OF AGRICULTURE

Marijuana and Industrial Hemp are both commodities with extensive regulatory implications. In addition, both commodities will require special attention in the consumer protection arena. Legalization will require an increase in staff, funding and training to ensure that the Department provides adequate services to the citizens of our state.

Department of Revenue

Department of Revenue Dan Noble, Director

Wyoming Department of Revenue Greg Cook, Administrator, Liquor Division

Wyoming Department of Revenue Tom Montoya, Chief of Enforcement, Liquor

Division

Introduction

The Department of Revenue and the Department of Agriculture have been tasked with evaluating the requirements of the Wyoming Cannabis Act of 2016 and developing a framework for administering the program should the ballot initiative become law. In developing this framework the Departments have focused on the testing requirements, labeling of product and product standards, auditing requirements, budgetary requirements, licensing and revenue generation.

This portion of the report will focus on the Administration of Cannabis from the Department of Revenue, Liquor Division's requirements under the proposed ballot initiative. The proposed initiative tasks the Liquor Division with regulation of the acquisition, growth, cultivation, extraction production, processing manufacture, testing distribution, retail sales, licensing and taxation of medical marijuana and medical marijuana infused products.

It is important to note that the ballot initiative does not directly impose the responsibility for the State to be the "sole wholesaler" of medical marijuana however it does state the following: "This chapter vests the Wyoming Department of Revenue Liquor Division (the "Liquor Division") to regulate the state's marijuana industry in a manner similar to the state's regulation of alcohol." Wyoming currently functions as the sole wholesaler of alcoholic spirits and wine in Wyoming. The critical difference between state regulation of alcohol and marijuana is the fact that alcohol is a legal product at both the state and federal level. Marijuana is not a legal product at the federal level. Because of this difference we will assume that the Liquor Division will not regulate medical marijuana by acting as the wholesaler and will instead regulate the distribution network.

Because the Liquor Division has no expertise in administration of this product we felt that we would need to work with states that are currently involved in the regulation of medical and recreational marijuana. Additionally the Department researched existing statutes to analyze the various requirements imposed on the regulatory agencies. The following is a report on the actions taken by the Department and our findings.

- The department assumes that the staffing of the Marijuana Division will be similar to that of Colorado scaled to represent our relative population but

recognizing the similar duties. The Division would be staffed with 18 employees divided between two sections, Accounting and Compliance.

- Start-up costs would include office space, furniture and computer equipment and vehicles for the field staff. Estimated cost to begin operations is $2,724,693. Ongoing budget for administration of the program are estimated at $1,737,800 annually.
- Revenue from the administration and sale of medical marijuana are projected to come from two sources; licensing fees for dispensaries, cultivation, marijuana infused products facilities and testing facilities and from sales taxes paid on the retail sale of medical marijuana.
- In the current projection the department is assuming that licensing fees will be similar to what is already charged for liquor licenses. Currently local governments impose a $1,500 annual fee for liquor licenses. We're assuming that there will be 23 dispensaries opening in the state and 23 cultivation facilities. Marijuana infused products facilities are estimated at 5 in the state and possibly 2 testing facilities. Total annual licensing revenue from the facilities is estimated at $79,500.
- Revenue from sales taxes will depend on the number of patients registered for medical use and the amount of product sold. The department reviewed the number of patients registered in Colorado and adjusted that figure based on Wyoming's population relative to Colorado. We assumed that there would be 10,000 patients registered in Wyoming for the purposes of estimating the product sold.
- Average price in Colorado for an ounce of marijuana was $160/ounce. This does vary by strain sold but is a reasonable average. The average dosage prescribed varies widely depending on the source of information but an ounce of product per month looked to be a reasonable estimate. We estimated that 120,000 ounces of product would be sold annually. The estimated revenue generated would be $529,920 in state general fund revenue from sale of medical marijuana. The local taxes distributed to the counties would be $504,960.
- **Based on the assumptions made, the revenue generated from licensing and sales will not be sufficient to pay for the administration of the program.** It is certainly possible to adjust the licensing fees to cover the administration. It is

also important to note that if more dispensaries and cultivation facilities are licensed, more revenue could be generated from licensing.

- **Without further revenue support the program administration would be funded by other state revenue.**

Department of Education

BACKGROUND

The Education Subcommittee of the Governor's Marijuana Impact Assessment Council was formed in September 2015 to determine possible impacts to Wyoming's student population if Wyoming were to approve legislation addressing medical and recreational marijuana. The subcommittee met periodically from Sept. 30, 2015, until Nov. 20, 2015.

MEMBERS

Jillian Balow	State Superintendent of Public Instruction
Rob Black	Education Consultant and Subcommittee Facilitator, Department of Education
Brian Cox	Associate Principal, Cheyenne Central High School
Brian Farmer	Executive Director, Wyoming School Boards Association
Shad Hamilton	Principal, Fort Washakie High School
Jason Garman	Counselor, Johnson Junior High School, Cheyenne
Monica Keele	AWARE Program Coordinator, University of Wyoming
Doreen McGlade	President, Natrona County Education Association
Marty Nelson	Senior Administrator, Services Division, Department of Family Services

SUMMARY

This report examines impacts to Wyoming students based on five scenarios:

SCENARIO 1: If no new legislation is passed addressing marijuana in Wyoming.

SCENARIO 2: If Wyoming were to enact a law similar to Vermont's medical marijuana law.

SCENARIO 3: If Wyoming were to adopt the Peggy A. Kelley Cannabis Act of 2016.

SCENARIO 4: If Wyoming were to adopt a law similar to Colorado's medical marijuana law.

SCENARIO 5: If Wyoming were to adopt full recreational marijuana.

The subcommittee reviewed numerous studies and reports, including data on current Wyoming usage among youth aged 12-17 and adults aged 18-25.

Generally speaking, the subcommittee projects that marijuana use and marijuana-specific infractions among Wyoming's student population will increase on roughly a sliding scale, with the lowest impact under Scenario 1 and proceeding to the highest impact under Scenario 5. It should be noted that student usage under age 21 would be prohibited under each scenario.

Even the most ardent supporters of liberalized marijuana laws do not wish to see widespread recreational use of cannabis by young people. The two most important areas of concern for young people are an increased risk of dependence and interference with success in school. Individuals who begin cannabis use during adolescence are approximately twice as likely to develop cannabis dependence, compared to those who begin use after the age of 25. Numerous studies point to the negative relationship between cannabis use and school performance. The causal nature of this relationship cannot be established scientifically, because there is evidence that those who begin using cannabis at earlier ages are already more likely to have both behavioral and academic problems in school.

At the present time, our best evidence is that approximately 6% of 12-17 year olds in Wyoming report using marijuana within the past month, which is below the national average. Among college students at the University of Wyoming, the most recent data found 17% reported past-month usage. The question then becomes whether, and to what extent, use among these young people would increase after the implementation of legal medical marijuana in Wyoming. As with other impacts, the specifics of the law and how it would be implemented would play a large role in determining any such effects. There is some evidence from Colorado that usage rates there have increased more rapidly than the national average, and also a report indicating some underage users were obtaining marijuana that was diverted from the medical market.

An issue for all schools is that the federal Drug Free Schools And Communities Act requires a zero-tolerance policy for illicit drugs, including all forms of cannabis. Therefore, schools would need to develop clear policies prohibiting on-campus cannabis use by students or staff, even those otherwise allowed to use medical cannabis.

The Education Subcommittee pointed out the possibility that increased youth use would lead to increased numbers of students sent to the Wyoming Boys and Girls Schools. However, this would depend a great deal on responses by law enforcement and the juvenile justice system concerning juvenile cannabis infractions.

Health Subcommittee Report

Purpose

On June 30, 2015, Wyoming Governor Matthew Mead announced the creation of the Governor's Marijuana Impact Assessment Council (GMIAC). Through this council, subcommittees were created to gather data and information on specific subtopics related to marijuana legislation in Wyoming. The GMIAC Health Subcommittee completed this report.

The priority health areas chosen by the Health Subcommittee to be addressed in this report are:

Youth/Adolescents
Adult/Chronic Issues
Marijuana Composition & Interactions
Impact to Health Systems
Potential Health Benefits

This report presents a compilation of research, data, and information related to the identified priority health areas, as well as the impacts in Wyoming and other states in which marijuana is either legal for medical or retail use. When considering impacts to health in Wyoming, the report covers the priority areas in three regulatory scenarios: current conditions, medical marijuana legalization, and full recreational legalization.

Research Gaps

An important note for interpreting all findings is that the available research and state information reviewed in this report outline the *association* between marijuana use and health outcomes. This association does not prove that marijuana use alone caused the observed effects. Also, marijuana was illegal in all fifty states prior to 1996, while the first retail law did not take effect until 2014. An identified barrier to understanding the effects of marijuana legislation is the limited availability of longitudinal data.

Other considerable research gaps related to the population-based health effects of marijuana have been identified. For example, little research has focused on occasional marijuana use as distinct from chronic or heavy use, concentrations and consumption methods, or issues important to public health or the judiciary. Marijuana is a Schedule 1 drug under the Controlled Substances Act, which is the most restricted category reserved for drugs that have no accepted medical use. Therefore, marijuana remains a federally illegal substance. The GMIAC Health Subcommittee recognizes these barriers and recommends that all information should be interpreted carefully in the context of the data limitations.

Marijuana Compounds and Consumption

Cannabinoids & Human Physiology

While there are several different types of cannabinoids present in marijuana, tetrahydrocannabinolic acid (THCa) and cannabidiolic acid (CBDa) are the most abundant compounds (Mackie, 2008; Hillig and Mahlberg, 2004). When heated, they convert to their "activated" forms, which are tetrahydrocannabinol (THC) and cannabidiol (CBD), respectively. THC is primarily responsible for the psychoactive effects of marijuana. Research also finds that THC acts as an effective moderate pain reliever in chronic neuropathic pain (pain caused by damaged nerves) as well as an effective anti-nausea treatment (Devinsky et al, 2014). Marijuana plants range in their potency and distribution of cannabinoids, but most have more THC than CBD. CBD alone has been proven to have several metabolic effects including acting as an antioxidant, an immunosuppressant, and an anti-inflammatory analgesic (Fichna et al, 2014). Clinical evidence for anti-seizure properties along with favorable side effects support further development of CBD-based treatments for epilepsy and other neuropsychiatric disorders (Devinsky et al., 2014; Zuardi et al., 2006).

In magnetic resonance imaging (MRI), CBD and THC induced opposite effects in various areas of the brain. It was speculated by Bhattacharyya et al. (2010) in *Neuropsychopharmacology* that the two cannabinoids had opposing effects in terms of brain activation, but in contrast to decades of previous work, that the relationship between THC and CBD is not simply counteracting. In recent studies, the ratio of CBD to THC has a significant effect on having both enhancing and counteracting reactions with THC (Zuardi, Hallak, & Crippa, 2012; Morgan & Curran, 2008). More research must be done to define the effects of various ratios of THC to CBD and their therapeutic uses as well as the synergistic effects of other cannabinoids, such as cannabigerol (CBG), cannabichromenes (CBC), and tetrahydrocannabivarin (THCV). Some current research suggests that these cannabinoids aid in the reduction of blood flow to cancerous tumors, thereby inhibiting growth, but significant data are lacking to support definitive conclusions (Vara et al., 2011).

In an effort to understand the psychoactive effects of THC, researchers sought to identify the cannabinoid receptors within the body. These receptors, called cannabinoid receptor type 1 (CB1) and cannabinoid receptor type 2 (CB2), are located predominantly in the brain, but receptor evidence has been found in the liver, pancreas, and skeletal muscle (Mackie, 2008). These cannabinoid receptors, along with endocannabinoids, such as anandamide and 2-arachidonoyl glycerol (2-AG), and certain enzymes, make up the human endocannabinoid system (Mackie, 2008; McPartland, Duncan, Di Marzo, & Pertwee, 2015).

Cannabinoids found in marijuana attach to the same receptors as endocannabinoids, and there are several pathways in which they can enter the body: smoke inhalation, topical absorption, and ingestion. More recently, smokeless inhalers have been developed for (potentially) healthier use (Eisenberg, Ogintz, & Almog, 2014). Prior to entry, many forms of cannabinoids must be

heated to be "activated," which is also known as the process of decarboxylation. Approximately 70% of the acidic precursors of cannabinoids are converted to their "activated" forms. Through smoke inhalation, the act of lighting the marijuana flower or extract converts the acidic forms of the cannabinoids into their "activated" forms. Prior to topical application and ingestion, heat must be applied to the marijuana, or the application or ingestion would be non-reactive. At the same time, research indicates that even the acidic or "non-reactive" forms of cannabinoids can still have minor therapeutic and physiological effects (McPartland, Duncan, Di Marzo, & Pertwee, 2015). More research is required to fully understand how the multitude of cannabinoids interact with each other and their acidic counterparts.

Potency

A variety of methods are available to test the potency of marijuana products; however these tests are often inaccurate. In Colorado, current regulations for potency testing differ between medical marijuana and recreational retail marijuana. Recreational marijuana products have potency limits. For example, no marijuana product with less than 0.3% THC, also defined as industrial hemp, may be sold in a recreational retail store. Also, for edible recreational marijuana products, the THC potency limit is 100 mg total with a 10 mg limit per serving. Though the extract used to create the edible product requires testing, each of the recreational edible by-products must be tested again to re-evaluate potency, contaminants, and homogeneity. In contrast, medical marijuana has no potency limits; therefore, testing medical marijuana extracts and products is done on a voluntary basis with few willing to invest in unrequired and expensive lab costs. Laws in Colorado have changed frequently to account for gaps in quality control and safety hazards, so it is expected that further restrictions on medical marijuana will be implemented.

When required to test for potency, Colorado also requires the concurrent testing of residual solvents and other chemicals in marijuana products. Dried and cured marijuana buds can contain certain amounts of pesticides, molds, mildews, and filth that are considered toxic. Marijuana hash oil is extracted using a variety of solvents such as n-butane, carbon dioxide, and ethanol which have varying toxicity risks; therefore, the testing of residual solvents is required. Hash oil can be presented in a variety of forms known as wax, shatter, or budder. Overall, the resulting hash oil is very similar, but the by-products can vary depending on the solvent. For example, n-butane is highly effective at extracting the various cannabinoids, but it also extracts plant lipids and waxes. If the plant by-products are not removed, the product is commonly referred to as wax or budder. If marijuana is extracted at below freezing temperatures or winterized post-extraction, a majority of those plant by-products are removed which results in higher potency and less risk of contaminant exposure. This product is commonly referred to as shatter, described by its more hardened, glass-like consistency. Because the marijuana buds, or flowers, are used for traditional smoking, the fan leafs and trim are commonly used to make hash oil from chemical extraction. By doing so, more plant matter from various plants is

required, which can result in exponential exposure to trace chemicals from fertilizers and pesticides.

Further considerations regarding extraction need to be recognized. Health impacts may occur due to waste products and disposal issues. Appropriate handling and disposal processes need to be enforced on items such as wastewater, compostable waste, non-compostable waster, and hazardous wastes to minimize health impacts.

Pharmaceuticals

Currently, there are several pharmaceutical products made of synthetic cannabinoids such as Marinol® and Nabilone®. Marinol® (generic drug name: dronabinol) is a synthetic THC used to treat nausea in cancer patients, as an appetite stimulant in AIDS patients, and as an analgesic for pain in multiple sclerosis patients (Bedi, Cooper, & Haney, 2013). Nabilone® is a synthetic cannabinoid similar to THC used to prevent nausea and as a diabetic neuropathy analgesic. Additionally, Nabilone® has been clinically observed to significantly relieve post-traumatic stress disorder related nightmares in those with a history of non-response to traditional therapies (Jetly, Heber, Fraser, & Boisvert, 2015). Both Marinol® and Nabilone® show clinical success in treating marijuana dependence and are being researched for their potential benefit in treating withdrawals from opiate addiction, showing promise when used alongside methadone (Scavone, Sterling, & Bockstaele, 2013; Scavone, Sterling, Weinstein, & Bockstaele, 2013).

Summaries and Key Findings on Marijuana Use and Health Effects

Impact on the Developing Brain

In order to understand marijuana's effects on the developing brain, it is important first to review the brain development of adolescence. Adolescence is the period of a young person's life that begins at puberty, or around the age of ten, and continues into the mid-twenties. Neuroscience has shown that a young person's cognitive development continues into this later age and that emotional maturity, self-image, and judgment will be affected until the prefrontal cortex of the brain has fully developed. The prefrontal cortex is responsible for critical thinking and judgment, and it is the last part of the brain to fully develop. The brain's reward center, which seeks rewards, pleasures, thrills, and adventures, matures very early in adolescence. In other words, the adolescent brain craves pleasure, but it does not know how to weigh risks, determine and plan for consequences, or how to say, "Enough is enough." Because of this gap in brain development, children and adolescents are especially vulnerable to addiction, including marijuana (Joffe, 2004).

Marijuana affects a neurotransmitter in the brain called dopamine. Dopamine plays a very important role in the brain's functioning by regulating attention, cognition, hormonal processes,

impulsivity, movement, and pleasure. Attention-deficit/hyperactivity disorder, schizophrenia, and Parkinson's disease are attributed, in part, to dysfunction within the dopamine system. All substances of abuse, including marijuana, increase the amount of dopamine released into the brain's reward circuit. Adolescents who try marijuana are over nine times more likely to develop symptoms of cannabis dependence than adults who try marijuana (Chen et al., 2009).

Long-term, regular users who started using marijuana before the age of 18 often cause changes in their brain structure and functioning that result in permanent cognitive deficits, resulting in lower functioning than they may have achieved had they not used marijuana. Research has shown that when marijuana users are intoxicated, their working memory is impaired and they are more impulsive, less attentive, less motivated, and slower to make decisions (Lundqvist, 2005). These effects continue even after they quit using marijuana. Studies at 28 days post marijuana usage showed no improvement in cognitive functioning (Vigil, 2015).

A systematic literature review conducted by the Colorado Department of Public Health and Environment (CDPHE, 2015) evaluated the association between marijuana use and potential adverse health outcomes. The literature review found moderate association with other illicit drug use and addiction after adolescence; increased marijuana, alcohol, and tobacco use and addiction after adolescence; and lower high school graduation rates among those who regularly use marijuana. The literature review also found substantial evidence that adolescents who regularly use marijuana are more likely than non-users to develop psychotic symptoms or psychotic disorders such as schizophrenia in adulthood. It should be noted that this association does not prove that marijuana caused the effect…

The main factors for marijuana use and addiction in the adolescent population are availability, perceived harmfulness, and social norms. Research from states that have passed medical marijuana laws before passing recreational laws show increases in marijuana use and decreases in perceived harmfulness among adolescents prior to recreational legalization (Vigil, 2015).

Marijuana as a Gateway Drug

As more states legalize marijuana it continues to be discussed as a possible gateway drug. The gateway theory argues that because heroin, cocaine, and methamphetamine users often used marijuana before graduating to harder drugs, marijuana may be a "gateway" to harder drug use. This theory implies that there is a causal mechanism that initiates drug users, making them more willing to try and/or desire harder drugs. According to Merrill, Fox, Lewis, and Pulver (1994), children who had used marijuana were 85 times more likely to use cocaine than their peers who had not used marijuana; additionally, adults who used marijuana as children were 17 times more likely to become regular cocaine users than those who had not used marijuana as a child. This study showed a correlation between marijuana and cocaine but failed to determine causality. One leading theory for the link between marijuana and harder drugs is the brain disease model, which describes changes in the brain during the progression from drug use to addiction. Gilman et al. (2014) reviewed composite brain scans of 20 marijuana smokers,

ages 18 to 25, and found evidence of structural differences in two areas of the brain even with occasional use. The findings suggest that recreational marijuana use may lead to previously unidentified brain changes and predispose users to other drugs, highlighting the importance of research aimed at understanding the long-term effects of low to moderate marijuana use on the brain.

Each of these theories fails to take into consideration the cultural and social risk factors that have been shown to lead to drug abuse including, but not limited to, socioeconomic status (poverty), drug availability, lack of parental supervision or family involvement, early aggressive behavior, and mental health disorders. A study by Moselhy (2013) concluded that although there is a clear association between the use of marijuana and subsequent use of harder drugs, the pathway to drug addiction is multifaceted and complex and the sequence leading to drug use cannot be normalized.

Thus, research has shown a strong association between marijuana use and subsequent use of other illicit drugs with a possible biological cause for this association, but more research is necessary in order to determine the exact nature of the causal processes.

Chronic Use of Marijuana

The long-term effects of marijuana use have been a subject of debate. Since marijuana has been illegal until recently in most countries, research of chronic use presents a challenge and leaves much to be concluded. Some research has shown that long-term marijuana use potentially creates physical changes in the brain associated with addiction, reduces grey matter volume in nearly all brain regions that are rich in cannabis receptors, and changes users' motivation, emotions, and emotional learning (Battistella, 2014). The degree of these changes is related to age of initiation, usage rates, length of use, and potency. With changes to the barriers for research, hopefully solid conclusions will be reached about the risks and benefits of long-term marijuana use.

Marijuana Use and Respiratory Effects

Marijuana is the second most widely smoked substance in the U.S. after tobacco. Conservative estimates indicate that 11 million people smoked marijuana during the last month and approximately 20% of those smoked daily. Marijuana smoke contains as much tar as tobacco smoke and up to 50% more carcinogens. Marijuana smoke is unfiltered and marijuana users inhale more deeply and hold the smoke longer than tobacco users. Furthermore, 77% of marijuana users are also tobacco users, and these individuals were found to have greater prevalence of respiratory symptoms than those who only smoke tobacco.

A study by Moore, Auguston, Moser, and Budney (2005) provides estimates of respiratory symptoms by current marijuana users in a nationally representative sample in the U.S within a broad range of ages and marijuana exposure. Marijuana use is associated with a variety of respiratory symptoms similar to those of tobacco users, which include chronic bronchitis, coughing on most days, phlegm production, wheezing and chest sounds without a cold, and

cancer. Marijuana use may also increase exposure to other infectious organisms such as fungi and molds. Additionally, a study by Tetrault et al. (2007) concluded that short-term exposure to marijuana was associated with bronchodilation, and long-term exposure was associated with increased respiratory symptoms consistent with obstructive lung disease.

According to the study by Moore et al., more than 2 million adults in the U.S. are heavy marijuana users, defined as those who ingest the drug on a daily or nearly daily basis, and these risks pose a potentially large health burden. The study also stated that marijuana users have greater rates of utilizing outpatient medical services for respiratory and other illnesses.

Marijuana Use During Pregnancy and Breastfeeding

According to the report, *Monitoring Health Concerns Related to Marijuana in Colorado* (2015), literature review found moderate evidence that "maternal use of marijuana during pregnancy is associated with negative effects on exposed offspring, including decreased academic ability, cognitive function, and attention. Importantly, these effects may not appear until adolescence" (p. 11).

There are few studies about the effects of marijuana consumption during breastfeeding on infant health or development. THC has been found to accumulate at varying levels within human breast milk, and infants who are exposed to marijuana through breast milk will excrete THC in their urine (Garry et al., 2009). It is important to note that mothers who consume marijuana during pregnancy also probably used before pregnancy. Thus, evaluating the effects during breastfeeding without consideration of previous effects is difficult.

Two studies evaluated the effects of the marijuana use during pregnancy on child development. Neither study was able to conclusively prove a relationship between the marijuana exposure and mental or physical effects observed in infants (Day, 1991; Haizink, 2014).

Marijuana Use and Mental Health

At this time, there has been no conclusive evidence that establishes marijuana as a sole indicator in causing mental health disorders. Several studies have linked marijuana use to increased risk of mental illnesses, including psychosis, depression, and anxiety (Crippa et al., 2009). Other less prominent associations have also linked marijuana use with suicidal thoughts among teens, personality disorders, and amotivational syndrome. Amotivational syndrome is defined as diminished or absent drive to engage in typically rewarding activities. Some studies also suggest that those who experience extreme psychosis after using marijuana most likely already had mental health issues, and the use of marijuana exacerbated it (Crippa et al., 2009).

Marijuana Addiction

According to the National Institute on Drug Abuse (NIDA), approximately 9% of people who begin using marijuana as an adult will meet the definition of addiction to marijuana, in which a person cannot stop using a drug even though it interferes with many aspects of his or her life. Approximately 17% of persons who start using marijuana between the ages of 13 and 25 will meet the definition of addiction. According to the 2013 National Survey on Drug Use and Health (NSDUH), marijuana accounted for 4.2 million of the estimated 6.9 million Americans dependent on or abusing illicit drugs. Marijuana addiction appears to be very similar to other substance use disorders, although the long-term outcomes may be less severe.

Marijuana Use and Injury

The *Monitoring Health Concerns Related to Marijuana in Colorado* (2015) report found substantial evidence that:

> Risk of motor vehicle crashes doubled among drivers with recent marijuana use. Additionally, we found substantial evidence for a positive relationship between THC blood level and motor vehicle crash risk –that is, substantial evidence that the higher the level of THC in blood, the higher the crash risk. Finally, the committee found that the combined use of marijuana and alcohol increases motor vehicle crash risk more than use of either substance alone. For non-traffic injuries, the evidence is limited, but data suggest that the risk of non-traffic workplace injuries may be higher with marijuana use (p. 13).

Potential Health Benefits

In recent years, the legalization and use of marijuana for a variety of medical issues has spurred discussion and highlighted the need for further research. Currently, a small percentage of studies on marijuana analyze its medicinal properties. As stated previously in the Marijuana Compounds and Consumption section, existing research indicates there are at least two active chemicals in marijuana that may have medicinal applications. Those are cannabidiol (CBD), which may positively impact regions of the brain without an associated high, and tetrahydrocannabinol (THC), which may have pain-relieving properties.

The endocannabinoid system has receptors throughout the human body, with CB1 receptors showing more prominence in the brain and reproductive system while CB2 receptors are more spread out through the immune system and the skeletal muscles (Devinksy et al., 2014). Because of their numerous locations, several conditions are being researched for the potential pharmacological use of marijuana cannabinoids. For example, the location of receptors in the pancreas has shown potential in treating diabetes and other related complications such as kidney failure (Hovath, Mukhopadhyay, Hasko, & Pacher, 2012; Kim et al. 2011). Several studies have demonstrated the potential for marijuana and synthetic cannabinoids to aid in apoptosis, or the breakdown of cancer cells *in vitro* and *in vivo* (Sarfaraz, Adhami, Syed, Afaq, &

Mukhtar, 2008; Vara et al., 2011). The location of the receptors in the brain is especially being studied for the prospective treatment of post-traumatic stress disorder, depression, and anxiety disorders (Jetly, Heber, Fraser, & Boisvert, 2015). Until research advances, the exact effectiveness of marijuana cannabinoids on these conditions remains under scrutiny.

On the other hand, certain cannabinoids have already been approved by states for therapeutic use for certain conditions. For example, mounting evidence regarding the anti-seizure properties of CBD has led several states, including Wyoming, to legalize the therapeutic use of industrial hemp oil for intractable epilepsy (Devinsky et al., 2014). The anti-nausea, pain management, and anti-inflammatory effects of marijuana are being actively examined for efficacy for use in cancer patients undergoing chemotherapy, HIV patients suffering from anorexia, and inflammatory bowel conditions (Mackie, 2008; Fichna et al., 2014; Schicho et al., 2011; Storr et al., 2010). Two cannabinoid drugs are approved in the United States under the names Dronabinol® and Nabilone®. Both are approved by the Federal Drug Administration (FDA) for the treatment of chemotherapy-related nausea and vomiting in patients who have not responded to standard therapy.

Significant research on the topical use of cannabinoids has also demonstrated its efficacy on both acute and chronic inflammatory skin diseases (Kim et al., 2015). Even with the current successful application of marijuana cannabinoids, research of the exact mechanisms and benefits are still in its infancy. In 2014, the FDA granted the drug Sativex®, a mouth spray in which THC and CBDs are derived from the cannabis plant, a fast track designation for the treatment of pain in patients with advanced cancer. FDA describes fast track as a "process designed to facilitate the development and expedite the review of drugs to treat serious conditions and fill and unmet medical need."

Effects of Legislative Changes

The following information outlines impacts to health within each of the priority areas in three regulatory scenarios: current conditions with no legislative changes, medical marijuana legalization, and full recreational legalization.

No Legislative Changes

In 2015, the Wyoming Legislature passed HB 0032, allowing supervised medical use of hemp extract for intractable epilepsy, providing an exemption from prosecution, and creating a registration program. This section discusses the probable outcomes within each of the five priority areas if no further changes to the marijuana legislations are approved.

After reviewing the available evidence in regards to no medical or retail marijuana legislation, the subcommittee finds the following:

- Youth: current trends of use should remain stable
- Adults and chronic use: current trends of use should remain stable

- Composition and interaction: no increase or decrease is likely to occur
- Health system impacts: no increase or decrease in health system impacts
- Potential health benefits: patients will not be able to receive potential health benefits

Greater detail regarding the above findings as related to this scenario is provided below.

Youth/Adolescents

Marijuana is the most commonly used illicit drug according to the 2013 National Survey on Drug Use and Health (NSDUH), and nationwide marijuana use is widespread among adolescent and young adult subpopulations.

Wyoming's data are similar to the national data. According to the Wyoming Prevention Needs Assessment (PNA), marijuana use has remained unchanged from 2008 to 2014 across all grade levels and for both lifetime and 30-day use measures.

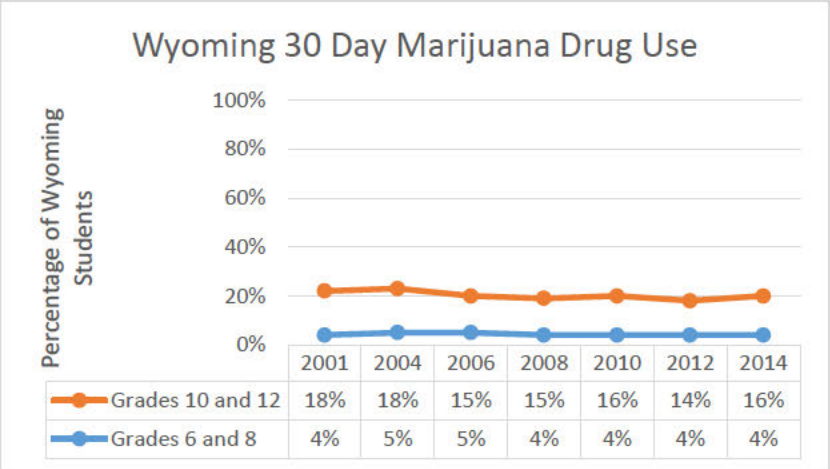
Figure 3: Wyoming Students' Marijuana Drug Use

Definition:

The percentage of Wyoming students who reported using marijuana in the 30 days before the survey

Data Source:

PNA 2001-2014



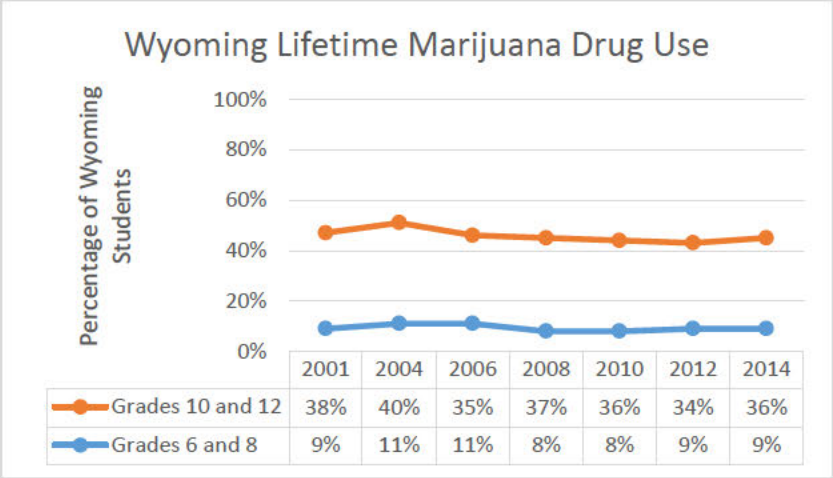


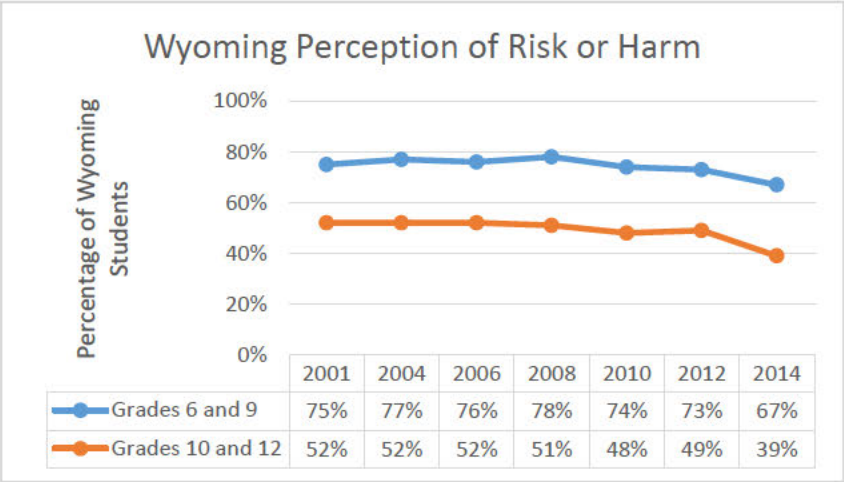
Figure 4: Wyoming Students' Marijuana Lifetime Use

Definition:

The percentage of Wyoming students who reported using marijuana during their lifetime: **Data Source:** PNA 2001-2014

Wyoming has experienced a significant decrease in student perception of great risk or harm with smoking marijuana regularly, especially between 2012 and 2014 (73% vs 67%, 6th and 8th grades; 49% vs 39%, 10th and 12th grades).

Figure 5: Wyoming Student Perception of Great Risk with Marijuana Use



Definition:

The percentage of Wyoming students who perceive there is great risk or harm with smoking marijuana regularly

Data Source: PNA 2001-2014

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana and in consideration of current Wyoming data trends, the GMIAC Health Subcommittee reasons that youth/adolescent marijuana drug use in Wyoming will remain constant.

Adult/Chronic Issues

Nationally, marijuana use among adults has doubled over the past decade with the changes in laws and attitudes about the drug. According to NSDUH, the rate of current marijuana use in 2013 among young adults aged 18 to 25 (19.1 percent) was similar to the rates in 2009 to 2012 (ranging from 18.2 to 19.0 percent), but it was higher than the rates in 2002 to 2008 (ranging from 16.1 to 17.3 percent). In 2013, the national rate of current marijuana use (5.6 percent) was similar to the rate in 2012 (5.3 percent), but it was higher than the rates in 2002 to 2011 (ranging from 3.9 to 4.8 percent).

Wyoming has not experienced this increase in use and has remained fairly consistent for both age ranges.

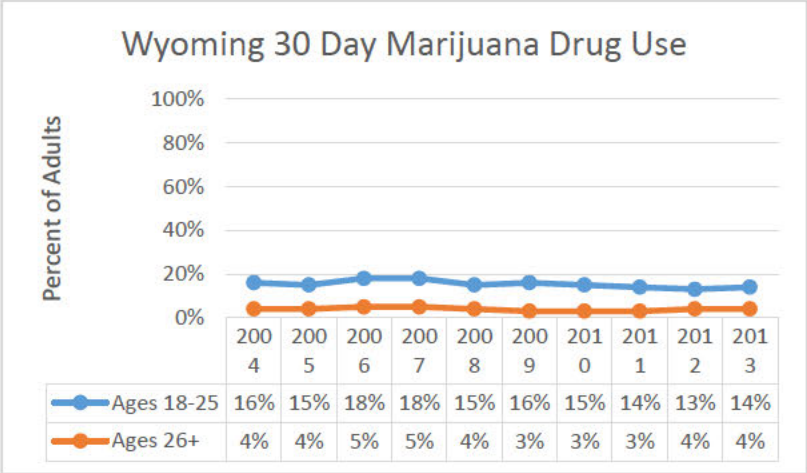


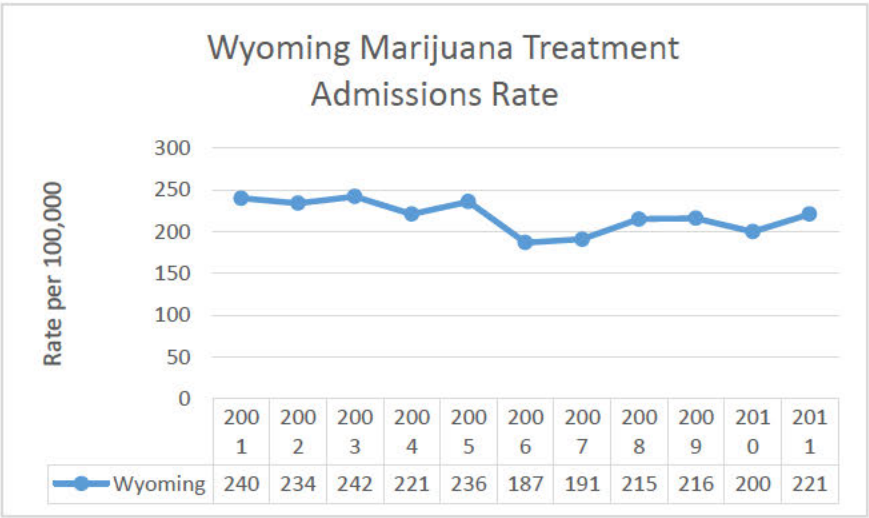
Figure 6: Wyoming Self-Reported 30-day Marijuana Use

Definition: The percentage of Wyoming adults reported using marijuana in the 30 days before survey.

Data Source: NSDUH 2004-2013

According to the NSDUH Treatment Episode Data Set (TEDS), the national treatment admission rate for primary marijuana was 14% higher in 2011, at 125 per 100,000 population aged 12 and older, than in 2001 (110 per 100,000). Wyoming has not experienced this increase. During this same time period, Wyoming saw a 9% decrease in the rate from 240 per 100,000 population aged 12 and older in 2001 versus 221 per 100,000.

Figure 7: Primary Marijuana Treatment Admissions



Definition:

Primary marijuana treatment admissions by rate per 100,000 of Wyoming residents aged 12 and older

Data Source: TEDS 2001-2011

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana and in consideration of current Wyoming data trends, the GMIAC Health Subcommittee reasons that adult marijuana drug use in Wyoming will remain constant with the current trend line.

Marijuana Composition & Interactions

In the scenario that no changes are passed to the current legislation in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that no increase or decrease in issues resulting in marijuana composition or interactions will occur.

Impact to Health Systems

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana and in consideration of the current trends of use that are neither increasing nor decreasing, the GMIAC Health Subcommittee reasons that no increase or decrease in impact will be realized within the current health systems.

Potential Health Benefits

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana, the GMIAC Health Subcommittee reasons that Wyoming residents will not have the ability to access any potential health benefits from marijuana use.

Medical Marijuana Legislation

This section discusses the probable outcomes within each of the five priority areas if further medicinal changes to the marijuana legislations are approved.

Since 1996, 23 states plus the District of Columbia have legalized marijuana use (more than just CBD, such as Wyoming's law allowing CBD for intractable epilepsy) for medical purposes. Each state law varies in approved medical conditions, possession amounts and cultivation, residency requirements, legal issues, caregivers, dispensaries, and registration. For example, Illinois permits marijuana use for about 40 different conditions, whereas, Washington, the most restrictive state, allows for six.

After reviewing the available evidence in regards to medical marijuana, the subcommittee finds the following:

- Youth: increased use may occur
- Adults and chronic use: insufficient evidence to draw conclusions
- Composition and interactions: insufficient evidence to draw conclusions
- Health system impacts: increased poisonings and emergency needs may occur with possible decrease in opioid overdoes death
- Potential health benefits: health benefits for certain conditions may occur

Greater detail regarding the above findings as related to this scenario is provided below.

Youth/Adolescents

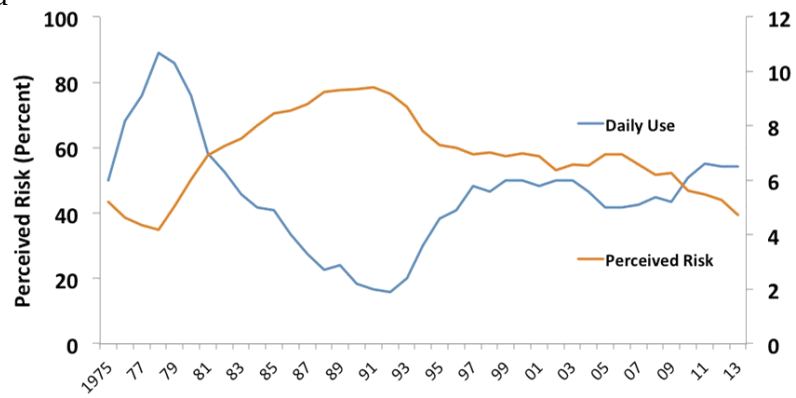
There are no consistent epidemiological data indicating that the prevalence of marijuana use among youth has significantly increased in states after the first few years of enactment of medical marijuana laws (Lynne-Landsman et al., 2013). Hasin et al. (2015), utilizing the Monitoring the Future Study adolescent survey data from 1991 through 2014 found that marijuana was more prevalent in states that passed a medical marijuana law any time up to 2014 than in other states (adjusted prevalence 15-87% vs. 13-27%). However, the rates of adolescent marijuana use in states with medical marijuana laws were higher than other states prior to the laws being passed (Hasin et al., 2015).

An association between medical marijuana laws and youth recreational use rates has shown an increase with time. This association may not be due to the assumed increased availability of marijuana through the medical marijuana programs. Rather, it may be a result of the decrease in perceived risk of marijuana. According to the Monitoring the Future Study, five-year trends are showing significant increases in marijuana use among 12th grade students (Figure 6). These increases continue to parallel decreasing perceived risk about the harm and disapproval of marijuana use. Wyoming has also experienced a decrease in perception of harm of marijuana as either a moderate or great risk from 76% of 10th and 12th grade students in 2001 to 61% in 2014 (PNA).

Figure 8: Daily Marijuana Use vs. Perceived Risk

Definition:

The percentage of 12th grade students who reported using marijuana daily and perceived risk of regular marijuana use



Data Source: MFS 1975-2013

The Monitoring the Future study also found that 34% of 12th graders who used marijuana in the past 12 months and lived in states that have passed medical marijuana legislation self-reported that one of their sources of marijuana was another person's medical marijuana recommendation while 6% self-reported that they received it from their own recommendation (Johnston, et al., 2015). Although youth use of marijuana has experienced a decrease from 2000-2009, the Youth Risk Behavior Survey (YRBS) has shown a national increase in high school (9th -12th grade) 30 day use within the subsequent years (20.8%, 2009 vs. 23.4, 2013).

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that an

increase in youth use may occur. It is also likely that as medical marijuana laws continue to be passed in other states, the perception of harm will continue to decrease, leading to an increase in youth use in Wyoming.

Adult/Chronic Issues

Wen, Hockenberry, and Cummings (2015) found an increase in adult marijuana use and binge drinking after the implementation of medical marijuana laws in ten states. The study showed that states that implemented medical marijuana legislation between 2004 and 2012 experienced an average of 14% increase in past-month marijuana use and an 18% increase in marijuana abuse/dependence among adults aged 21 or above. Medical marijuana legislation implementation was also associated with a 10% increase in binge drinking among adults of legal drinking age. Another study was not able to replicate the same findings when increasing the number of variables; thus the evidence of effect of medical marijuana laws on adult abuse is limited.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data are necessary in order to determine any associations between medical marijuana laws and adult use issues.

Marijuana Composition & Interactions

Limited data are available regarding potential drug interactions associated with marijuana. According to Lindsey, Stewart, and Childress (2012), interactions between marijuana and other drugs should be expected, but research in this area is limited. The breadth of this issue must also be considered. Not only do the compounds and potency of marijuana need to be studied within research on drug interactions, but also marijuana in combination with all other drugs from alcohol to prescription to illicit drugs.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data is necessary to determine any issues resulting in marijuana composition or interactions.

Impact to Health Systems

Relatively few studies have looked at the health effects of marijuana and associated impacts to the existing care systems. Health systems include, but are not limited to, hospitals and emergency departments, substance abuse treatment facilities, mental health facilities, payors, and public health. One study (Polen et al., 1993) looked at medical records, between 1979 and 1985, of marijuana users who did not smoke tobacco. Medical records were reviewed for as long as two years after the initial checkup. Frequent marijuana smokers had small increased risks of outpatient visits for

respiratory illnesses, injuries, and other types of illnesses in comparison with nonsmokers. Daily marijuana smoking, though, even in the absence of tobacco, was associated with elevated use of healthcare for various health issues including respiratory and injury.

According to Wang, Roosevelt, and Heard (2012), states that began allowing marijuana use saw calls to poison centers triple regarding children accidentally ingesting marijuana. Conversely, states that did not have medical marijuana laws did not show an increase in call volume. Marijuana-related emergent hospital admission rates per 100,000 have been rising in the United States, according to the Drug Abuse Warning Network (DAWN), which shows emergency department admissions increasing from a rate of 355.03 per 100,000 (16,251 admissions) in 1991 to a rate of 7991.56 per 100,000 (461,028 admissions) in 2012 (SAMHSA, 2013), which is more than a 22% rate increase. The reported DAWN data are also prior to any retail laws going into effect; thus the association is with the passing of medical marijuana only. Marijuana-related admissions to hospital emergency rooms account for more than half of all drug admissions combined. According to the DAWN, data showed a 62% increase (96.2 vs. 146.2 rate per 100,000) in medical emergency room visits resulting from marijuana from 2004 to 2011. DAWN estimates that on an average day in 2011, there were 2,317 drug-related emergency department visits for young adults aged 18 to 25, of which 1,340 involved the use of illegal drugs, the misuse or abuse of pharmaceuticals, or alcohol involved with other drugs. Marijuana was the most reported reason for the emergency room visit at 422 of the 1,340 visits per day.

TEDS reported that there were 403,756 admissions to publicly funded substance abuse treatment facilities for persons aged 18 to 25 in 2011. TEDS indicates that on an average day in 2011, 308 young adults were admitted for treatment for marijuana as the primary substances of abuse.

Further impacts of medical marijuana on health care systems include a potential decrease in opioid use and overdose mortality. In a recent study, Hayes and Brown (2014) found that the availability of medical marijuana as a treatment for chronic pain reduced the use of opioids, thus decreasing the opioid overdose mortality rate. This study examined the yearly opioid overdose mortality rate for all 50 states from 1999 to 2010. The results showed that, on average, there was a 24.8% decrease in the opioid mortality rate after states enacted laws legalizing the use of medical marijuana for chronic pain. Furthermore, when the mortality rate was examined on a yearly basis after legalization, the authors found that these effects grew stronger over time. In the first year after legalizing medical marijuana there was a 19.9% decrease in the mortality rate, a 23.6% decrease after three years, and a 33.7% decrease after five years. These findings remained significant even after controlling for variables such as the presence of

prescription drug monitoring programs, laws requiring pharmacists to request patient identification, and the annual state unemployment rate.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that an increase in the burden on Wyoming's healthcare systems may occur. Further research needs to be conducted in order to have a better understanding of the burdens or benefits medical marijuana legislation creates within existing healthcare systems.

Potential Health Benefits

States with medical marijuana laws vary greatly on the number of conditions to be treated through marijuana use. The ten most common conditions included within the laws and a summary of the current research are outlined below. It is important to note that most research has been conducted with smoked marijuana and not with oils, extractions, or varying modifications to plant compositions. Further research is necessary to understand all medical implications.

HIV/AIDS and AIDS Wasting – Marijuana may mitigate many of the afflictions of AIDS, such as nausea, appetite loss, pain, and anxiety.

Alzheimer's disease –THC may prevent the enzyme acetylcholinesterase from accelerating the formation of "Alzheimer's plaques" in the brain, as well as protein clumps that can inhibit cognition and memory, more effectively than commercially marketed drugs.

Arthritis –Marijuana may assist patients with rheumatoid arthritis to experience a decrease in pain and reduce inflammation. However, marijuana has not been found to improve or curb the disease.

Cancer –Marijuana may assist patients with cancer through reduction of the effects of neuropathic pain, reduction in nausea and vomiting from chemotherapy, improved food intake, and reduction in opiate use. Recently, research has shown preliminary indications that certain marijuana compounds may slow growth and reduce the spread of some forms of cancer *in vitro.*

Chronic Pain – Marijuana has analgesic effects, and the addition of marijuana to therapeutic regimens may reduce the need for opiates.

Crohn's/Gastrointestinal Disorders – Marijuana use may improve quality of life for people suffering from ulcerative colitis and Crohn's disease through easing pain, limiting the frequency of diarrhea, and reversing appetite loss.

Epilepsy/Seizures – Marijuana may play a critical role in controlling spontaneous seizures in epilepsy. Seizure patients, both in the United States and in other countries, report that marijuana has been therapeutic and effective.

Glaucoma - Marijuana may be an effective treatment against glaucoma, one of the leading causes of blindness in the world. Research associates marijuana use with reductions and relief of the intraocular pressure that causes optic nerve damage.

Hepatitis C – Marijuana is associated with improved effectiveness of drug therapy for hepatitis C, an infection that roughly 3 million Americans contract each year. Current hepatitis C medications often have severe side effects such as loss of appetite, depression, nausea, muscle aches, and extreme fatigue. Patients who smoked marijuana every day or two were found to have an increase in completion and effectiveness of the therapy.

Multiple Sclerosis – Marijuana impacts multiple sclerosis patients with muscle spasticity. Even though the drug has been known to cause dizziness and fatigue in some users, many multiple sclerosis patients report marijuana helps ease the pain in their arms and legs when they painfully contract.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that those suffering from covered conditions may experience benefit from the usage of marijuana, but further research is necessary in order to understand medicinal marijuana uses and how it impacts health.

Retail Marijuana Legislation

This section discusses the potential outcomes within each of the five priority areas if the recreational use of marijuana were legalized. Currently, four states (Colorado, Oregon, Alaska, and Washington) have legalized the use of marijuana for recreational purposes for the adult population. In 2012, Colorado and Washington became the first states to legalize, regulate, and tax the sale of marijuana for recreational use, followed by Alaska and Oregon in 2014. All four states had legalized marijuana use for medical purposes prior to legalization for recreational use. Recreational use greatly expanded the retail availability of marijuana and its various forms, such as edibles in the form of candies, brownies, cookies, and liquids, as well as extracts. THC concentrations can vary greatly among all forms.

After reviewing the available evidence in regards to retail marijuana legislation, the subcommittee finds the following:

- Youth: increase in youth use may occur
- Adults and chronic use: insufficient evidence to draw conclusions
- Composition and interaction: insufficient evidence to draw conclusions
- Health system impacts: increased health care utilization related to marijuana exposure
- Potential health benefits: no potential health benefits of marijuana use for the general population

Greater detail regarding the above findings as related to this scenario is provided below.

Youth/Adolescents

In states that have legalized the recreational use of marijuana, the laws generally prohibit the sale to and possession of marijuana products by individuals under the age of 21. One concern of public health professionals is the social impact, particularly on young people, of normalizing the smoking of marijuana. This could also lead to a decrease in the perceptions of harms and risks associated with use (Cork 2015).

Marijuana is not a risk-free drug and can have serious adverse health effects such as learning impairment; interference with memory, perception, and judgement; and damage to the heart, lungs, and immune system. These adverse effects can be magnified in people who begin use at a young age, and some effects can be irreversible. For example, frequent marijuana use has been linked to the risk of testicular cancer, a decrease in IQ, addiction, and recurring psychotic experiences. As discussed previously, use of marijuana by young people can have serious adverse effects on the developing brain, increasing the risk of serious mental health problems (Cork, 2015).

A growing number of poisonings have been attributed to the consumption of marijuana products that are appealing to children, such as cookies, chocolate bars, and brownies. As mentioned above, between 2005 and 2011 the rate of poison center calls for unintentional marijuana exposure in children ages 9 and under more than tripled in states that decriminalized marijuana before 2005. States that had not passed marijuana decriminalization showed no change in call rates (Cork, 2015)

According to the Colorado report, there is moderate evidence to suggest that more unintentional marijuana exposures of children occur in states with increased legal access to marijuana. Additionally, moderate evidence was found that use of child-resistant packaging reduces unintentional child poisonings. The Colorado report also found substantial evidence for association between adolescent and young adult marijuana use and future addiction to illicit drugs in adulthood.

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that youth use rates will increase along with adverse health and learning effects.

Adult/Chronic Issues

General adverse effects of marijuana will not differ with the legalization of recreational use. The difference expected will be in the number of adults. Adverse health effects can be experienced by any use, and the severity of adverse health effects may be magnified by frequent/heavy use. Unfortunately, at the time of this report, only Colorado's retail law has been in effect for a long enough period of time that some data may be collected. In regards to usage and consumption rates, 2014 data are not available at this time. Thus, it is unknown as to the significance of any change.

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data are necessary in order to determine any associations between retail marijuana laws and adult use issues.

Marijuana Composition & Interactions

Marijuana growers and manufacturers continue to invent new ways in which users can ingest the drug other than by smoking it. These include capsules, vaporization, edibles, liquids (such as tea), topical oils, and even suppositories. The flavoring of products makes them more enticing and palatable, especially to youth and young children. Not enough research has been done to determine the exact interactions marijuana may have with other prescription medications, but current research indicates that marijuana could affect psychosis, depression, or anxiety when used with an antipsychotic, antidepressant, or anti-anxiety medication (Crippa et al, 2009).

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data are necessary in order to determine any positive or negative consequences in varying marijuana composition and interactions.

Impact to Health Systems

According to Monte (2015), in the article *The Implications of Marijuana Legalization in Colorado*, it was expected that increased availability would lead to increased health care utilization related to marijuana exposure. Exacerbation of chronic health conditions was expected, since THC is associated with psychosis, anxiety, and depression symptoms which could exacerbate underlying psychiatric disorders. This can be difficult to quantify since marijuana use is often coincident with other behaviors, such as drinking alcohol. However, there has been an increase in emergency department visits in Colorado due to pure marijuana intoxication. Patients may come to emergency departments with anxiety, panic attacks, public intoxication, vomiting, or other nonspecific symptoms precipitated by marijuana use.

Additionally, there have been unexpected effects to health systems due to the consequences of experimentation with new ways to produce and use THC products. The unexpected health effects include increased prevalence of burns and healthcare visits due to ingestion of edible products. The University of Colorado Burn Center has seen an increase in the number of marijuana-related burns. In the past two years, the burn center has had 31 admissions for marijuana-related burns. A majority of these were flash burns related to the THC extraction process. Furthermore, the number of children evaluated in the emergency department for unintentional marijuana ingestion at the Children's Hospital of Colorado increased from zero in the five years preceding marijuana legalization to 14 in the two years since legalization. This number has increased since

legalization: as of September 2014, 14 children had been admitted to the hospital, with seven of these admitted to the intensive care unit.

Monte also states that edible marijuana products are responsible for the majority of health care visits due to marijuana intoxication for all ages. This is likely due to a misunderstanding about the delayed intoxication effects of edibles versus smoking. Furthermore, manufacturing processes for marijuana edible products are not standardized.

In addition to the direct impacts on health systems due to illness related to marijuana use, there are also public health challenges related to evidence-based practices to reduce consumption and restrict youth access. These goals are similar to the tobacco control goals to reduce the public health impact due to smoking and exposure to secondhand smoke. Regulatory policies and efforts effective in tobacco control may lend themselves to marijuana prevention efforts. These are discussed in an article produced by the Tobacco Control Legal Consortium, entitled *Smoking, Toking & Public Health: Lesson from Tobacco Control for Marijuana Regulation* (Cork, 2015).

The increase in efforts to legalize the use and sale of marijuana has created challenges for both opponents and proponents of these measures. Although marijuana and tobacco products vary in many ways, the policy strategies used to regulate the products are often similar. There is a wealth of research and experience in developing the most effective policies to reduce and prevent tobacco-related death and disease; however, the regulation of marijuana as a legal product is a new frontier. Many of the administrative and regulatory challenges facing policy makers and public health professionals in states considering the legalization of use and sale of marijuana are familiar to the tobacco control community: restricting public use, prohibiting youth access, developing robust licensing and zoning laws, regulating the price, and controlling the advertising and marketing of marijuana. Similar to tobacco control goals, most regulatory efforts for marijuana focus on limiting the overall consumption for recreational marijuana and restricting youth access (Cork, 2015).

A list of tobacco control policies that could apply to marijuana regulation includes (Cork, 2015):

Usage

- Prohibit marijuana smoking in public places.
- Prohibit marijuana smoking in workplaces.
- Prohibit marijuana smoking in federally subsidized housing.
- Prohibit marijuana smoking in multi-unit residential properties.
- Prohibit marijuana use when operating motorized vehicles, boats, heavy machinery, etc.

Youth Access

- Set the minimum purchase age at 21.
- Require that marijuana establishment personnel meet the minimum legal purchase age.
- Require tamper proof, child resistant packaging of all marijuana products.
- Require easily visible graphic public health warnings (labels) on marijuana products.
- Institute other options to protect youth from easy access to low-cost marijuana products that make marijuana use more affordable and accessible

Retailer Licensing

- Set up safeguards, such as photo ID checks, to ensure compliance with minimum age requirements.
- Restrict the number of marijuana retail outlets.
- Require a minimum distance between marijuana retail outlets.
- Prohibit the sale of marijuana products at certain types of establishments.
- Limit the number of hours/days when marijuana products can be sold.
- Implement a licensing incentive program.

Pricing

- Set minimum price laws.
- Prohibit price discounting.
- Earmark revenue from taxation for prevention, education, treatment, etc.

Marketing and Advertising

- Prohibit self-service marijuana displays and vending machines.
- Prohibit marijuana product displays.
- Prohibit internet sales.
- Prohibit free samples of marijuana cigarettes and smokeless marijuana products.
- Prohibit brand sponsorship.
- Prohibit mass media advertising.
- Prohibit flavored marijuana products.

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that current systems may need to develop capacity in order to address system impacts.

Potential Health Benefits

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that there are no potential health benefits for the general population.

Conclusions

In reviewing the research within the five health priorities - which are youth and adolescents, adult and chronic issues, marijuana compositions and interactions, impacts to health systems, and potential health benefits, and evaluating the potential legalization of marijuana - limited conclusions could be drawn due to insufficient data, issues within the data collection processes, and contradictory findings. What can be deduced from the data gathered is that very little will change in all five areas if no change in legislation is enacted. If medical marijuana is legalized in Wyoming, an overall increase in marijuana use among both youth and adults is expected, since research has shown a strong association between such laws and a decrease in the perception of marijuana use risk. Additionally, injury from intoxication and the need for addiction treatment resources will increase. The legalization of retail marijuana will reflect the health impacts that Colorado is experiencing such as increase in hospital visits due to unintentional overdose and increased costs of healthcare associated to increased respiratory issues.

Summary Table of Findings

Priority Area	**Current Conditions**	**Medical Legalization**	**Retail Legalization**
Youth	Current trends of use should remain stable	Increase in youth use may occur	Increase in youth use may occur
Adults and Chronic Use	Current trends of use should remain stable	Insufficient evidence to draw conclusions	Insufficient evidence to draw conclusions
Composition & Interactions	No increase or decrease in issues shall occur	Insufficient evidence to draw conclusions	Insufficient evidence to draw conclusions
Health System Impacts	No increase or decrease in health system impacts	Increased health care utilization related to marijuana exposure	Increased health care utilization related to marijuana exposure
Potential Health Benefits	Patients will not be able to receive potential health benefits.	Some potential health benefits of marijuana use by people with certain medical conditions.	No potential health benefits of marijuana use for the general population.

Legislative

Contributors

- Representative Bunky Loucks
- Representative Tyler Lindholm
- Representative James Byrd
- Legislative Aid Misty Heil

Overview

The term marijuana as referenced is Wyoming Statutes will be used interchangeably with the common spelled version marijuana. There is no distinction between the two words for the purpose of this document.

Current pending measures in Wyoming

Referendum – Medical

- Status: signature collection

Reciprocity – Medical 16LSO-0069

- Status: Filed awaiting numbering

Decriminalization – Possession medical or recreational 16LSO-0067

- Status: In final draft before numbering

Statutory Evaluation & Recommendations

Current

- Under current law all forms of marijuana except a diluted extract of CBD oil are illegal to have in ones possession in Wyoming.

Proposed Changes

Referendum Ballot initiative

a. Intent: Legalize marijuana for medical purposes through election referendum process.

b. Problems:

i. The language was adopted from the recreational statutes in Colorado.

ii. Incomplete definitions as to what "chronic pain

iii. Administrative agency authority not clear

iv. Revenue, taxing, and lessening not correct or clearly defined.

v. Rulemaking authority not defined.

Legislative Process - Agency Assignment and Effects

1. Dept. of Revenue (WYDOR) - suggested controlling agency
2. Creation of New Division - Marijuana Enforcement Division (MED)
    a. Separate from Liquor
3. Stand up cost of division
    a. Estimated number of personnel
    b. Administrative Staff
    c. Inspectors
    d. Support staff
    e. Facilities
4. Related costs and impacts to other agencies
    a. Law enforcement – local, county, state
    b. WDEQ
    c. Employment & Labor
    d. Health
5. Conforming to existing statutes and federal law.
    a. Where applicable the MED should have the ability to construct "day-to-day" regulations and process to facilitate governance.
    b. The legislature should adopt conforming language that would redefine DEA classifications removing the Class I status.
    c. The legislature should adopt conforming language to allow for banking practices for the licensed marijuana entities.

d. The legislature should adopt conforming language to address the Cole Memo (U.S. District Attorney)

e. The legislature shall take any action necessary to complete all regulatory and oversite process even when conflicting language will occur with the federal statutes.

    i. The legislature/Attorney General shall notify the federal government of the conflict to federal statutes and the intent of the state of Wyoming to execute the new state rule/statute as a states right stated in the 10th amendment to the U.S. constitution.

Legislative Oversight

House & Senate Revenue committees

Agency Administration

Department of Revenue

Boundaries on the regulations

Recreational use still considered illegal.

Medical – Strict requirements to obtain card.

1. Not any one can prescribe. An additional pharmaceutical endorsement should be required from the board of pharmacy for any degreed medical doctor (MD) requesting to prescribe marijuana for medical purposes.
2. Not all ailments can be covered
    a. A list of ailments shall be generally agreed upon by a commission of currently practicing professional MD and pharmacologist with periodic review for additions and deletions.
    b. The ailment list shall not require legislative authority to add, edit, delete or review effectiveness.

Government Obligations to:

General public – non users

Public users

Local Control

1. Local cannot block medical permissions.
2. Local political subdivision can limit:
    a. Number and location of grow operations
    b. Number and location of retail locations

New statute and Rule Creations – abbreviated

Banking regulations

1. Allowing for the deposit and withdrawal of marijuana generated capital
2. Allowing for the transport/electronic transfer of funds in accordance with current practices

Consumable product definitions and regulation

1. Edible/Oral
2. Smoke able
3. Topical
4. Injectable
5. THC concentration definitions

Medical Marijuana - specific

1. Medical Law
2. Employment law
3. Unemployment benefits
4. Age restrictions and exemptions
5. Licensees & Certified Testing Facilities

Recreational – Commercial Dispensaries

1. Licensure (state)
2. Licensure (local)
3. Age restrictions
4. Geographic restrictions on retail locations

Home Cultivation Personal Use

1. Number of mature plants
2. Number of seedling to premature plants
3. Seed stocks
4. Accounting for plants "life of plant"

Cultivation Commercial

1. Licensure (state & local)
2. Geographic restrictions
3. "Seed to Sale" tracking
4. Department of Ag inspections
    a. Pesticides
    b. Fertilizers
    c. GMO integrated processes

Paraphernalia

1. Sales
    a. Pipes, papers, smoking utensils
    b. Vapor smoking devices
    c. Additional devices generally considered in conjunction with marijuana consumption.

2. Possession of related consumptive items and hardware
3. Minimum age requirements
    a. 21 years of age or older
4. Prohibited Items
    a. TBD

Recommendations

It is recommended by the subcommittee that the items discussed above and not limited to this list be addressed in the following manner.

The overall template from the state of Colorado MED be adapted with conforming language and researched for state constitutionality.

1. Create placeholder bills that would enable the necessary sub-agencies to be created.
2. Create placeholder bills that would define the financial enterprise.
    a. State licensure
    b. Local licensure
    c. State Tax assessment and collection
    d. Local Tax assessment and collection
    e. Fine (noncompliance/violation) schedule and receipt structure
    f. Statutory allowance of marijuana collected funds to be deposited by the department of revenue for MED operations with the unused portion tipping to the general fund
    g. Sub-agency funding stream (MED) independent from general funds generated from license fees
3. Create placeholder bills that would allow for additional agencies to have access to data necessary for inspection, evaluation, violations enforcement

Summary

The most important thing learned on the legislative/statutory side is to be ready to roll-out an agency or group of agencies with rules and statutory guidelines already in place. This requires that agency structural templates be designed along with statutory and rule promulgation. All of

these items should be “stood-up” and beta tested for viability as soon as possible even if there is no immediate need now there will be one in the future.

As stated repeatedly by the Colorado MED director the biggest problem was to stay ahead of the legalization.

Criminal Justice

Crime and Traffic Related

Data compiled by the Wyoming Association of Sheriffs and Chiefs of Police indicates 12.83% of misdemeanors and 31.62% of felonies in Wyoming in 2014, involved drugs. Meth involved arrests have almost doubled, and drug involved arrests have increased by 37%, in the past two years. 75% of all arrests in 2014 involved alcohol and/or other drugs. Marijuana comprised 6.35% of meth, alcohol and other drug involved arrests.

11.43% of DUI arrests in Wyoming in 2014 involved drugs. 15.83% of traffic crashes which resulted in arrest(s) involved drugs. 1.8% of all crashes involved drugs, 4% of all injury crashes involved drugs, and 17% of all fatality crashes involved drugs.

5.62% of all persons arrested for driving under the influence (DUI) were under the age of 21, and that number would represent alcohol and drug impairment. 18.18% of all juvenile arrests involved marijuana, 1.01% of juvenile arrests involved methamphetamine and 27.27% involved other drugs.

Based on observed trends, it is reasonable to conclude each of these figures will likely increase over time. While it was not tracked, it has been reported heroin use/arrests have increased, and it has been reported meth use/arrests have increased. Some experts are attributing this to cartel activity shifting to drugs other than marijuana, due to lost revenue from government regulated legalized marijuana.

Training

Wyoming law enforcement agencies are training their personnel as a reaction to increased drug related activity. Many agencies have drug recognition experts (DRE’s), who have been trained to identify people whose driving is impaired by drugs other than, or in addition to, alcohol. DRE’s often testify in court, where the term "expert" has important legal implications. This training is extensive, and typically involves sending officers out of state for initial training, so that they may observe actual drug impairment. Out-of-state travel and prolonged absences from one’s department can creates difficulties for many of Wyoming’s smaller agencies. Currently, there are approximately 78 DRE’s in Wyoming; however it appears that number may diminish after December if all do not recertify. The National Traffic Law Center published an

article recognizing the need for DRE prosecutors in the court room. The Wyoming law enforcement community is beginning to recognize the significance this may have on the outcome of DUI cases, given the rise of combination (alcohol and drugs) DUI's. Many agencies are training their officers in Advanced Roadside Impaired Driving Enforcement (ARIDE), which was developed by the National Highway Transportation Administration (NHTSA). ARIDE training is less intensive and can be administered locally, allowing agencies to train more of their personnel. Currently, over 600 law enforcement officers in Wyoming, to include all Wyoming Highway Patrol troopers, are trained in ARIDE. Wyoming law enforcement continues to train in basic and advanced drug interdiction techniques, as well as case law and search and seizure.

Currently, officers rely upon a subject's performance of standardized field sobriety tests (SFST's) to determine impairment. Field testing is made much more difficult with Driving Under the Influence of Drug (DUID) cases or combined substance DUI cases. There are devices available which can indicate the presence of THC in a subject's system; however, those devices are extremely expensive. Purchasing of such devices would again most certainly impact an agency's budget.

The Wyoming Highway Patrol and other Wyoming law enforcement agencies are expanding their K-9 narcotics detection programs in response to an observed increase in activity stemming from Colorado legalized marijuana, and because it is believed there are large amounts of narcotics moving into and through our state, which are going undetected. Interestingly enough, if medical or legalized recreational marijuana comes to pass in Wyoming, all law enforcement agencies with K-9 programs will face a dilemma. Currently, we rely upon a K-9's alert as probable cause for a search or a warrant. We may no longer be able to rely solely on a dog's alert when determining probable cause for a search or a warrant. Obviously, the dog cannot discern between "personal use" and "intent to sell" amounts of marijuana. Many agencies in states with legalized marijuana are no longer training their K-9's to detect marijuana, due to possible unwarranted investigatory detentions of people who are not breaking any laws. We understand that many agencies are not altering their training programs or policy, which could place the officer, as well as the agency, in a predicament until sufficient case law is developed to prompt those sorts of changes. The possibility certainly exists that dependent upon what our courts communicate to us, we may have to retrain or replace our existing K-9's. That could be extremely costly, given the average cost of a new K-9 with training is approximately $15,000.

- *Driving under the influence of illegal drugs (DUID) has become a significant problem worldwide.*
- *Drugged drivers are less frequently detected, prosecuted, or referred to treatment compared with drunk drivers.*
- *There is a lack of uniformity or consistency in the way the 50 U.S. states approach drugged drivers.*

- *Current laws in most U.S. states make it difficult to identify, prosecute, or convict drugged drivers.*
- *Too few police officers have been trained to detect drugged drivers.*
- *Per se DUID laws are feasible and represent a good strategy for dealing with drugged drivers.*
- *Per se DUID laws can assist in the prosecution of DUID.*

The many different forms, uses and methods of consumption make marijuana and THC detection and subsequent field testing difficult. Law enforcement is continuously receiving new information and new training, as different methods are discovered.

According to RMHIDTA report, in 2009, 10.17 percent of Colorado youth (12 to 17 years of age) used marijuana, and the national average was 7.03 percent. Wyoming's average was less than 6 percent. In 2013 Colorado ranked 3rd in the nation for youth marijuana use, and was 56 percent higher than the national average. Drug-related suspensions and expulsions from school increased by 40 percent from 2008/2009 to 2013/2014, and the majority were for marijuana violations.

Police Recruiting

Recruiting and hiring qualified candidates for vacant peace officer positions has never been an easy task, as it involves a fairly arduous process, which may include drug testing, aptitude testing, physical agility testing, some form of interview panel, a psychological screening process, and all this is generally capped-off with an in-depth background investigation. This has been made more difficult in the recent past by such things as negative media exposure, low pay, officer assault and mortality rates increasing, and more liberal marijuana laws.

Most, if not all, law enforcement agencies have an automatic disqualifier behavior list for new candidates. Many agencies are finding that their strict drug policy on new-hires is limiting the number of candidates, from an already small pool, who can qualify for their open positions. Pre-employment drug use is becoming one of the most troublesome areas for police recruits. Agencies are finding themselves in a quandary. Should they relax their standards or should they leave positions open? This question is generally answered by relaxing standards to fill positions. This may not be a negative thing. Many agencies have been using policies or standards which have been in place for years, and in examining other agency's policies, they've opted for the change.

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GMIAC Literature Review Article Rating Scale

Introduction: The types/categories of articles accepted for review are peer-reviewed scholarly literature, scientific research organization reports, government agency reports, reports from advocacy groups, news media articles and primarily anecdotal work. All will be considered and each will receive one of the rating scale scores of 1-6 or be placed in the *Multiple Rating* category.

The scores indicate the relative analytical weight that will be attributed to particular articles or reports considered by the GMIAC. The categories are based on research design, measurement, analysis, statistical methods and conclusions. The underpinning assumption initiating this hierarchy is that not all sources of information are equal in reliability, validity, quality, and thus, usefulness to the principal goal of the GMIAC—exploring the potential outcomes associated with medical marijuana legalization in Wyoming.

Definitions:

Defensible conclusions *are defined as conclusions which are logical, reasonable, and supportable by the data included within the report.*

Unbiased *work is defined as a study, report, article or work that is conducted without a predetermined perspective or conclusion.*

By its very nature ***advocacy*** *work is considered* ***biased*** *since it attempts to present a case for a specific perspective or conclusion.* ***Biased*** *work often ignores or minimizes contradictory data and/or ignores or minimizes alternative explanations.*

Anecdotal *work will always receive the lowest rating since it is not based on systematic data collection and analysis.*

Rating Scale:

1 *= Unbiased work from a study or report without methodological and analytic flaws, and presents defensible conclusions*

2 *= Unbiased work from a study or report with only 1 or 2 minor methodological and/or analytic flaws, but still presents defensible conclusions*

3 *= Biased work from a study or report without major methodological and/or analytic flaws, and that does not rely on anecdotal information in its conclusions*

4 *= Unbiased work from any context with 3 or more minor flaws, and/or 1 or more major flaws*

5 *= Unbiased or biased work from any source that does not present defensible conclusions*

6 *= All solely anecdotal work*
Multiple rating *= Wide-ranging large reports from unbiased or biased sources that contain a combination of credible data competently analyzed, credible data wrongly interpreted, anecdote, reasonable and/or unreasonable assumptions. Work in the multiple rating category will have sections with some analytical value (weight) in the compilation of the literature review, and other sections that will have little or no value. No overall single score will be assigned, but the research subcommittee will include portions/sections according to their merit in the literature review report resulting from this project.*

Other *= Documents that simply do not fit any of the criteria above. Examples include copies of state statutes, regulations or rules, Powerpoint presentations, or letters, etc.*

Annotated Bibliography

Adele, G. (2015). Will colleges have to accommodate medical marijuana. Retrieved from http://onlinelibrary.wiley.com/doi/10.1002/say.30017/pdf.

Analytic Rating- Other

American Academy of Pediatrics. (2004). Legalization of Marijuana: Potential Impact on Youth. American Academy of Pediatrics, 113(6). Retrieved from http://pediatrics.aappublications.org/content/pediatrics/113/6/1825.full.pdf

Analytic Rating- 4

AAP Policy Statement 2004: A 2004 policy statement from the AAP that includes only a 1-page abstract, introduction and two policy recommendations. Not a scientific analysis, it is a short summary of a more in-depth position paper.

American Academy of Pediatrics. (2015a). Policy Statement: The Impact of Marijuana Policies on Youth: Clinical, Research, & Legal Update. American Academy of Pediatrics, 135(3). Retrievedfrom:http://pediatrics.aappublications.org/content/pediatrics/early/2015/01/20/peds.2014-4146.full.pdf

Analytic Rating- 4

A policy/position paper written by the AAP committee on Substance Abuse & Committee on Adolescence. With appropriate citations, it discusses the prevalence of youth use, the available science, effects of short and long-term youth use of MJ, decriminalization, medical MJ and offers 10 recommendations. By no means a meta-analysis or scientific article, it contains useful information from those who medically treat youth.

American Academy of Pediatrics. (2015b). State Advocacy Focus: Marijuana Legalization. Retrieved from https://www.aap.org/en-us/advocacy-and-policy/state-advocacy/Documents/Marijuana%20Legalization.pdf.

Analytic Rating - 5

This is a 2-page infographic by the American Academy of Pediatrics (AAP) that summarizes the organization's reasons for its overall policy against legalization of MJ. It is not a report and is an advocacy piece without specific citations.

American Heart Association. (2014). Secondhand marijuana smoke may damage blood vessels as much as tobacco smoke. Retrieved from http://newsroom.heart.org/news/secondhand-marijuana-smoke-may-damage-blood-vessels-as-much-as-tobacco-smoke.

Analytic Rating- Not Assessed

American Public Health Association. (2014). Regulating Commercially Legalized Marijuana as a Public Health Priority. Retrieved from http://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2015/01/23/10/17/regulating-commercially-legalized-marijuana-as-a-public-health-priority.

Analytic Rating- 2

American Society of Addiction Medicine. (2015). Public Policy Statement. Retrieved from: http://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2015/09/22/public-policy-statement-on-marijuana-cannabinoids-and-legalization

Analytic Rating- Not Assessed

Arizona High Intensity Drug Trafficking Area. (2015). Medical marijuana prescription for a new black market. Retrieved from: http://www.justice.gov/archive/ndic/pubs40/40381/40381p.pdf

Analytic Rating- Other

Arria, A., Caldeira, K., Bugbee, B., Vincent, K., O'Grady, K. (2015). The Academic Consequences of Marijuana use during College, 29(3), Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/26237288

Analytic Rating- 4

This study has some serious sampling issues (high GPA, high graduation rates, omitting dropouts), probably resulting in an underestimation of the relationship between marijuana use and college success.

Asbridge, M., Hayden, J.A., Cartwright, J.L. (2012). Acute cannabis consumption and motor vehicle collision risk: systematic review of observational studies and meta-analysis. doi: 10.1136/bmj.e536.

Analytic Rating -1

Careful analysis of a difficult set of data. Presented with appropriate caution and context.

Bedi, G., Cooper, Z., Haney, M. (2012). Subjective, cognitive and cardiovascular dose-effect profile of nabilone and dronabinol in marijuana smokers. DOI: 10.1111/j.1369-1600.2011.00427.x

Analytic Rating- Not Assessed

Bonn-Miller, M.O., Boden, T. M., Vujanovic, A.A., & Drescher, K.D. (2013). Prospective investigation of the impact of cannabis use disorders on posttraumatic stress disorder symptoms among veterans in residential treatment. APA PsycNet, 5(2), 193-200. http://dx.doi.org/10.1037/a0026621.

Analytic Rating - 2

Study well done but the effects are quite small. This is an esoteric topic that might not be too useful to the work of the GMIAC.

Brady, J.E., Li, G. (2014). Trends in Alcohol and Other Drugs Detected in Fatally Injured Drivers in the United States, 1999-2010. Oxford Journals. doi: 10.1093/aje/kwt327.

Analytic Rating -3

Relies on the drug tests reported in the NHTSI FARS report, and drug testing and reporting methods have not remained stable over the time period in question. Appears to indicate a doubling of marijuana-related fatalities during a time when overall use of

marijuana increased by maybe 11%, which doesn't make sense. Also includes positive metabolite results, which may not indicate impairment.

Brohl, B., Kammerzell, R., Koski, L. (2015). WY Presentation: Marijuana Regulation-The CO Model. Colorado Department of Revenue. Retrieved from https://www.colorado.gov/pacific/sites/default/files/DOR%20MarijuanaRegulationIntro.pdf

Analytic Rating - Other

A presentation by Colorado MJ legalization administrators. We had reports from council members that the presentation was very valuable and detailed, but there is really not enough to assess from the PowerPoint slides.

Brookings Institution. (2013). Q&A: Legal Marijuana in Colorado and Washington. Retrieved from http://www.wola.org/sites/default/files/downloadable/Drug%20Policy/Q%26A-%20Legal%20Marijuana%20in%20Colorado%20and%20Washington%20WEB.pdf.

Analytic Rating- Other

Casey, B., Jones, R., Hare., T. (2008). The Adolescent Brain. 1124. DOI: 10.1196/annals.1440.010

Analytic Rating- Other

This article proposes a neurobiological explanation for adolescent risk-taking. Does not specifically address marijuana or its effects.

Caulkins, J. P., Kilmer, B., Kleiman, M. R., MacCoun, R.J., Midgette, G., Oglesby, P., Pacula, R. L., & Reuter, P. (2015). Considering Marijuana Legalization: Insights for Vermont and Other Jurisdictions. RAND. Retrieved from http://www.rand.org/content/dam/rand/pubs/research_reports/RR800/RR864/RAND_RR864.pd

Analytic Rating -1

The RAND 196-page research report is a balanced and exhaustive exploration of the potential outcomes of policy options for states considering medical marijuana while explicitly noting the numerous uncertainties involved. It contains a 30-page references section.

Cerdá, M., Wall, M., Keyes, M. K., Galea, S., & Hasin, D. (2012). Medical marijuana laws in 50 states: investigating the relationship between state legalization of medical marijuana and marijuana use, abuse and dependence. Drug and Alcohol Dependence, 120(1-3), 22–27. http://doi.org/10.1016/j.drugalcdep.2011.06.011.

Analytic Rating -1

This older report compares states that had enacted medical marijuana laws before 2004, using data from two different large national surveys. The states with medical marijuana laws had higher rates of marijuana use and dependence, but the authors point out that the direction of causation is unclear (states where more people used MJ might be more likely to pass MM laws).

Chen, A. (2015). Pot Can Trigger Psychotic Symptoms For Some, But Do The Effects Last. Retrieved from http://www.npr.org/sections/health-shots/2015/03/06/390143641/pot-can-trigger-psychotic-symptoms-for-some-but-do-the-effects-last

Analytic Rating- 5

Media story on association of MJ use and schizophrenia.

Chen, C., Storr, C., Anthony, J. (2009) Early-onset drug use and risk for drug dependence problems. doi: 10.1016/j.addbeh.2008.10.021

Analytic Rating- 1

This analysis of self-report data indicates that people who begin substance use in adolescence develop signs of dependence more rapidly than those who begin in adulthood. This is reported for cannabis as well as inhalants and nonmedical use of stimulants, opioids, anxiolytics, but not hallucinogens. Other studies have shown the same for alcohol. Another chicken and egg issue. The authors point out that those at greater risk for dependence might be more likely to begin use in adolescence, which would mean that attempts to delay onset of use in order to reduce eventual dependence rates might not be effective

Colorado Department of Agriculture. (2015a) Availability of Industrial Hemp Seed. Retrieved from:https://www.colorado.gov/pacific/sites/default/files/atoms/files/Issue%20Paper%20on%20Hemp%20Seed%20Availability%20Final%202-2015.pdf

Analytic Rating - Other

State rules.

Colorado Department of Agriculture. (2015b). CDA Selected examples of pesticides that cannot be used in marijuana production. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Selected%20examples%20of%20pesticides%20that%20cannot%20be%20used%20in%20marijuana%20production.pdf

Analytic Rating - Other

Specific pesticides.

Colorado Department of Agriculture. (2015c). CO Commercial Industrial Hemp Registration Application. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/2015%20App%20Commercial%20Hemp%20Reg%20Final_0.pdf

Analytic Rating -Other

As with other CO statutes and rules, this document shows the level of detail and data collection that will have to be available to accurately track growing of hemp--down to the square-foot GPS coordinates, varieties of hemp, and other agricultural-related grower reporting requirements.

Colorado Department of Agriculture. (2015d). Criteria for potential pesticide products for SLN Cannabis use. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/5-2015%2024c%20criteria%20industry%20doc.pdf

Analytic Rating - Other

Provides instructions and detail on pesticides that is required by EPA. Potential toxicity to bees and other species of animals and plants.

Colorado Department of Agriculture. (2015e). Industrial Hemp Regulatory Program, C.R.S. 35-61-109. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Hemp%20Act%202015%20current.pdf

Analytic Rating -Other

Explains regulatory program.

Colorado Department of Agriculture. (2015f). CO Industrial Hemp Plan Material Declaration for Inclusion. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Hemp%20Declaration%20for%20Inclusion%20non%20mail%20merge%20final_2.pdf

Analytic Rating -Other

Declaration of varieties grown and other.

Colorado Department of Agriculture. (2015g). CO Industrial Hemp Harvest Notification Form. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Hemp%20Harvest%20Notification%20form%202015%20final.pdf

Analytic Rating -Other

Harvest notification for growers.

Colorado Department of Agriculture. (2015h). CO Industrial Hemp Plant Report Form. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Hemp%20Planting%20Report%20final_0.pdf

Analytic Rating -Other

Industrial hemp notification.

Colorado Department of Agriculture. (2015i). CDA Industrial Hemp Inspection, Sampling and Testing Protocol. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/CDA%20Industrial%20Hemp%20Inspection%20Protocol%202015.pdf

Analytic Rating -Other

Rules.

Colorado Department of Agriculture. (2015j). CDA Letter to the USDA re: hemp seeds. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Letter%20to%20Secretary%20Vilsack.pdf

Analytic Rating -Other

Letter.

Colorado Department of Agriculture. (2015k). CDA Products that have been removed from the list of pesticides that may be used on marijuana. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Products%20that%20have%20been%20removed%20from%20the%20list%20of%20pesticides%20that%20may%20be%20used%20on%20marijuana.pdf

Analytic Rating -Other

Removal of pesticides from approved list.

Colorado Department of Agriculture. (2015L). CO Rules for the Administration & Enforcement of the Industrial Hemp Regulatory Program Act. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/8%20CCR%201203-23%20final%20effective%2003-30-15.pdf

Analytic Rating - Other

The Colorado rules for admin and enforcement of hemp no doubt required some very heaving lifting to create. They are valuable, demonstrate the many responsibilities that will accompany MM, and provide a solid model for Wyoming to consider. Yet they are not really suited to the lit review rating scale. Thus they are given a rating of "Other."

Colorado Department of Agriculture. (2015m). Research and Development Industrial Hemp Registration Application. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/2015%20App%20R%20and%20D%20good%20Hemp%20Reg%20Final_0.pdf

Analytic Rating - Other

See comments on CO Rules for the Administration & Enforcement of the Industrial Hemp Regulatory Program Act.

Colorado Department of Agriculture. (2015n). CO Criteria for Pesticides Used in the Production of Marijuana in Colorado. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Criteria%20for%20pesticides%20used%20in%20the%20production%20of%20marijuana%20in%20Colorado_0.pdf

Analytic Rating -Other

Colorado Department of Agriculture. (2015o). CO Pesticides that can be used to produce marijuana. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/Pesticides%20that%20can%20be%20used%20to%20produce%20marijuana%2010-30-15.pdf

Analytic Rating -Other

Colorado Department of Agriculture. (2015p). CDA SLN Application Checklist: Cannabis Indoor Uses. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/SLN%20checklist-Cannibis.pdf

Analytic Rating -Other

Colorado Department of Agriculture. (2015q). A Guide for Requesting Section 24(c) Special Local Need Registrations in Colorado. Retrieved from https://drive.google.com/open?id=0Bxm7nAzNwoBgenVzR0lYWjdJMW8

Analytic Rating -Other

Colorado Department of Agriculture. (2015r). Availability of Industrial Hemp Seed. https://www.colorado.gov/pacific/sites/default/files/atoms/files/Issue%20Paper%20on%20Hemp%20Seed%20Availability%20Final%202-2015.pdf

Analytic rating- Not Assessed

Colorado Department of Public Health & Environment. (2015). Monitoring Health Concerns Related to Marijuana in Colorado: 2014. Retrieved from http://www2.cde.state.co.us/artemis/hemonos/he1282m332015internet/he1282m332015internet01.pdf

Analytic Rating - Multiple Ratings

Created by statute, the Colorado Retail Marijuana Public Health Advisory Committee's duties are to conduct a review of the scientific literature and data currently available on health effects of marijuana use. The report is encyclopedic using national and Colorado-based data sources. Overall it appears the methods and analysis observe prudent scientific methods, 400 pages including appendices.

Colorado Department of Revenue. (2015). Laws: Constitution, statutes. And regulations on marijuana enforcement. DOI: 10.1111/j.1521-0391.2013.12044.x

Analytic Rating- Not Assessed

Colorado State Licensing Authority. (2015). Colorado Rules for Medical Marijuana. Retrieved from https://www.colorado.gov/pacific/sites/default/files/Medical%20Redlines.pdf

Analytic Rating -Other

Cork, K. (2015). Toking, Smoking & Public Health: Lessons from tobacco control for marijuana regulation. http://publichealthlawcenter.org/sites/default/files/resources/tclc-synopsis-marijuana-tobacco-2015_0.pdf.

Analytic rating- Not Assessed

D'Amico, E., Miles, J., Tucker, J. (2015). Gateway to Curiosity: Medical Marijuana Ads and Intention and use during Middle School. 29(3). http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4587352/

Analytic Rating- 2

The study was done well, and the conclusions are mostly solid, however they slightly overstated the importance of a few of their results based on the statistical significance level.

Denver City Attorney's Office. (2015). Marijuana in the Mile-High City. https://dmms2015.com/wp-content/uploads/2015/11/14-Legal-Roundtable.pdf

Analytic Rating- Not Assessed

Denver The Mile High City. (2015a). Marijuana Business Licensing. https://drive.google.com/file/d/0Bxm7nAzNwoBgWG1FTG82bS1YRmRFTXA0UjlMZlpldHdnYXNN/view?pref=2&pli=1

Analytic Rating- Not Assessed

Denver The Mile High City. (2015b). Marijuana management symposium. https://drive.google.com/file/d/0Bxm7nAzNwoBgU3FHbWxONU9hMmFGblFYTnM0SHN6UG5aNTFR/view?pref=2&pli=1

Analytic Rating- Not Assessed

Derby, W. (2008). The Impact of Drug Decriminalization on the Future of Police Recruiting Standards. Retrieved from http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display_arch&article_id=1582&issue_id=82008

Analytic Rating- Not Assessed

Di Forti, M., Marconi, A., Carra, E., Fraiette, S., Trotta, A., Bonomo, M., Bianconi, F., Gardner-Sood, P., O'Connor, J., Russo, M., Stilo, S. A., Marques, T. R., Mondelli, V., Dazzan, P., Pariante, C., David, A., Gaughran, F., Atakan, Z., Lyegbe, C., Powell, J., Morgan, C., Lynskey, M., Murray, R. (2015). Proportion of patients in south London with first-episode psychosis attributable to use of high potency cannabis: a case-control study. The Lancet Psychiatry, 2(3), 233-238. doi: http://dx.doi.org/10.1016/S2215-0366(14)00117-5

Analytic Rating -3

They make the logical error of assuming that use of "skunk" cannabis means only exposure to the drug, ignoring all of the individual and subcultural factors associated with use of the drug.

Drug Enforcement Administration. (2015). State-approved marijuana measures as of August 25, 2015. Retrieved from https://drive.google.com/file/d/0Bxm7nAzNwoBgUnZoMW5jWWpVYkE/view?pref=2&pli=1

Analytic Rating- Not Assessed

DynaMed Plus. (2015). Medical uses of Cannabinoids. https://drive.google.com/file/d/0Bxm7nAzNwoBgUDB6U0RhNGs1Um8/view?pref=2&pli=1

Analytic Rating- Not Assessed

Ellison, J., Spohn, R. (2015). Colorado's legalization of medicinal marijuana: The effects on Nebraska's law enforcement and local jail system. Retrieved from http://www.unomaha.edu/college-of-public-affairs-and-community-service/nebraska-center-for-justice-research/documents/reduced-colorado-legalization.pdf.

Analytic Rating- Not Assessed

Garry, A., Rigourd, V., Amirouche, A., Fauroux, V., Aubury, S., Serreau, R. (2009). Cannabis and Breastfeeding. http://www.hindawi.com/journals/jt/2009/596149/.

Analytic Rating-other

This is not a research study but a rather superficial review of the topic of breastfeeding in cannabis users.

Ghosh, T., Van Dyke, Michael., Maffey, Ali., Whitley, Elizabeth., Erpelding, Dana., Wolk, Larry. (2015). Medical Marijuana's Public Health Lessons- Implications for Retail Marijuana in Colorado. DOI: 10.1056/NEJMp1500043

Analytic Rating- Others

Not a research article but a brief "Perspectives" informational piece that simply reviews health-related conditions based on public data sources after legalization of MJ in CO; no actual conclusions drawn. Neutral short review of existing data related to heath pointing out that much more data is needed in order to fully understand the impacts of legal MJ.

Eisenberg, E., Ogintz, M., Almog, S. (2014). The Pharmacokinetics, Efficacy, Safety, and Ease of Use of a Novel Portable Metered-Dose Cannabis Inhaler in Patients With Chronic Neuropathic Pain: A Phase 1a Study. DOI: 10.3109/15360288.2014.941130

Analytic Rating- 3

The authors were funded by the company making the device they're testing. The device might prove to be useful, but these results are based on a small number of people.

Fichna, J., Bawa, M., Thakur, G., Tichkule, R., Makriyannis, A., McCafferty, D., Sharkey, K., Storr, M. (2014). Cannabinoids Alleviate Experimentally Induced Intestinal Inflammation by Acting at Central and Peripheral Receptors. doi: 10.1371/journal.pone.0109115

Analytic rating- Not assessed

Governors Highway Safety Association. (2015). Drug-Impaired Driving. http://www.ghsa.org/html/files/pubs/GHSA_DruggedDrivingt2015_R5_LoResInteractive.pdf

Analytic Rating- Not Assessed

Hall, W. (2014). What has research over the past two decades revealed about the adverse health effects of recreational cannabis use. Retrieved from https://drive.google.com/file/d/0Bxm7nAzNwoBgZGlTTE03RS1wTFU/view?pref=2&pli=1.

Analytic Rating-1

A careful effort to review recent literature on all the major health consequences of marijuana use, relying on the published literature and pointing out when inconsistent results weaken a conclusion.

Harthorne, M. (2013). Legal pot means big changes for state's drug-sniffing dogs. Retrieved from http://www.komonews.com/news/local/Legal-pot-means-big-changes-for-states-drug-sniffing-dogs-199043431.html.

Analytic Rating- Not Assessed

Hasin, D., Wall, M., Keyes, K., Cerda, M., Schulenberg, J., O'Malley, P., Galea, S., Pacula, R., Feng, T. (2015). Medical marijuana laws and adolescent marijuana use in the USA from 1991-2014: results from annual, repeated cross-sectional surveys. http://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(15)00217-5/abstract

Analytic Rating- 1

Well-done study reaching defensible conclusions based on their data

Hondro, M. (2015). Marijuana Research find Psychosis in Pot-Smoking teen's way up. Retrieved from http://www.digitaljournal.com/life/health/marijuana-research-says-psychosis-in-teens-who-smoke-pot-way-up/article/435100.

Analytic Rating- Not Assessed

Horvath, B., Mukhopadhyay, P., Hasko, G., Pacher, P. (2012). The Endocannabinoid System and Plant-Derived Cannabinoids in Diabetes and Diabetic Complications. 180(2). doi: 10.1016/j.ajpath.2011.11.003

Analytic Rating- Not Assessed

Jacobus, J., Tapert, S. (2014). Effects of cannabis on the adolescent brain. 20(13). http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3930618/

Analytic Rating- 1

This review paper examines a wide variety of research on cognitive and brain effects of cannabis use in adolescents, especially those smaller effects found after weeks of

abstinence. It appropriately points out that the differences seen may have been pre-existing.

Jetly, R., Heber,A., Fraser, G., Boisvert. (2015). The efficacy of nabilone, a synthetic cannabinoid, in the treatment of PTSD-associated nightmares: A preliminary randomized, double-blind, placebo-controlled cross-over design study.

Analytic Rating- Not Assessed

Johnson, R. (2007). Hemp as an Agricultural Commodity.

Analytic Rating- 4

Demonstrates the potential utility of nabilone, a synthetic cannabinoid, in treating PTSD. Small sample size, marginal statistical significance.

Kim, W., Doyle, M., Liu, Z., Lao, Z., Skin, Y., Carlson, O., Kim, H., Thomas, S., Napora, J., Lee, E., Moaddel, R., Wang, Y., Maudsley, S., Martin, B., Kulkarni, R., Egan, J. (2011). Cannabinoids Inhibit insulin receptor signaling in pancreatic b-cells. 60(4). doi: 10.2337/db10-1550

Analytic Rating- Not Assessed

Institute for Behavior and Health. (2014). A Strategy to Assess the Consequences of Marijuana Legalization. Retrieved from https://drive.google.com/file/d/0Bxm7nAzNwoBgVkRVb0RqcDRiUUU/view?pref=2&pli=1.

Analytic Rating- Not Assessed

Kim, H., Kim, B., Park, B., Jeon, J., Lee, S., Mann, S., Ahn, S., Hong, S., Jeong, S. (2015). Topical cannabinoid receptor 1 agonist attenuates the cutaneous inflammatory responses in oxazolone-induced atopic dermatitis model. 54(10). DOI: 10.1111/ijd.12841.

Analytic Rating- Not Assessed

Kripp, J., Stelter, L. (2014). Are Conflicting Comments by Obama on Marijuana Policy Undermining Law Enforcement's Drug War. Retrieved from http://inpublicsafety.com/2014/02/are-conflicting-comments-by-obama-on-marijuana-policy-undermining-law-enforcements-drug-war/

Analytic Rating- Not Assessed

Ksir, C., Hart, C. (2016). Cannabis and Psychosis: a Critical Overview of the Relationship. Substance Use and Related Disorders. 2016 Topical Collection.

Analytic Rating- 1

A careful study looking at the strengths and weaknesses of prior studies exploring the relationship between cannabis use and psychosis.

Learn about Sam. (2015a). American Academy of Pediatrics Opposes Marijuana Legalization, Medicalization; Supports Research. Retrieved from http://marijuanaharmlessthinkagain.org/wp-content/uploads/2013/10/American-Academy-of-Pediatrics-Opposes-Marijuana-Legalization.pdf

Analytic Rating- Not Assessed

Lee, D., Whitehead, K., Backus, E. (2015). Public Health and Environmental Quality Concerns in the Marijuana Industry. https://dmms2015.com/wp-content/uploads/2015/11/6-Public-Health-Environmental-Quality.pdf

Analytic Rating- Not Assessed

Light, M. K., Orens, A., Lewandowski, B., Pickton, T. (2015). Market Size and Demand for Marijuana in Colorado. The Marijuana Policy Group. Retrieved from https://www.colorado.gov/pacific/sites/default/files/Market%20Size%20and%20Demand%20Study,%20July%209,%202014%5B1%5D.pdf

Analytic Rating - Not Assessed

Lynne-Landsman, S., Livingstron, M., Wagenaar, A. (2013). Effects of State Medical Marijuana Laws on Adolescent Marijuana Use, 103(8). Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4007871/.

Analytic Rating- 2

Careful study, reaching appropriate conclusions for their data and with appropriate caveats in the discussion. However, later studies show that the specifics of MMLs make a big difference and this study treats all MMLs as equivalent.

Lorenzetti, V., Solowij, N., Whittle, S., Fornito, A., Lubman, D., Pantelis, C., Yucel, M. (2015). Gross Morphological Brain Changes with Chronic, Heavy Cannabis use, 206(1). Retrieved from http://bjp.rcpsych.org/content/206/1/77.

Analytic Rating- 2

Brief report on a brain scan study showing statistical differences between heavy smokers and controls in a couple of brain regions. Figure DS1 shows that there is considerable overlap between the groups in these regions and the range of volumes (highest to lowest) is similar, so it's not clear whether these fairly small differences are important in a neurological sense.

Mackie, j. (2008). Cannabinoid Receptors: Where they are and what they do. DOI: 10.1111/j.1365-2826.2008.01671.x

Analytic Rating- Other

This is not original research, but a description of the neurobiology of cannabinoid receptors as understood 7 years ago. Not really useful for our purposes

Macrae, F. (2014). Cannabis users 'have lungs of 80-year-olds': Doctors warn people are turning up at A&E with new form of emphysema after using drug for less than ten years. Retrieved from http://www.dailymail.co.uk/health/article-2858373/Cannabis-users-lungs-80-year-olds-Doctors-warn-people-turning-E-new-form-emphysema-using-drug-ten-years.html.

Analytic Rating- Not Assessed

Mair, C., Freisthler, B., Ponicki, W., Gaidus, A. (2015). The impacts of marijuana dispensary density and neighborhood ecology on marijuana abuse and dependence, 154. Retrieved from http://www.sciencedirect.com/science/article/pii/S037687161500318X

Analytic Rating- 4

This study purports to inform us of the "Impact of marijuana dispensary density" on marijuana abuse and dependence rates using geographic data from all of California's zip codes. Unfortunately, they got 10 years' worth of data on hospital admissions, but only had dispensary information for the last year of the study (2012). We have to assume that there were large changes in the number and distribution of dispensaries over the time period representing their hospitalization data. Also, they failed to consider the very real likelihood that dispensaries tend to become established in areas that have more users to begin with, both because of local political decisions and simple marketing strategies.

Maxwell, K. (2015). Regional Water Board Approves Marijuana Permit. Daily Journal. Retrieved from http://www.ukiahdailyjournal.com/general-news/20150813/regional-water-board-approves-marijuana-permit.

Analytic Rating - Not Assessed

Marijuana Policy Project. (2015a). Do Harsh Penalties for Marijuana Possession Reduce Teen Use? Retrieved from https://www.mpp.org/issues/decriminalization/decrim-teen-use-analysis/

Analytic Rating - 4

Work is from a marijuana legalization advocacy group. Data from charts ignore substantial NSDUH confidence intervals and infer differences that are probably not statistically significant. NSDUH and YRBS data can have confidence intervals ranging from 2 to over 5 percentage point at the 95% confidence level. Data only weakly support conclusions.

Marijuana Policy Project. (2015b). The Impact of Marijuana Policies on Youth: Clinical, Research, and Legal Update. Retrieved from https://www.mpp.org/issues/decriminalization/aap-decriminalization-report/

Analytic Rating -5

The 1-page document is from a marijuana legalization advocacy group. The unnamed author(s) extract quotes from a 2014 policy/position paper by the American Academy of Pediatrics (AAP). The full AAP paper is reviewed below. It appears the Marijuana Policy Project crafted their own marijuana issue-related questions and then pulled quotes from the AAP report and present them as AAP responses to those questions. Although the AAP quoted material is accurate, it only partially represents (and is sometimes misrepresentative) of the AAP policy view.

Marijuana Policy Project (2015c). Do Harsh Penalties for Marijuana Possession Reduce Teen Use. Retrieved from https://drive.google.com/file/d/0Bxm7nAzNwoBgN211QUVaMml6NEU/view?pref=2&pli=1

Analytic Rating- Not Assessed

Mastre, B. (2015). Special Report- Nebraska v. Colorado: The War on Weed. Retrieved from http://www.wowt.com/home/headlines/Special-Report---Nebraska-v-Colorado-The-War-on-Weed-295996161.html.

Analytic Rating- 6

Interview between TV reporter and Andy Williams, part owner of Medicine Man dispensary in Denver. Coincidentally, the research subcommittee visited Medince Man and met with Andy and his sister. Interesting conversation on views of MJ-legal and non MJ-legal border states, but is anecdotal only.

McPartland, J., Duncan, M., Di Marzo, V., Pertwee, R. (2015). Are cannabidiol and Δ^9-tetrahydrocannabivarin negative modulators of the endocannabinoid system? A systematic review. DOI: 10.1111/bph.12944

Analytic Rating- 1

This meta-analysis of cannabinoid receptor binding research is important in pointing out the complexity of the combined effects of THC, CBD, and THCV present in marijuana, and the difficulty of mimicking these effects with some of the synthetic cannabinoids that have been produced in pharmaceutical labs.

Meier, M. H., Caspi, A., Ambler, A., Harrington, H., Houts, R., Keefe, R. S. E., & 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. http://doi.org/10.1073/pnas.1206820109.

Analytic Rating - 2

The study looks well-designed, but the actual results are very small relative to the variability. Their main conclusions rely on questionable statistical methods (esp the linear trend analysis).

Merrill, J., Fox,K., Lewis, S., Pulver, G. (1994). Cigarettes, Alcohol, Marijuana, Gateway to Illicit Drug Use . https://www.ncjrs.gov/App/publications/abstract.aspx?ID=161247

Analytic Rating- Other

Unable to obtain the full paper, but it is over 20 years old and there are several more recent papers on the gateway hypothesis.

Missouri Substance Abuse Prevention Network. (2012). Marijuana Facts for Law Enforcement. Retrieved from http://www.plattecountyhealthdept.com/docview.aspx?docid=37474.

Analytic Rating- Not Assessed

Monte, A., Zane, R., Heard, K. (2015). The implications of marijuana legalization in Colorado. doi:10.1001/jama.2014.17057.

Analytic Rating- Not Assessed

Monitoring Health Concerns related to Marijuana in Colorado: 2014. (2014). http://www2.cde.state.co.us/artemis/hemonos/he1282m332015internet/he1282m332015internet02.pdf.

Analytic Rating- Other

Moore, B., Auguston, E., Moser, R., Budney, A. (2004). Respiratory Effects of Marijuana and Tobacco Use in a U.S. Sample. DOI: 10.1111/j.1525-1497.2004.40081.x.

Analytic Rating- 4

77% of MJ smokers used tobacco, so most of the respiratory effects can be attributed there. The first line of their discussion overstates the case. Other than wheezing, there's not much of a difference.

Morean,M., Kong, G., Camenga, D., Cavallo, D., Sarin, S. (2015). High School Students' Use of Electronic Cigarettes to Vaporize Cannabis .136(4).

Analytic Rating- Not Assessed

Morgan, C., Curran, V. (2008). Effects of cannabidiol on schizophrenia-like symptoms in people who use cannabis. 192(4). DOI:10.1192/bjp.bp.107.046649

Analytic rating- 4

The hair analysis measure is very imprecise, and the scale used for "unusual experiences" probably doesn't reflect any real pathology.

Moselhy, H. (2013). Gateway Hypothesis. https://drive.google.com/file/d/0Bxm7nAzNwoBgSWFLZ0ZSajBVLTg/view?pref=2&pli=1

Analytic Rating- 1

Not really a meta-analysis, more of a theoretical overview of the entire Gateway hypothesis, with appropriate references to support the various perspectives.

National Commission on Drug abuse (2015) 1972 Shafer Commission. Retrieved from http://www.iowamedicalmarijuana.org/documents/nc1contents.aspx.

Analytic Rating - Multiple Rating

The National Commission on Marihuana and Drug Abuse was created by the Controlled Substances Act signed into law by President Richard Nixon. It is the same statute that created the five classification "Schedules" of drugs. Even though the federal report is over 40 years old, it engages in reasonable discussion of topics hotly debated currently: dosage, durations of use, patterns of use, mental function, intoxication…

National Conference of State Legislatures. (2015). State Medical Marijuana Laws. Retrieved from http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx.

Analytic Rating- Other

National Institute on Drug Abuse. (2015a). Effects of marijuana – with and without alcohol – on driving performance. Retrieved from http://www.drugabuse.gov/news-events/news-releases/2015/06/effects-marijuana-without-alcohol-driving-performance#.VhR29fOhKyY.mailto.

Analytic Rating -1

Well-done laboratory study comparing THC levels and BAC levels on driving simulator performance.

National Institute on Drug Abuse. (2015b). Researching Marijuana for Therapeutic Purposes: The Potential Promise of Cannabidiol (CBD). Retrieved from http://www.drugabuse.gov/about-nida/noras-blog/2015/07/researching-marijuana-therapeutic-purposes-potential-promise-cannabidiol-cbd#.VhR1xiBb10k.mailto.

Analytic Rating - Not Assessed

Nelson, S. (2015). Colorado's New Attorney General: Pot Legalization 'Not Worth It'. Retrieved from http://www.usnews.com/news/articles/2015/02/23/colorados-new-attorney-general-pot-legalization-not-worth-it.

Analytic Rating- Not Assessed

NHTSA. (2014). Drug and Alcohol Crash Risk Study. Retrieved from http://www.nhtsa.gov/Driving+Safety/Research+&+Evaluation/Alcohol+and+Drug+Use+By+Drivers.

Analytic Rating - 2

NIH. (2015). DrugFacts: Marijuana. Retrieved from http://www.drugabuse.gov/publications/drugfacts/marijuana.

Analytic Rating - 3

DrugFacts: Marijuana, NIDA website. A 6-page factsheet (~1,200 words), it explains methods of ingesting cannabis, short and long-term brain functioning, health effects, addiction, etc. The website publication is aimed at informing the public, at a very basic level, the commonly accepted outcomes of MJ use and abuse. Contains references.

Office of National Drug Control Policy (2012a). Drug Availability Estimates in the United States. Retrieved from: https://www.whitehouse.gov/sites/default/files/page/files/daeus_report_final_1.pdf

Analytic Rating- Not Assessed

Office of National Drug Control Policy (2012b). What America's Users Spend on Illegal Drugs. Retrieved from https://www.whitehouse.gov/sites/default/files/page/files/wausid_report_final_1.pdf.

Analytics Rating- Not Assessed

Office of National Drug Control Policy (2015a). What America's Users Spend on Illegal Drugs: 2000-2010. Retrieved from https://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/wausid_results_report.pdf.

Analytic Rating- Not Assessed

Office of National Drug Control Polciy (2015b). What America's Users Spend on Illegal Drugs: 2000-2010 Technical Report. Retrieved from https://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/wausid_technical_report.pdf.

Analytic Rating- Not Assessed

Onders, B., Casavant, M., Spiller, H., Chounthirath, T., Smith, G. (2015). Marijuana Exposure Among Children Younger Than Six Years in the United States. Retrieved from http://cpj.sagepub.com/content/early/2015/06/03/0009922815589912.long.

Analytic Rating- 1

Solid report on the exposure of young children to accidental ingestion of cannabis products.

Pacula, R.L., Powell, D., Heaton, P., & Sevigny, E.L. (2013). Assessing the Effects of Medical Marijuana Laws on Marijuana and Alcohol Use: The Devils is in the Details. The National Bureau of Economic Research. doi: 10.3386/w19302.

Analytic Rating -1

Similar to other recent studies in showing that not all MM laws are equal.

Pennsylvania Medical Society. (2015). Is marijuana medicine. Retrieved from http://pamedwebemail.pamedsoc.org/PAMED-IsMarijuanaMedicine.pdf.

Analytic Rating- Not Assessed

Peters, F. (2015). Teen Marijuana Use and the Risk of Psychosis. Retrieved from http://www.worldcrunch.com/culture-society/teen-marijuana-use-and-the-risks-of-psychosis/drug-health-addiction-cannabis-europe/c3s18633/.

Analytic Rating- Not Assessed

Police Foundation. (2015). Colorado's Legalization of Marijuana and the Impact on Public Safety. Retrieved from http://www.policefoundation.org/wp-content/uploads/2015/06/Legalized-Marijuana-Practical-Guide-for-Law-Enforcement_Rev6_18_15_LOW_0.pdf.

Analytic Rating- 3

Quakenbush, L. (2015). CDA Memo to Colorado marijuana producers & other stakeholders. Colorado Department of Agriculture. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/letter%20mj%20stakeholders%20SLN%20info.pdf

Analytic Rating -Other

Memo to growers.

Roberts, M. (2015). Feds Should Amend Marijuana and Hemp Laws, Legislatures Group Says. Westword Magazine. Retrieved from http://www.westword.com/news/feds-should-amend-marijuana-and-hemp-laws-legislatures-group-says-7013540.

Analytic Rating -6

Regional news magazine story describing positions and resolutions by the National Conference of State Legislatures organization. The primary position is to allow states to set their own marijuana policies without federal interference.

Rocky Mountain High Intensity Drug Trafficking Area. (2014).The Legalization of Marijuana in Colorado: The Impact, 2. Retrieved from http://www.in.gov/ipac/files/August_2014_Legalization_of_MJ_in_Colorado_the_Impact(1).pdf

Analytic Rating - Multiple Ratings

This 170 page report contains useful information from well-known reliable sources, but also contains anecdotal information from a wide variety of sources: media reports, law enforcement agents/administrators, school employees... As such, the analytical value of each data source presented is highly variable and must individually be considered on the basis of the data source accessed, methodology employed, and analysis performed.

Rocky Mountain High Intensity Drug Trafficking Area. (2015a).Monitoring Health Concerns Related to Marijuana in Colorado, 3. Retrieved from http://s3.amazonaws.com/media.hudson.org/files/publications/Vol32015PREVIEWLegalizationofMJinColoradotheImpact.pdf.

Analytic Rating - Multiple Rating

This preview report contains useful information from well-known reliable sources and local data collection efforts in Colorado. As such, the analytical value of each data source presented is highly variable and must individually be considered on the basis of the data source accessed, methodology employed, and analysis performed.

Rocky Mountain High Intensity Drug Trafficking Area (2015b). The Legalization of Marijuana in Colorado The Impact,3, Retrieved from https://www.coloradopotguide.com/media/2987/2015-hidta.pdf

Analytic Rating- Not Assessed

Rocky Mountain High Intensity Drug Trafficking Area. (2015c). The Legalization of Marijuana in Colorado The Impact.

Analytic Rating- Not Assessed

Sacco, L., Finklea, K. (2014). State Marijuana Legalization Initiatives: Implications for Federal Law Enforcement. Retrieved from https://www.fas.org/sgp/crs/misc/R43164.pdf

Analytic Rating- Not Assessed

Sachs, J., McGlade,E., Yurgelun-Todd, D. (2015). Safety and Toxicology of Cannabinoids, 12(4). Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4604177/

Analytic Rating- 1

This report skims the surface of many areas related to both safety concerns and potential efficacy of medicinal cannabis, doing so in an unbiased manner and providing a useful

overall perspective on the limitations of our current knowledge as well as the risk-benefit context of other treatments or activities.

Salomonsen-Sautel, S., Sakai, J., Thurstone, C., Corley,R., Hopfer, C. (2012). Medical Marijuana Use Among Adolescents in Substance Abuse Treatment. 51(7).

Analytic Rating- 3

Self-report for adolescents in two Denver substance-abuse programs, 74% of whom reported that they had used someone else's medical marijuana, indicating that medical marijuana does get diverted to adolescent users. They did not differentiate whether the clients were treated for marijuana dependence or other substances. Their suggestion that "substantial diversion" is taking place seems overdone based on this fairly small high-risk sample.

Sarfaraz, S., Adami, V., Syed, D., Afaq, F., Muktar. (2015). Cannabinoids for Cancer Treatment: Progess and Promise. http://cancerres.aacrjournals.org/content/68/2/339.full.pdf+html

Analytic Rating- Not Assessed

Scavone, J., Sterling, R., Weinstein, S., Van Bockstaele, E. (2013). Impact of cannabis use during stabilization on methadone maintenance treatment. 22(4). DOI: 10.1111/j.1521-0391.2013.12044.x

Analytic Rating- 4

Study on opiate addicts who also used cannabis, looking for evidence that cannabis use reduces the amount of opiate use or reduces the severity of withdrawal symptoms, based on self-report. Several sampling issues, and the results are not particularly impressive.

Scavone, J., Sterling, R., Van Bockstaele. (2013). Cannabinoid and Opioid interactions: implications for opiate dependence and withdrawal. 248.
doi: 10.1016/j.neuroscience.2013.04.034

Analytic Rating- Not Assessed

Schicho, R., Bashashati, B. McHugh, D., Saur, D., Hu, H., Zimmer, A., Lutz, A., Mackie, K., Bradshaw, H., McCaggerty, D., Sharkey, K., Storr, M. (2010). The atypical cannabinoid O-1602 protects against experimental colitis and inhibits neutrophil recruitment. DOI: 10.1002/ibd.21538. 17(8).

Analytic Rating- Not Assessed

Sevigny, E., Pacula, R.L., & Heaton, P. (2014). The Effects of Medical Marijuana Laws on Potency. RAND, 25(2), 308-319. Retrieved from http://www.rand.org/pubs/external_publications/EP51767.html.

Analytic Rating -1

Tetrahydrocannabinol (THC)—the main psychoactive component of marijuana—nearly tripled from 3.4% to 9.6% over the period 1990-2010. "Marijuana is not a uniform product, varying considerably by strain (indica, sativa, hybrid), cultivation technique (hemp, sinsemilla, hydroponic), and manner of processing (herb, resin, oil)." This comprehensive RAND report explores whether medical marijuana laws have contributed to the rising rates of potency.

Silinis, E., Horwood, J.L., Patton, G.C., Fergusson, D.M., Olsson, C.A., Hutchinson, D.M., Spry,E., Toumbourou, J.W., Degenhardt, L., Swift, W., Coffey, C., Tait, R.J., Letcher, P., Copeland, J., Mattick, R. P. (2014). Young adult sequelae of adolescent cannabis use: An integrative analysis. The Lancet Psychiatry, 1(4), 286-293. DOI: http://dx.doi.org/10.1016/S2215-0366(14)70307-4.

Analytic Rating - 2

Pooling disparate studies allowed for statistical significance from smaller effects. Looking at confidence intervals in Table 2, their conclusions seem much stronger than the overlapping means would suggest. Also, they did not account for the contribution of ongoing drug use and attributed these effects to use during adolescence.

Skodzinski, N. (2015). Senate Appropriations Committee Allows Marijuana Legalization to Move Forward in Nation's Capital. Cannabis Business Times. Retrieved from http://www.cannabisbusinesstimes.com/senate-appropriations-committee-allows-marijuana-legalization-to-move-forward-in-nations-capital/.

Analytic Rating -6

From the about section on CBT website: "The Cannabis Business Time's focus is to help accelerate the success and acceptance of the legal cannabis market by providing actionable intelligence to help all aspects of the business – from seed to sale – succeed and grow." Clearly a marijuana legalization advocacy publication, the magazine story reports on marijuana reforms moving through the U.S. Congress. The author is a staff writer for the magazine.

Smith, M. J., Cobia, D. J., Reilly, J. L., Gilman, J. M., Roberts, A. G., Alpert, K. I., Wang, L., Breiter, H. C. and Csernansky, J. G. (2015), Cannabis-related episodic memory deficits and hippocampal morphological differences in healthy individuals and schizophrenia subjects. Hippocampus, 25(9), 1042–1051. doi: 10.1002/hipo.22427.

Analytic Rating -2

Hippocampal scan results inconsistent--need replication. Episodic memory data are barely significant even after imputation of some missing values. Strength of findings seems overstated.

Springer, M., Glantz, S. (2015). Marijuana Use and Heart Disease: Potential Effects of Public Exposure to Smoke. Retrieved from https://tobacco.ucsf.edu/marijuana-use-and-heart-disease-potential-effects-public-exposure-smoke

Analytic Rating- Not Assessed

Stecker, K. (2015). Between the Lines the Significance of a Drug Recognition Expert Prosecutor in the Courtroom, 23(4). Retrieved from http://www.ndaa.org/pdf/BTL-v23-n4.pdf.

Analytic Rating- Not Assessed

Storr, M., Emmerdinger, D., Diegelmann, J., Pfenning, S., Ochsenkuhn, T., Goke, B., Lohse, P., Brand, S. (2010). The Cannabinoid 1 Receptor (CNR1) 1359 G/A Polymorphism Modulates Susceptibility to Ulcerative Colitis and the Phenotype in Crohn's Disease. DOI: 10.1371/journal.pone.0009453.

Analytic rating- Not Assessed

Tetrault, J., Crothers, K., Moore, B., Mehra, R., Concato, J., Fielin, D. (2007). Effects on Marijuana Smoking on Pilmonary Function and Respiratory Complications. 167(3). http://archinte.jamanetwork.com/article.aspx?articleid=411692

Analytic Rating- 1

A carefully-done meta-analysis using appropriate methods and appropriate caution in discussing results.

Street, C. (2015). California Marijuana Boom Destroying 25% of Stream Flows. Retrieved from http://www.breitbart.com/california/2015/07/27/california-marijuana-boom-destroying-25-of-stream-flows/

Analytic Rating- Not Assessed

U.S Department of Justice. (2013). Memorandum for All United States Attorneys. Retrieved from http://www.justice.gov/iso/opa/resources/305201382913275685746 7.pdf

Analytic Rating - Other

The Cole Memo

U.S. Department of Justice National Drug Intelligence Center. (2010). Arizona High Intensity Drug Trafficking Area. Retrieved from http://www.justice.gov/archive/ndic/pubs40/40381/40381p.pdf

Analytic Rating- Not Assessed

United States Environmental Protection Agency. (2015). Special Local Needs Registration for pesticide use for legal marijuana production in Colorado. Retrieved from https://www.colorado.gov/pacific/sites/default/files/atoms/files/EPA%20letter%20to%20CDA%205-19-15%20%20SLNs%20%20for%20marijuana.pdf

Analytic Rating –Other

Unknown. (2015). Research summary of cannabis use effects. https://drive.google.com/file/d/0Bxm7nAzNwoBgZWN6S0hDNDQ4SEk/view?pref=2&pli=1

Analytic rating- Not Assessed

Vara, B., Salazar, M., Olea-Herrero, N., Guzman, M., Diaz-Laviada, I. (2011). Anti-tumoral action of cannabinoids on hepatocellular carcinoma: role of AMPK-dependent activation of autophagy. doi: 10.1038/cdd.2011.32

Analytic Rating- Not Assessed

Volkow, N.D., Baler, R.D., Wilson, M., & Weiss, S. (2015). Adverse Health Effects of Marijuana Use. The New England Journal of Medicine. Retrieve from https://demystifyingmedicine.od.nih.gov/DM15/m2d24/reading01.pdf

Analytic Rating -2

This review from the Director of the National Institute on Drug Abuse reviews available literature on possible adverse health consequences of marijuana, but promotes the idea that marijuana use causes many of the negative outcomes that the data show only to be correlated with use.

Wang, G., Roosevelt, G., Heard, K. (2015). Pediatric Marijuana Exposures in Medical Marijuana State. http://northstarbehavioral.com/wp-content/uploads/2015/06/JAMApediatrics_2013_MedMj.pdf

Analytic Rating- 2

The results are not presented as clearly as they might be, but the conclusion of increased exposure seems sound based on the data. The discussion compares the danger of marijuana to alcohol, but there is a big difference is peoples' familiarity with the two substances as well as the palatability of the products for young children (brownies vs. vodka?).

Washington Association for Substance Abuse and Violence Prevention. (2015). Position Statement on Marijuana. Retrieved from

http://origin.library.constantcontact.com/download/get/file/1102598948519-65/WASAVP+POSITION+STATEMENT+ON+MARIJUANA.pdf.

Analytic Rating- 5

Washington Traffic Safety Commission. (2015). Driver Toxicology Testing and the Involvement of Marijuana in Fatal Crashes, 2010-2014. http://wtsc.wa.gov/wp-content/uploads/dlm_uploads/2015/10/Driver-Toxicology-Testing-and-the-Involvement-of-Marijuana-in-Fatal-Crashes_Oct2015.pdf

Analytic Rating- Not Assessed

Marijuana in Fatal Crashes, 2010-2014

Washington Legislature. (2015). Washington Marijuana Tax Revenue Flow. https://drive.google.com/file/d/0B7cFwp7DFEAnSlNXaktZRW1zMFk/view?pref=2&pli=1/

Analytic Rating- Not Assessed

Washington State. (2015). Washington State Liquor and Cannabis Board. Retrieved from https://drive.google.com/file/d/0Bxm7nAzNwoBgbDJzMXdYc2VBa28/view?pref=2&pli=1.

Analytic Rating- Not Assessed

Washington State Institute for Public Policy. (2015). I-502 Evaluation Plan and Preliminary Report on Implementation. Retrieved from http://www.wsipp.wa.gov/ReportFile/1616/Wsipp_I-502-Evaluation-Plan-and-Preliminary-Report-on-Implementation_Report.pdf.

Analytic Rating- Not Assessed

Weitzman, E., Ziemnik, R., Huag,Q., Levy, S. (2015). http://pediatrics.aappublications.org/content/early/2015/08/26/peds.2015-0722

Analytic Rating- Not Assessed

Wen, H., Hockenberry, J.M., & Cummings. J. R. (2014). The effect of medical marijuana laws on adolescent and adult use of marijuana, alcohol, and other substances. Journal of Health Economics, 42, 64-80. doi:10.1016/j.jhealeco.2015.03.007.

Analytic Rating -1

This represents the state of the art in estimating how much MM laws increase marijuana use.

Whiting, P., Wolff, R., Deshpande, S., Nisio, M., Duffy, S., Hernandez, A., Keurenjes, C., Lang, S., Misso, K., Ryder, S., Schmidlkofer, S., Westwood, M., Klejnen, J. (2015). Cannabinoids for medical use: a systematic review and meta-analysis. 313(24). http://www.ncbi.nlm.nih.gov/pubmed/26103030

Analytic Rating- 1

A careful meta-analysis, using the right tools.

WYDOT. (2015). 2010 - 2014 WYDOT Wyoming drug-related crash history. Retrieved from https://drive.google.com/open?id=0Bxm7nAzNwoBgdDhoVUM2VTlWVDg.

Analytic Rating -5

These data tables on crashes and drug tests are not really a report or article; no methodology or narrative explanation is offered. The frequency tables presented come from a very small number of crashes per year, particularly crashes involving drugs. Even though the cell counts vary considerably over time, cell counts are simply too low to infer any type of trend. The accuracy of the data is not questioned.

Young, Bob. (2015). More pot use found in fatal crashes, data says. http://www.seattletimes.com/seattle-news/marijuana/more-pot-use-found-in-fatal-crashes-data-says/

Analytic Rating- Not Assessed

Zolfagharifard, E. (2015). Marijuana users may have 'false memories': Brain scans reveal how cannabis smokers can live in their own reality. Retrieved from http://www.dailymail.co.uk/sciencetech/article-3051326/Marijuana-users-false-memories-Brain-scans-reveal-cannabis-smokers-live-reality.html.

Analytic Rating- Not Assessed

Zuradi, et al. (2011). Interaction between cannabidiol (CBD) and Δ(9)-tetrahydrocannabinol (THC): influence of administration interval and dose ratio between the cannabinoids.

Analytic Rating- Other

This is a letter to the editor, refers to some older work on the interactions between CBD and THC in rats. Not very important for our purposes, other than just more indication that the effects of cannabis are not only through THC.

Zuardi, A., Crippa, J., Hallak, J., Moreira, F., Guimaraes, F. (2006). Cannabidiol, A Cannabis sativa constituent, as an antipsychotic drug. 39(4). http://www.scielo.br/scielo.php?pid=s0100-879x2006000400001&script=sci_arttext

Analytic Rating- 2

An overview of animal and a few human studies on the use of cannabidiol to treat psychosis. Written by Zuardi, and his lab conducted most of the research being reviewed. There is newer information on this topic.

Appendix A

Health Subcommittee Report

Purpose

On June 30, 2015, Wyoming Governor Matthew Mead announced the creation of the Governor's Marijuana Impact Assessment Council (GMIAC). Through this council, subcommittees were created to gather data and information on specific subtopics related to marijuana legislation in Wyoming. The GMIAC Health Subcommittee completed this report.

The priority health areas chosen by the Health Subcommittee to be addressed in this report are:

Youth/Adolescents
Adult/Chronic Issues
Marijuana Composition & Interactions
Impact to Health Systems
Potential Health Benefits

This report presents a compilation of research, data, and information related to the identified priority health areas, as well as the impacts in Wyoming and other states in which marijuana is either legal for medical or retail use. When considering impacts to health in Wyoming, the report covers the priority areas in three regulatory scenarios: current conditions, medical marijuana legalization, and full recreational legalization.

Research Gaps

An important note for interpreting all findings is that the available research and state information reviewed in this report outline the *association* between marijuana use and health outcomes. This association does not prove that marijuana use alone caused the observed effects. Also, marijuana was illegal in all fifty states prior to 1996, while the first retail law did not take effect until 2014. An identified barrier to understanding the effects of marijuana legislation is the limited availability of longitudinal data.

Other considerable research gaps related to the population-based health effects of marijuana have been identified. For example, little research has focused on occasional marijuana use as distinct from chronic or heavy use, concentrations and consumption methods, or issues important to public health or the judiciary. Marijuana is a Schedule 1 drug under the Controlled Substances Act, which is the most restricted category reserved for drugs that have

no accepted medical use. Therefore, marijuana remains a federally illegal substance. The GMIAC Health Subcommittee recognizes these barriers and recommends that all information should be interpreted carefully in the context of the data limitations.

Marijuana Compounds and Consumption

Cannabinoids & Human Physiology

While there are several different types of cannabinoids present in marijuana, tetrahydrocannabinolic acid (THCa) and cannabidiolic acid (CBDa) are the most abundant compounds (Mackie, 2008; Hillig and Mahlberg, 2004). When heated, they convert to their "activated" forms, which are tetrahydrocannabinol (THC) and cannabidiol (CBD), respectively. THC is primarily responsible for the psychoactive effects of marijuana. Research also finds that THC acts as an effective moderate pain reliever in chronic neuropathic pain (pain caused by damaged nerves) as well as an effective anti-nausea treatment (Devinsky et al, 2014). Marijuana plants range in their potency and distribution of cannabinoids, but most have more THC than CBD. CBD alone has been proven to have several metabolic effects including acting as an antioxidant, an immunosuppressant, and an anti-inflammatory analgesic (Fichna et al, 2014). Clinical evidence for anti-seizure properties along with favorable side effects support further development of CBD-based treatments for epilepsy and other neuropsychiatric disorders (Devinsky et al., 2014; Zuardi et al., 2006).

In magnetic resonance imaging (MRI), CBD and THC induced opposite effects in various areas of the brain. It was speculated by Bhattacharyya et al. (2010) in *Neuropsychopharmacology* that the two cannabinoids had opposing effects in terms of brain activation, but in contrast to decades of previous work, that the relationship between THC and CBD is not simply counteracting. In recent studies, the ratio of CBD to THC has a significant effect on having both enhancing and counteracting reactions with THC (Zuardi, Hallak, & Crippa, 2012; Morgan & Curran, 2008). More research must be done to define the effects of various ratios of THC to CBD and their therapeutic uses as well as the synergistic effects of other cannabinoids, such as cannabigerol (CBG), cannabichromenes (CBC), and tetrahydrocannabivarin (THCV). Some current research suggests that these cannabinoids aid in the reduction of blood flow to cancerous tumors, thereby inhibiting growth, but significant data are lacking to support definitive conclusions (Vara et al., 2011).

In an effort to understand the psychoactive effects of THC, researchers sought to identify the cannabinoid receptors within the body. These receptors, called cannabinoid receptor type 1 (CB1) and cannabinoid receptor type 2 (CB2), are located predominantly in the brain, but receptor evidence has been found in the liver, pancreas, and skeletal muscle (Mackie, 2008). These cannabinoid receptors, along with endocannabinoids, such as anandamide and 2-arachidonoyl glycerol (2-AG), and certain enzymes, make up the human endocannabinoid system (Mackie, 2008; McPartland, Duncan, Di Marzo, & Pertwee, 2015).

Cannabinoids found in marijuana attach to the same receptors as endocannabinoids, and there are several pathways in which they can enter the body: smoke inhalation, topical absorption, and ingestion. More recently, smokeless inhalers have been developed for (potentially) healthier use (Eisenberg, Ogintz, & Almog, 2014). Prior to entry, many forms of cannabinoids must be heated to be "activated," which is also known as the process of decarboxylation. Approximately 70% of the acidic precursors of cannabinoids are converted to their "activated" forms. Through smoke inhalation, the act of lighting the marijuana flower or extract converts the acidic forms of the cannabinoids into their "activated" forms. Prior to topical application and ingestion, heat must be applied to the marijuana, or the application or ingestion would be non-reactive. At the same time, research indicates that even the acidic or "non-reactive" forms of cannabinoids can still have minor therapeutic and physiological effects (McPartland, Duncan, Di Marzo, & Pertwee, 2015). More research is required to fully understand how the multitude of cannabinoids interact with each other and their acidic counterparts.

Potency

A variety of methods are available to test the potency of marijuana products; however these tests are often inaccurate. In Colorado, current regulations for potency testing differ between medical marijuana and recreational retail marijuana. Recreational marijuana products have potency limits. For example, no marijuana product with less than 0.3% THC, also defined as industrial hemp, may be sold in a recreational retail store. Also, for edible recreational marijuana products, the THC potency limit is 100 mg total with a 10 mg limit per serving. Though the extract used to create the edible product requires testing, each of the recreational edible by-products must be tested again to re-evaluate potency, contaminants, and homogeneity. In contrast, medical marijuana has no potency limits; therefore, testing medical marijuana extracts and products is done on a voluntary basis with few willing to invest in unrequired and expensive lab costs. Laws in Colorado have changed frequently to account for gaps in quality control and safety hazards, so it is expected that further restrictions on medical marijuana will be implemented.

When required to test for potency, Colorado also requires the concurrent testing of residual solvents and other chemicals in marijuana products. Dried and cured marijuana buds can contain certain amounts of pesticides, molds, mildews, and filth that are considered toxic. Marijuana hash oil is extracted using a variety of solvents such as n-butane, carbon dioxide, and ethanol which have varying toxicity risks; therefore, the testing of residual solvents is required. Hash oil can be presented in a variety of forms known as wax, shatter, or budder. Overall, the resulting hash oil is very similar, but the by-products can vary depending on the solvent. For example, n-butane is highly effective at extracting the various cannabinoids, but it also extracts plant lipids and waxes. If the plant by-products are not removed, the product is commonly referred to as wax or budder. If marijuana is extracted at below freezing temperatures or winterized post-extraction, a majority of those plant by-products are removed which results in higher potency and less risk of contaminant exposure. This product is commonly referred to as

shatter, described by its more hardened, glass-like consistency. Because the marijuana buds, or flowers, are used for traditional smoking, the fan leafs and trim are commonly used to make hash oil from chemical extraction. By doing so, more plant matter from various plants is required, which can result in exponential exposure to trace chemicals from fertilizers and pesticides.

Further considerations regarding extraction need to be recognized. Health impacts may occur due to waste products and disposal issues. Appropriate handling and disposal processes need to be enforced on items such as wastewater, compostable waste, non-compostable waster, and hazardous wastes to minimize health impacts.

Pharmaceuticals

Currently, there are several pharmaceutical products made of synthetic cannabinoids such as Marinol® and Nabilone®. Marinol® (generic drug name: dronabinol) is a synthetic THC used to treat nausea in cancer patients, as an appetite stimulant in AIDS patients, and as an analgesic for pain in multiple sclerosis patients (Bedi, Cooper, & Haney, 2013). Nabilone® is a synthetic cannabinoid similar to THC used to prevent nausea and as a diabetic neuropathy analgesic. Additionally, Nabilone® has been clinically observed to significantly relieve post-traumatic stress disorder related nightmares in those with a history of non-response to traditional therapies (Jetly, Heber, Fraser, & Boisvert, 2015). Both Marinol® and Nabilone® show clinical success in treating marijuana dependence and are being researched for their potential benefit in treating withdrawals from opiate addiction, showing promise when used alongside methadone (Scavone, Sterling, & Bockstaele, 2013; Scavone, Sterling, Weinstein, & Bockstaele, 2013).

Summaries and Key Findings on Marijuana Use and Health Effects

Impact on the Developing Brain

In order to understand marijuana's effects on the developing brain, it is important first to review the brain development of adolescence. Adolescence is the period of a young person's life that begins at puberty, or around the age of ten, and continues into the mid-twenties. Neuroscience has shown that a young person's cognitive development continues into this later age and that emotional maturity, self-image, and judgment will be affected until the prefrontal cortex of the brain has fully developed. The prefrontal cortex is responsible for critical thinking and judgment, and it is the last part of the brain to fully develop. The brain's reward center, which seeks rewards, pleasures, thrills, and adventures, matures very early in adolescence. In other words, the adolescent brain craves pleasure, but it does not know how to weigh risks, determine and plan for consequences, or how to say, "Enough is enough." Because of this gap in brain development, children and adolescents are especially vulnerable to addiction, including marijuana (Joffe, 2004).

Marijuana affects a neurotransmitter in the brain called dopamine. Dopamine plays a very important role in the brain's functioning by regulating attention, cognition, hormonal processes, impulsivity, movement, and pleasure. Attention-deficit/hyperactivity disorder, schizophrenia, and Parkinson's disease are attributed, in part, to dysfunction within the dopamine system. All substances of abuse, including marijuana, increase the amount of dopamine released into the brain's reward circuit. Adolescents who try marijuana are over nine times more likely to develop symptoms of cannabis dependence than adults who try marijuana (Chen et al., 2009).

Long-term, regular users who started using marijuana before the age of 18 often cause changes in their brain structure and functioning that result in permanent cognitive deficits, resulting in lower functioning than they may have achieved had they not used marijuana. Research has shown that when marijuana users are intoxicated, their working memory is impaired and they are more impulsive, less attentive, less motivated, and slower to make decisions (Lundqvist, 2005). These effects continue even after they quit using marijuana. Studies at 28 days post marijuana usage showed no improvement in cognitive functioning (Vigil, 2015).

A systematic literature review conducted by the Colorado Department of Public Health and Environment (CDPHE, 2015) evaluated the association between marijuana use and potential adverse health outcomes. The literature review found moderate association with other illicit drug use and addiction after adolescence; increased marijuana, alcohol, and tobacco use and addiction after adolescence; and lower high school graduation rates among those who regularly use marijuana. The literature review also found substantial evidence that adolescents who regularly use marijuana are more likely than non-users to develop psychotic symptoms or psychotic disorders such as schizophrenia in adulthood. It should be noted that this association does not prove that marijuana caused the effect, but it was the largest present causal factor.

The main factors for marijuana use and addiction in the adolescent population are availability, perceived harmfulness, and social norms. Research from states that have passed medical marijuana laws before passing recreational laws show increases in marijuana use and decreases in perceived harmfulness among adolescents prior to recreational legalization (Vigil, 2015).

Marijuana as a Gateway Drug

As more states legalize marijuana it continues to be discussed as a possible gateway drug. The gateway theory argues that because heroin, cocaine, and methamphetamine users often used marijuana before graduating to harder drugs, marijuana may be a "gateway" to harder drug use. This theory implies that there is a causal mechanism that initiates drug users, making them more willing to try and/or desire harder drugs. According to Merrill, Fox, Lewis, and Pulver (1994), children who had used marijuana were 85 times more likely to use cocaine than their peers who had not used marijuana; additionally, adults who used marijuana as children were 17 times more likely to become regular cocaine users than those who had not used marijuana as a child. This study showed a correlation between marijuana and cocaine but failed to determine causality. One leading theory for the link between marijuana and harder drugs is the

brain disease model, which describes changes in the brain during the progression from drug use to addiction. Gilman et al. (2014) reviewed composite brain scans of 20 marijuana smokers, ages 18 to 25, and found evidence of structural differences in two areas of the brain even with occasional use. The findings suggest that recreational marijuana use may lead to previously unidentified brain changes and predispose users to other drugs, highlighting the importance of research aimed at understanding the long-term effects of low to moderate marijuana use on the brain.

Each of these theories fails to take into consideration the cultural and social risk factors that have been shown to lead to drug abuse including, but not limited to, socioeconomic status (poverty), drug availability, lack of parental supervision or family involvement, early aggressive behavior, and mental health disorders. A study by Moselhy (2013) concluded that although there is a clear association between the use of marijuana and subsequent use of harder drugs, the pathway to drug addiction is multifaceted and complex and the sequence leading to drug use cannot be normalized.

Thus, research has shown a strong association between marijuana use and subsequent use of other illicit drugs with a possible biological cause for this association, but more research is necessary in order to determine the exact nature of the causal processes.

Chronic Use of Marijuana

The long-term effects of marijuana use have been a subject of debate. Since marijuana has been illegal until recently in most countries, research of chronic use presents a challenge and leaves much to be concluded. Some research has shown that long-term marijuana use potentially creates physical changes in the brain associated with addiction, reduces grey matter volume in nearly all brain regions that are rich in cannabis receptors, and changes users' motivation, emotions, and emotional learning (Battistella, 2014). The degree of these changes is related to age of initiation, usage rates, length of use, and potency. With changes to the barriers for research, hopefully solid conclusions will be reached about the risks and benefits of long-term marijuana use.

Marijuana Use and Respiratory Effects

Marijuana is the second most widely smoked substance in the U.S. after tobacco. Conservative estimates indicate that 11 million people smoked marijuana during the last month and approximately 20% of those smoked daily. Marijuana smoke contains as much tar as tobacco smoke and up to 50% more carcinogens. Marijuana smoke is unfiltered and marijuana users inhale more deeply and hold the smoke longer than tobacco users. Furthermore, 77% of marijuana users are also tobacco users, and these individuals were found to have greater prevalence of respiratory symptoms than those who only smoke tobacco.

A study by Moore, Auguston, Moser, and Budney (2005) provides estimates of respiratory symptoms by current marijuana users in a nationally representative sample in the U.S within a broad range of ages and marijuana exposure. Marijuana use is associated with a variety of

respiratory symptoms similar to those of tobacco users, which include chronic bronchitis, coughing on most days, phlegm production, wheezing and chest sounds without a cold, and cancer. Marijuana use may also increase exposure to other infectious organisms such as fungi and molds. Additionally, a study by Tetrault et al. (2007) concluded that short-term exposure to marijuana was associated with bronchodilation, and long-term exposure was associated with increased respiratory symptoms consistent with obstructive lung disease.

According to the study by Moore et al., more than 2 million adults in the U.S. are heavy marijuana users, defined as those who ingest the drug on a daily or nearly daily basis, and these risks pose a potentially large health burden. The study also stated that marijuana users have greater rates of utilizing outpatient medical services for respiratory and other illnesses.

Marijuana Use During Pregnancy and Breastfeeding

According to the report, *Monitoring Health Concerns Related to Marijuana in Colorado* (2015), literature review found moderate evidence that "maternal use of marijuana during pregnancy is associated with negative effects on exposed offspring, including decreased academic ability, cognitive function, and attention. Importantly, these effects may not appear until adolescence" (p. 11).

There are few studies about the effects of marijuana consumption during breastfeeding on infant health or development. THC has been found to accumulate at varying levels within human breast milk, and infants who are exposed to marijuana through breast milk will excrete THC in their urine (Garry et al., 2009). It is important to note that mothers who consume marijuana during pregnancy also probably used before pregnancy. Thus, evaluating the effects during breastfeeding without consideration of previous effects is difficult.

Two studies evaluated the effects of the marijuana use during pregnancy on child development. Neither study was able to conclusively prove a relationship between the marijuana exposure and mental or physical effects observed in infants (Day, 1991; Haizink, 2014).

Marijuana Use and Mental Health

At this time, there has been no conclusive evidence that establishes marijuana as a sole indicator in causing mental health disorders. Several studies have linked marijuana use to increased risk of mental illnesses, including psychosis, depression, and anxiety (Crippa et al., 2009). Other less prominent associations have also linked marijuana use with suicidal thoughts among teens, personality disorders, and amotivational syndrome. Amotivational syndrome is defined as diminished or absent drive to engage in typically rewarding activities. Some studies also suggest that those who experience extreme psychosis after using marijuana most likely already had mental health issues, and the use of marijuana exacerbated it (Crippa et al., 2009).

Marijuana Addiction

According to the National Institute on Drug Abuse (NIDA), approximately 9% of people who begin using marijuana as an adult will meet the definition of addiction to marijuana, in which a person cannot stop using a drug even though it interferes with many aspects of his or her life. Approximately 17% of persons who start using marijuana between the ages of 13 and 25 will meet the definition of addiction. According to the 2013 National Survey on Drug Use and Health (NSDUH), marijuana accounted for 4.2 million of the estimated 6.9 million Americans dependent on or abusing illicit drugs. Marijuana addiction appears to be very similar to other substance use disorders, although the long-term outcomes may be less severe.

Marijuana Use and Injury

The *Monitoring Health Concerns Related to Marijuana in Colorado* (2015) report found substantial evidence that:

> Risk of motor vehicle crashes doubled among drivers with recent marijuana use. Additionally, we found substantial evidence for a positive relationship between THC blood level and motor vehicle crash risk –that is, substantial evidence that the higher the level of THC in blood, the higher the crash risk. Finally, the committee found that the combined use of marijuana and alcohol increases motor vehicle crash risk more than use of either substance alone. For non-traffic injuries, the evidence is limited, but data suggest that the risk of non-traffic workplace injuries may be higher with marijuana use (p. 13).

Potential Health Benefits

In recent years, the legalization and use of marijuana for a variety of medical issues has spurred discussion and highlighted the need for further research. Currently, a small percentage of studies on marijuana analyze its medicinal properties. As stated previously in the Marijuana Compounds and Consumption section, existing research indicates there are at least two active chemicals in marijuana that may have medicinal applications. Those are cannabidiol (CBD), which may positively impact regions of the brain without an associated high, and tetrahydrocannabinol (THC), which may have pain-relieving properties.

The endocannabinoid system has receptors throughout the human body, with CB1 receptors showing more prominence in the brain and reproductive system while CB2 receptors are more spread out through the immune system and the skeletal muscles (Devinksy et al., 2014). Because of their numerous locations, several conditions are being researched for the potential pharmacological use of marijuana cannabinoids. For example, the location of receptors in the pancreas has shown potential in treating diabetes and other related complications such as kidney failure (Hovath, Mukhopadhyay, Hasko, & Pacher, 2012; Kim et al. 2011). Several studies have demonstrated the potential for marijuana and synthetic cannabinoids to aid in apoptosis, or the breakdown of cancer cells *in vitro* and *in vivo* (Sarfaraz, Adhami, Syed, Afaq, &

Mukhtar, 2008; Vara et al., 2011). The location of the receptors in the brain is especially being studied for the prospective treatment of post-traumatic stress disorder, depression, and anxiety disorders (Jetly, Heber, Fraser, & Boisvert, 2015). Until research advances, the exact effectiveness of marijuana cannabinoids on these conditions remains under scrutiny.

On the other hand, certain cannabinoids have already been approved by states for therapeutic use for certain conditions. For example, mounting evidence regarding the anti-seizure properties of CBD has led several states, including Wyoming, to legalize the therapeutic use of industrial hemp oil for intractable epilepsy (Devinsky et al., 2014). The anti-nausea, pain management, and anti-inflammatory effects of marijuana are being actively examined for efficacy for use in cancer patients undergoing chemotherapy, HIV patients suffering from anorexia, and inflammatory bowel conditions (Mackie, 2008; Fichna et al., 2014; Schicho et al., 2011; Storr et al., 2010). Two cannabinoid drugs are approved in the United States under the names Dronabinol® and Nabilone®. Both are approved by the Federal Drug Administration (FDA) for the treatment of chemotherapy-related nausea and vomiting in patients who have not responded to standard therapy.

Significant research on the topical use of cannabinoids has also demonstrated its efficacy on both acute and chronic inflammatory skin diseases (Kim et al., 2015). Even with the current successful application of marijuana cannabinoids, research of the exact mechanisms and benefits are still in its infancy. In 2014, the FDA granted the drug Sativex®, a mouth spray in which THC and CBDs are derived from the cannabis plant, a fast track designation for the treatment of pain in patients with advanced cancer. FDA describes fast track as a "process designed to facilitate the development and expedite the review of drugs to treat serious conditions and fill and unmet medical need."

Effects of Legislative Changes

The following information outlines impacts to health within each of the priority areas in three regulatory scenarios: current conditions with no legislative changes, medical marijuana legalization, and full recreational legalization.

No Legislative Changes

In 2015, the Wyoming Legislature passed HB 0032, allowing supervised medical use of hemp extract for intractable epilepsy, providing an exemption from prosecution, and creating a registration program. This section discusses the probable outcomes within each of the five priority areas if no further changes to the marijuana legislations are approved.

After reviewing the available evidence in regards to no medical or retail marijuana legislation, the subcommittee finds the following:

- Youth: current trends of use should remain stable
- Adults and chronic use: current trends of use should remain stable

- Composition and interaction: no increase or decrease is likely to occur
- Health system impacts: no increase or decrease in health system impacts
- Potential health benefits: patients will not be able to receive potential health benefits

Greater detail regarding the above findings as related to this scenario is provided below.

Youth/Adolescents

Marijuana is the most commonly used illicit drug according to the 2013 National Survey on Drug Use and Health (NSDUH), and nationwide marijuana use is widespread among adolescent and young adult subpopulations.

Wyoming's data are similar to the national data. According to the Wyoming Prevention Needs Assessment (PNA), marijuana use has remained unchanged from 2008 to 2014 across all grade levels and for both lifetime and 30-day use measures.

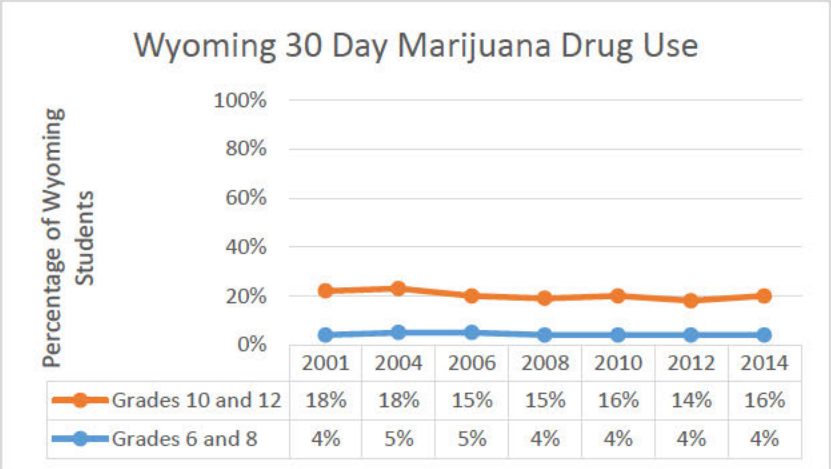
Figure 9: Wyoming Students' Marijuana Drug Use

Definition:

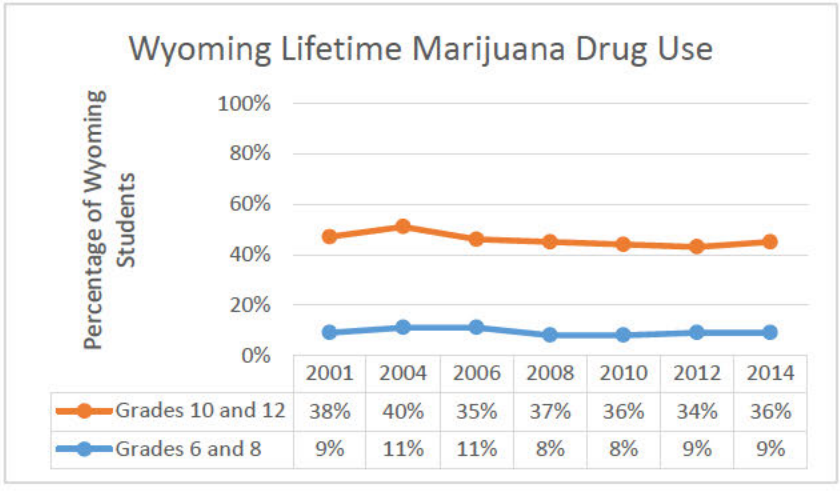
The percentage of Wyoming students who reported using marijuana in the 30 days before the survey

Data Source:

PNA 2001-2014



	2001	2004	2006	2008	2010	2012	2014
Grades 10 and 12	18%	18%	15%	15%	16%	14%	16%
Grades 6 and 8	4%	5%	5%	4%	4%	4%	4%



	2001	2004	2006	2008	2010	2012	2014
Grades 10 and 12	38%	40%	35%	37%	36%	34%	36%
Grades 6 and 8	9%	11%	11%	8%	8%	9%	9%

Figure 10: Wyoming Students' Marijuana Lifetime Use

Definition:

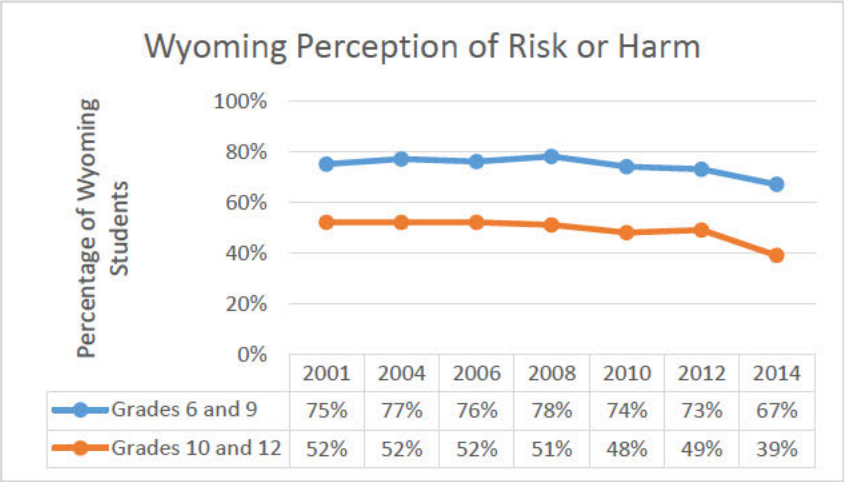
The percentage of Wyoming students who reported using marijuana during their lifetime

Data Source: PNA

2001-2014

Wyoming has experienced a significant decrease in student perception of great risk or harm with smoking marijuana regularly, especially between 2012 and 2014 (73% vs 67%, 6th and 8th grades; 49% vs 39%, 10th and 12th grades).

Figure 11: Wyoming Student Perception of Great Risk with Marijuana Use



Definition:

The percentage of Wyoming students who perceive there is great risk or harm with smoking marijuana regularly

Data Source:

PNA 2001-2014

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana and in consideration of current Wyoming data trends, the GMIAC Health Subcommittee reasons that youth/adolescent marijuana drug use in Wyoming will remain constant.

Adult/Chronic Issues

Nationally, marijuana use among adults has doubled over the past decade with the changes in laws and attitudes about the drug. According to NSDUH, the rate of current marijuana use in 2013 among young adults aged 18 to 25 (19.1 percent) was similar to the rates in 2009 to 2012 (ranging from 18.2 to 19.0 percent), but it was higher than the rates in 2002 to 2008 (ranging from 16.1 to 17.3 percent). In 2013, the national rate of current marijuana use (5.6 percent) was similar to the rate in 2012 (5.3 percent), but it was higher than the rates in 2002 to 2011 (ranging from 3.9 to 4.8 percent).

Wyoming has not experienced this increase in use and has remained fairly consistent for both age ranges.

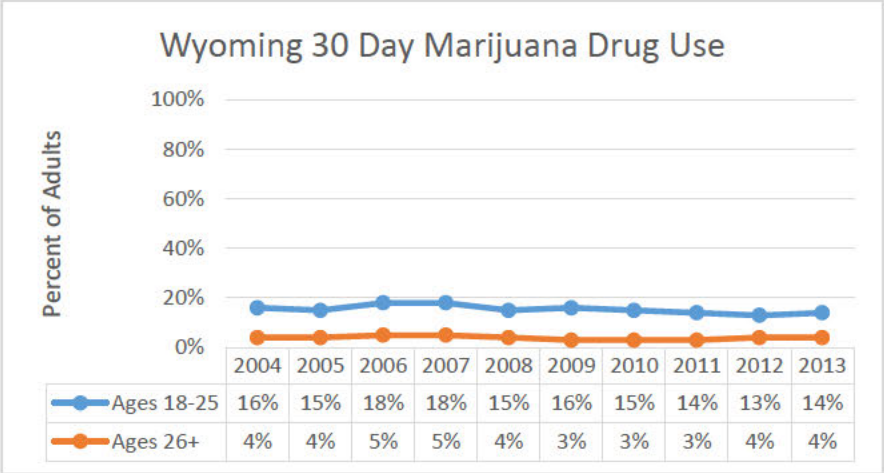


Figure 12: Wyoming Self-Reported 30-day Marijuana Use

Definition:

The percentage of Wyoming adults who reported using marijuana in the 30 days prior to the survey.

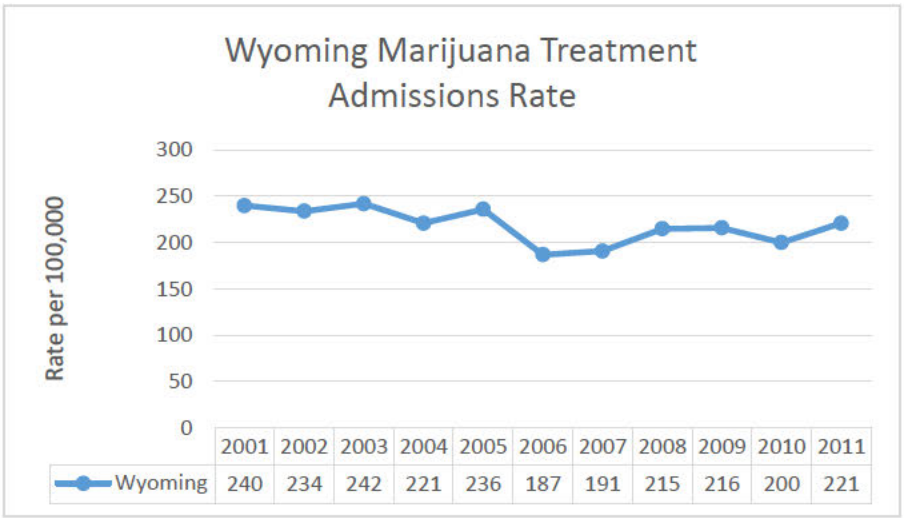
Data Source: NSDUH 2004-2013

According to the NSDUH Treatment Episode Data Set (TEDS), the national treatment admission rate for primary marijuana was 14% higher in 2011, at 125 per 100,000 population aged 12 and older, than in 2001 (110 per 100,000). Wyoming has not experienced this increase. During this same time period, Wyoming saw a 9% decrease in the rate from 240 per 100,000 population aged 12 and older in 2001 versus 221 per 100,000.

Figure 13: Primary Marijuana Treatment Admissions

Definition:

Primary marijuana treatment admissions by rate per 100,000 of Wyoming residents aged 12 and older



Data Source: TEDS 2001-2011

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana and in consideration of current Wyoming data trends, the GMIAC Health Subcommittee reasons that adult marijuana drug use in Wyoming will remain constant with the current trend line.

Marijuana Composition & Interactions

In the scenario that no changes are passed to the current legislation in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that no increase or decrease in issues resulting in marijuana composition or interactions will occur.

Impact to Health Systems

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana and in consideration of the current trends of use that are neither increasing nor decreasing, the GMIAC Health Subcommittee reasons that no increase or decrease in impact will be realized within the current health systems.

Potential Health Benefits

In the scenario that no changes are passed to the current legislation in Wyoming on marijuana, the GMIAC Health Subcommittee reasons that Wyoming residents will not have the ability to access any potential health benefits from marijuana use.

Medical Marijuana Legislation

This section discusses the probable outcomes within each of the five priority areas if further medicinal changes to the marijuana legislations are approved.

Since 1996, 23 states plus the District of Columbia have legalized marijuana use (more than just CBD, such as Wyoming's law allowing CBD for intractable epilepsy) for medical purposes. Each state law varies in approved medical conditions, possession amounts and cultivation, residency requirements, legal issues, caregivers, dispensaries, and registration. For example, Illinois permits marijuana use for about 40 different conditions, whereas, Washington, the most restrictive state, allows for six.

After reviewing the available evidence in regards to medical marijuana, the subcommittee finds the following:

- Youth: increased use may occur
- Adults and chronic use: insufficient evidence to draw conclusions
- Composition and interactions: insufficient evidence to draw conclusions
- Health system impacts: increased poisonings and emergency needs may occur with possible decrease in opioid overdoes death
- Potential health benefits: health benefits for certain conditions may occur

Greater detail regarding the above findings as related to this scenario is provided below.

Youth/Adolescents

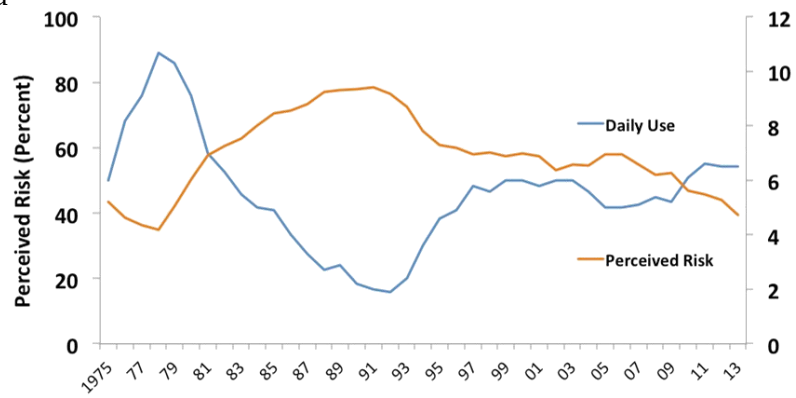
There are no consistent epidemiological data indicating that the prevalence of marijuana use among youth has significantly increased in states after the first few years of enactment of medical marijuana laws (Lynne-Landsman et al., 2013). Hasin et al. (2015), utilizing the Monitoring the Future Study adolescent survey data from 1991 through 2014 found that marijuana was more prevalent in states that passed a medical marijuana law any time up to 2014 than in other states (adjusted prevalence 15-87% vs. 13-27%). However, the rates of adolescent marijuana use in states with medical marijuana laws were higher than other states prior to the laws being passed (Hasin et al., 2015).

An association between medical marijuana laws and youth recreational use rates has shown an increase with time. This association may not be due to the assumed increased availability of marijuana through the medical marijuana programs. Rather, it may be a result of the decrease in perceived risk of marijuana. According to the Monitoring the Future Study, five-year trends are showing significant increases in marijuana use among 12th grade students (Figure 6). These increases continue to parallel decreasing perceived risk about the harm and disapproval of marijuana use. Wyoming has also experienced a decrease in perception of harm of marijuana as either a moderate or great risk from 76% of 10th and 12th grade students in 2001 to 61% in 2014 (PNA).

Figure 14: Daily Marijuana Use vs. Perceived Risk

Definition:

The percentage of 12th grade students who reported using marijuana daily and perceived risk of regular marijuana use



Data Source: MFS 1975-2013

The Monitoring the Future study also found that 34% of 12th graders who used marijuana in the past 12 months and lived in states that have passed medical marijuana legislation self-reported that one of their sources of marijuana was another person's medical marijuana recommendation while 6% self-reported that they received it from their own recommendation (Johnston, et al., 2015). Although youth use of marijuana has experienced a decrease from 2000-2009, the Youth Risk Behavior Survey (YRBS) has shown a national increase in high school (9th -12th grade) 30 day use within the subsequent years (20.8%, 2009 vs. 23.4, 2013).

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that an

increase in youth use may occur. It is also likely that as medical marijuana laws continue to be passed in other states, the perception of harm will continue to decrease, leading to an increase in youth use in Wyoming.

Adult/Chronic Issues

Wen, Hockenberry, and Cummings (2015) found an increase in adult marijuana use and binge drinking after the implementation of medical marijuana laws in ten states. The study showed that states that implemented medical marijuana legislation between 2004 and 2012 experienced an average of 14% increase in past-month marijuana use and an 18% increase in marijuana abuse/dependence among adults aged 21 or above. Medical marijuana legislation implementation was also associated with a 10% increase in binge drinking among adults of legal drinking age. Another study was not able to replicate the same findings when increasing the number of variables; thus the evidence of effect of medical marijuana laws on adult abuse is limited.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data are necessary in order to determine any associations between medical marijuana laws and adult use issues.

Marijuana Composition & Interactions

Limited data are available regarding potential drug interactions associated with marijuana. According to Lindsey, Stewart, and Childress (2012), interactions between marijuana and other drugs should be expected, but research in this area is limited. The breadth of this issue must also be considered. Not only do the compounds and potency of marijuana need to be studied within research on drug interactions, but also marijuana in combination with all other drugs from alcohol to prescription to illicit drugs.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data is necessary to determine any issues resulting in marijuana composition or interactions.

Impact to Health Systems

Relatively few studies have looked at the health effects of marijuana and associated impacts to the existing care systems. Health systems include, but are not limited to, hospitals and emergency departments, substance abuse treatment facilities, mental health facilities, payors, and public health. One study (Polen et al., 1993) looked at medical records, between 1979 and 1985, of marijuana users who did not smoke tobacco. Medical records were reviewed for as long as two years after the initial checkup. Frequent marijuana smokers had small increased risks of outpatient visits for

respiratory illnesses, injuries, and other types of illnesses in comparison with nonsmokers. Daily marijuana smoking, though, even in the absence of tobacco, was associated with elevated use of healthcare for various health issues including respiratory and injury.

According to Wang, Roosevelt, and Heard (2012), states that began allowing marijuana use saw calls to poison centers triple regarding children accidentally ingesting marijuana. Conversely, states that did not have medical marijuana laws did not show an increase in call volume. Marijuana-related emergent hospital admission rates per 100,000 have been rising in the United States, according to the Drug Abuse Warning Network (DAWN), which shows emergency department admissions increasing from a rate of 355.03 per 100,000 (16,251 admissions) in 1991 to a rate of 7991.56 per 100,000 (461,028 admissions) in 2012 (SAMHSA, 2013), which is more that a 22% rate increase. The reported DAWN data are also prior to any retail laws going into effect; thus the association is with the passing of medical marijuana only. Marijuana-related admissions to hospital emergency rooms account for more than half of all drug admissions combined. According to the DAWN, data showed a 62% increase (96.2 vs. 146.2 rate per 100,000) in medical emergency room visits resulting from marijuana from 2004 to 2011. DAWN estimates that on an average day in 2011, there were 2,317 drug-related emergency department visits for young adults aged 18 to 25, of which 1,340 involved the use of illegal drugs, the misuse or abuse of pharmaceuticals, or alcohol involved with other drugs. Marijuana was the most reported reason for the emergency room visit at 422 of the 1,340 visits per day.

TEDS reported that there were 403,756 admissions to publicly funded substance abuse treatment facilities for persons aged 18 to 25 in 2011. TEDS indicates that on an average day in 2011, 308 young adults were admitted for treatment for marijuana as the primary substances of abuse.

Further impacts of medical marijuana on health care systems include a potential decrease in opioid use and overdose mortality. In a recent study, Hayes and Brown (2014) found that the availability of medical marijuana as a treatment for chronic pain reduced the use of opioids, thus decreasing the opioid overdose mortality rate. This study examined the yearly opioid overdose mortality rate for all 50 states from 1999 to 2010. The results showed that, on average, there was a 24.8% decrease in the opioid mortality rate after states enacted laws legalizing the use of medical marijuana for chronic pain. Furthermore, when the mortality rate was examined on a yearly basis after legalization, the authors found that these effects grew stronger over time. In the first year after legalizing medical marijuana there was a 19.9% decrease in the mortality rate, a 23.6% decrease after three years, and a 33.7% decrease after five years. These findings remained significant even after controlling for variables such as the presence of

prescription drug monitoring programs, laws requiring pharmacists to request patient identification, and the annual state unemployment rate.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that an increase in the burden on Wyoming's healthcare systems may occur. Further research needs to be conducted in order to have a better understanding of the burdens or benefits medical marijuana legislation creates within existing healthcare systems.

Potential Health Benefits

States with medical marijuana laws vary greatly on the number of conditions to be treated through marijuana use. The ten most common conditions included within the laws and a summary of the current research are outlined below. It is important to note that most research has been conducted with smoked marijuana and not with oils, extractions, or varying modifications to plant compositions. Further research is necessary to understand all medical implications.

HIV/AIDS and AIDS Wasting – Marijuana may mitigate many of the afflictions of AIDS, such as nausea, appetite loss, pain, and anxiety.

Alzheimer's disease –THC may prevent the enzyme acetylcholinesterase from accelerating the formation of "Alzheimer's plaques" in the brain, as well as protein clumps that can inhibit cognition and memory, more effectively than commercially marketed drugs.

Arthritis –Marijuana may assist patients with rheumatoid arthritis to experience a decrease in pain and reduce inflammation. However, marijuana has not been found to improve or curb the disease.

Cancer –Marijuana may assist patients with cancer through reduction of the effects of neuropathic pain, reduction in nausea and vomiting from chemotherapy, improved food intake, and reduction in opiate use. Recently, research has shown preliminary indications that certain marijuana compounds may slow growth and reduce the spread of some forms of cancer *in vitro.*

Chronic Pain – Marijuana has analgesic effects, and the addition of marijuana to therapeutic regimens may reduce the need for opiates.

Crohn's/Gastrointestinal Disorders – Marijuana use may improve quality of life for people suffering from ulcerative colitis and Crohn's disease through easing pain, limiting the frequency of diarrhea, and reversing appetite loss.

Epilepsy/Seizures – Marijuana may play a critical role in controlling spontaneous seizures in epilepsy. Seizure patients, both in the United States and in other countries, report that marijuana has been therapeutic and effective.

Glaucoma - Marijuana may be an effective treatment against glaucoma, one of the leading causes of blindness in the world. Research associates marijuana use with reductions and relief of the intraocular pressure that causes optic nerve damage.

Hepatitis C – Marijuana is associated with improved effectiveness of drug therapy for hepatitis C, an infection that roughly 3 million Americans contract each year. Current hepatitis C medications often have severe side effects such as loss of appetite, depression, nausea, muscle aches, and extreme fatigue. Patients who smoked marijuana every day or two were found to have an increase in completion and effectiveness of the therapy.

Multiple Sclerosis – Marijuana impacts multiple sclerosis patients with muscle spasticity. Even though the drug has been known to cause dizziness and fatigue in some users, many multiple sclerosis patients report marijuana helps ease the pain in their arms and legs when they painfully contract.

In the scenario that medical marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that those suffering from covered conditions may experience benefit from the usage of marijuana, but further research is necessary in order to understand medicinal marijuana uses and how it impacts health.

Retail Marijuana Legislation

This section discusses the potential outcomes within each of the five priority areas if the recreational use of marijuana were legalized. Currently, four states (Colorado, Oregon, Alaska, and Washington) have legalized the use of marijuana for recreational purposes for the adult population. In 2012, Colorado and Washington became the first states to legalize, regulate, and tax the sale of marijuana for recreational use, followed by Alaska and Oregon in 2014. All four states had legalized marijuana use for medical purposes prior to legalization for recreational use. Recreational use greatly expanded the retail availability of marijuana and its various forms, such as edibles in the form of candies, brownies, cookies, and liquids, as well as extracts. THC concentrations can vary greatly among all forms.

After reviewing the available evidence in regards to retail marijuana legislation, the subcommittee finds the following:

- Youth: increase in youth use may occur
- Adults and chronic use: insufficient evidence to draw conclusions
- Composition and interaction: insufficient evidence to draw conclusions
- Health system impacts: increased health care utilization related to marijuana exposure
- Potential health benefits: no potential health benefits of marijuana use for the general population

Greater detail regarding the above findings as related to this scenario is provided below.

Youth/Adolescents

In states that have legalized the recreational use of marijuana, the laws generally prohibit the sale to and possession of marijuana products by individuals under the age of 21. One concern of public health professionals is the social impact, particularly on young people, of normalizing the smoking of marijuana. This could also lead to a decrease in the perceptions of harms and risks associated with use (Cork 2015).

Marijuana is not a risk-free drug and can have serious adverse health effects such as learning impairment; interference with memory, perception, and judgement; and damage to the heart, lungs, and immune system. These adverse effects can be magnified in people who begin use at a young age, and some effects can be irreversible. For example, frequent marijuana use has been linked to the risk of testicular cancer, a decrease in IQ, addiction, and recurring psychotic experiences. As discussed previously, use of marijuana by young people can have serious adverse effects on the developing brain, increasing the risk of serious mental health problems (Cork, 2015).

A growing number of poisonings have been attributed to the consumption of marijuana products that are appealing to children, such as cookies, chocolate bars, and brownies. As mentioned above, between 2005 and 2011 the rate of poison center calls for unintentional marijuana exposure in children ages 9 and under more than tripled in states that decriminalized marijuana before 2005. States that had not passed marijuana decriminalization showed no change in call rates (Cork, 2015)

According to the Colorado report, there is moderate evidence to suggest that more unintentional marijuana exposures of children occur in states with increased legal access to marijuana. Additionally, moderate evidence was found that use of child-resistant packaging reduces unintentional child poisonings. The Colorado report also found substantial evidence for association between adolescent and young adult marijuana use and future addiction to illicit drugs in adulthood.

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that youth use rates will increase along with adverse health and learning effects.

Adult/Chronic Issues

General adverse effects of marijuana will not differ with the legalization of recreational use. The difference expected will be in the number of adults. Adverse health effects can be experienced by any use, and the severity of adverse health effects may be magnified by frequent/heavy use. Unfortunately, at the time of this report, only Colorado's retail law has been in effect for a long enough period of time that some data may be collected. In regards to usage and consumption rates, 2014 data are not available at this time. Thus, it is unknown as to the significance of any change.

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data are necessary in order to determine any associations between retail marijuana laws and adult use issues.

Marijuana Composition & Interactions

Marijuana growers and manufacturers continue to invent new ways in which users can ingest the drug other than by smoking it. These include capsules, vaporization, edibles, liquids (such as tea), topical oils, and even suppositories. The flavoring of products makes them more enticing and palatable, especially to youth and young children. Not enough research has been done to determine the exact interactions marijuana may have with other prescription medications, but current research indicates that marijuana could affect psychosis, depression, or anxiety when used with an antipsychotic, antidepressant, or anti-anxiety medication (Crippa et al, 2009).

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that further research and data are necessary in order to determine any positive or negative consequences in varying marijuana composition and interactions.

Impact to Health Systems

According to Monte (2015), in the article *The Implications of Marijuana Legalization in Colorado*, it was expected that increased availability would lead to increased health care utilization related to marijuana exposure. Exacerbation of chronic health conditions was expected, since THC is associated with psychosis, anxiety, and depression symptoms which could exacerbate underlying psychiatric disorders. This can be difficult to quantify since marijuana use is often coincident with other behaviors, such as drinking alcohol. However, there has been an increase in emergency department visits in Colorado due to pure marijuana intoxication. Patients may come to emergency departments with anxiety, panic attacks, public intoxication, vomiting, or other nonspecific symptoms precipitated by marijuana use.

Additionally, there have been unexpected effects to health systems due to the consequences of experimentation with new ways to produce and use THC products. The unexpected health effects include increased prevalence of burns and healthcare visits due to ingestion of edible products. The University of Colorado Burn Center has seen an increase in the number of marijuana-related burns. In the past two years, the burn center has had 31 admissions for marijuana-related burns. A majority of these were flash burns related to the THC extraction process. Furthermore, the number of children evaluated in the emergency department for unintentional marijuana ingestion at the Children's Hospital of Colorado increased from zero in the five years preceding marijuana legalization to 14 in the two years since legalization. This number has increased since

legalization: as of September 2014, 14 children had been admitted to the hospital, with seven of these admitted to the intensive care unit.

Monte also states that edible marijuana products are responsible for the majority of health care visits due to marijuana intoxication for all ages. This is likely due to a misunderstanding about the delayed intoxication effects of edibles versus smoking. Furthermore, manufacturing processes for marijuana edible products are not standardized.

In addition to the direct impacts on health systems due to illness related to marijuana use, there are also public health challenges related to evidence-based practices to reduce consumption and restrict youth access. These goals are similar to the tobacco control goals to reduce the public health impact due to smoking and exposure to secondhand smoke. Regulatory policies and efforts effective in tobacco control may lend themselves to marijuana prevention efforts. These are discussed in an article produced by the Tobacco Control Legal Consortium, entitled *Smoking, Toking & Public Health: Lesson from Tobacco Control for Marijuana Regulation* (Cork, 2015).

The increase in efforts to legalize the use and sale of marijuana has created challenges for both opponents and proponents of these measures. Although marijuana and tobacco products vary in many ways, the policy strategies used to regulate the products are often similar. There is a wealth of research and experience in developing the most effective policies to reduce and prevent tobacco-related death and disease; however, the regulation of marijuana as a legal product is a new frontier. Many of the administrative and regulatory challenges facing policy makers and public health professionals in states considering the legalization of use and sale of marijuana are familiar to the tobacco control community: restricting public use, prohibiting youth access, developing robust licensing and zoning laws, regulating the price, and controlling the advertising and marketing of marijuana. Similar to tobacco control goals, most regulatory efforts for marijuana focus on limiting the overall consumption for recreational marijuana and restricting youth access (Cork, 2015).

A list of tobacco control policies that could apply to marijuana regulation includes (Cork, 2015):

Usage

- Prohibit marijuana smoking in public places.
- Prohibit marijuana smoking in workplaces.
- Prohibit marijuana smoking in federally subsidized housing.
- Prohibit marijuana smoking in multi-unit residential properties.
- Prohibit marijuana use when operating motorized vehicles, boats, heavy machinery, etc.

Youth Access

- Set the minimum purchase age at 21.
- Require that marijuana establishment personnel meet the minimum legal purchase age.
- Require tamper proof, child resistant packaging of all marijuana products.
- Require easily visible graphic public health warnings (labels) on marijuana products.
- Institute other options to protect youth from easy access to low-cost marijuana products that make marijuana use more affordable and accessible

Retailer Licensing

- Set up safeguards, such as photo ID checks, to ensure compliance with minimum age requirements.
- Restrict the number of marijuana retail outlets.
- Require a minimum distance between marijuana retail outlets.
- Prohibit the sale of marijuana products at certain types of establishments.
- Limit the number of hours/days when marijuana products can be sold.
- Implement a licensing incentive program.

Pricing

- Set minimum price laws.
- Prohibit price discounting.
- Earmark revenue from taxation for prevention, education, treatment, etc.

Marketing and Advertising

- Prohibit self-service marijuana displays and vending machines.
- Prohibit marijuana product displays.
- Prohibit internet sales.
- Prohibit free samples of marijuana cigarettes and smokeless marijuana products.
- Prohibit brand sponsorship.
- Prohibit mass media advertising.
- Prohibit flavored marijuana products.

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that current systems may need to develop capacity in order to address system impacts.

Potential Health Benefits

In the scenario that full marijuana legislation is passed in Wyoming and in consideration of the current research, the GMIAC Health Subcommittee reasons that there are no potential health benefits for the general population.

Conclusions

In reviewing the research within the five health priorities - which are youth and adolescents, adult and chronic issues, marijuana compositions and interactions, impacts to health systems, and potential health benefits, and evaluating the potential legalization of marijuana - limited conclusions could be drawn due to insufficient data, issues within the data collection processes, and contradictory findings. What can be deduced from the data gathered is that very little will change in all five areas if no change in legislation is enacted. If medical marijuana is legalized in Wyoming, an overall increase in marijuana use among both youth and adults is expected, since research has shown a strong association between such laws and a decrease in the perception of marijuana use risk. Additionally, injury from intoxication and the need for addiction treatment resources will increase. The legalization of retail marijuana will reflect the health impacts that Colorado is experiencing such as increase in hospital visits due to unintentional overdose and increased costs of healthcare associated to increased respiratory issues.

Summary Table of Findings

Priority Area	Current Conditions	Medical Legalization	Retail Legalization
Youth	Current trends of use should remain stable	Increase in youth use may occur	Increase in youth use may occur
Adults and Chronic Use	Current trends of use should remain stable	Insufficient evidence to draw conclusions	Insufficient evidence to draw conclusions
Composition & Interactions	No increase or decrease in issues shall occur	Insufficient evidence to draw conclusions	Insufficient evidence to draw conclusions
Health System Impacts	No increase or decrease in health system impacts	Increased health care utilization related to marijuana exposure	Increased health care utilization related to marijuana exposure
Potential Health Benefits	Patients will not be able to receive potential health benefits.	Some potential health benefits of marijuana use by people with certain medical conditions.	No potential health benefits of marijuana use for the general population.

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Report on Influence of Medical Marijuana Laws and Recreational Marijuana Laws on Student Usage

Prepared by the Education Subcommittee of the Governor's Marijuana Impact Assessment Council

Dec. 1, 2015

BACKGROUND

The Education Subcommittee of the Governor's Marijuana Impact Assessment Council was formed in September 2015 to determine possible impacts to Wyoming's student population if Wyoming were to approve legislation addressing medical and recreational marijuana. The subcommittee met periodically from Sept. 30, 2015, until Nov. 20, 2015.

MEMBERS

Jillian Balow	State Superintendent of Public Instruction
Rob Black	Education Consultant and Subcommittee Facilitator, Department of Education
Brian Cox	Associate Principal, Cheyenne Central High School
Brian Farmer	Executive Director, Wyoming School Boards Association
Shad Hamilton	Principal, Fort Washakie High School
Jason Garman	Counselor, Johnson Junior High School, Cheyenne
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Doreen McGlade	President, Natrona County Education Association
Marty Nelson	Senior Administrator, Services Division, Department of Family Services

SUMMARY

This report examines impacts to Wyoming students based on five scenarios:

SCENARIO 1: If no new legislation is passed addressing marijuana in Wyoming.

SCENARIO 2: If Wyoming were to enact a law similar to Vermont's medical marijuana law.

SCENARIO 3: If Wyoming were to adopt the Peggy A. Kelley Cannabis Act of 2016.

SCENARIO 4: If Wyoming were to adopt a law similar to Colorado's medical marijuana law.

SCENARIO 5: If Wyoming were to adopt full recreational marijuana.

The subcommittee reviewed numerous studies and reports, including data on current Wyoming usage among youth aged 12-17 and adults aged 18-25.

Generally speaking, the subcommittee projects that marijuana use and marijuana-specific infractions among Wyoming's student population will increase on roughly a sliding scale, with

the lowest impact under Scenario 1 and proceeding to the highest impact under Scenario 5. It should be noted that student usage under age 21 would be prohibited under each scenario.

BASELINE: Student Usage in Wyoming Today

Illicit drug use in the United States has been increasing, according to the National Institute on Drug Abuse. In 2013, an estimated 24.6 million Americans aged 12 or older—9.4 percent of the population—had used an illicit drug in the past month. This number is up from 8.3 percent in 2002. The increase mostly reflects a recent rise in use of marijuana, the most commonly used illicit drug.

Marijuana use nationwide remained stable in 2014, even though the percentage of youth perceiving the drug as harmful went down. Past-month use of marijuana remained steady among 8th graders at 6.5 percent, among 10th graders at 16.6 percent, and among 12th graders at 21.2 percent. Close to 6 percent of 12th graders report daily use of marijuana (similar to 2013), and 81 percent of them said the drug is easy to get. Among 8th graders, there was a drop in perceived availability in 2014, with 36.9 percent saying it is easy to get marijuana, compared to 39.1 percent in 2013.

In Wyoming, an estimated 32,000 residents had used an illegal drug in the past month in 2012 and 2013, according to the National Survey on Drug Use and Health.[8] Approximately 48,000 had used marijuana in the previous month, including 3,000 of those aged 12-17 and 9,000 of those aged 18-25. On a percentage basis, 5.95 percent of 12-17 year olds used the drug in the past month, and 14.12 percent of 18-25 year olds. Past year usage included 11.71 percent of 12-17 year olds, or 5,000 children, and 25.7 percent of 18-25 year olds, or 16,000 individuals.

Wyoming's usage among middle and high school students is slightly below the national average. About 1 percent of Wyoming 6th graders, a number that has held steady since 2008, reported using marijuana in the past 30 days. Usage in other grades has held similarly steady. From 2008 to 2014, previous-month usage has ranged from 6 to 7 percent of 8th graders, 13 to 16 percent of 10th graders and 16 to 17 percent of 12th graders.[9]

EFFECT OF LEGALIZATION OF MEDICAL MARIJUANA ON YOUTH

States that have legalized medical marijuana have higher rates of marijuana use among youth, but it has not been established that the association between legal medical marijuana and usage is causal or due to a pre-existing underlying common cause such as community norms supportive of marijuana usage. Some research has found little to no increase, and in some cases, a decrease in recreational adolescent use in the first few years after a state has legalized medical marijuana, adjusting for other factors.[10] [11] Further, not all medical marijuana laws are the same. Differences

[8] SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2012 and 2013.

[9] WySAC 2014 Prevention Needs Assessment Report

[10] Effects of state medical marijuana laws on adolescent marijuana use.
http://www.ncbi.nlm.nih.gov/pubmed/23763418

across the states could affect usage. According to a 2013 study by the National Bureau of Economic Research, "Marijuana dependence appears to be higher in states with more lenient access to medical marijuana. Measures that operate on supply channels--in particular home cultivation and state acceptance of dispensaries--are associated with higher levels of dependence."[12] The range of scenarios outlined below highlight those differences.

SECTION ONE: Effect of Usage by Middle-School and High-School Aged Youth

SCENARIO 1: If no new legislation is passed addressing marijuana in Wyoming.

If the state does not enact new legislation, Wyoming will likely continue to see the influence of Colorado's status as having legalized medical and recreational marijuana. In 2013, the usage rate of Colorado youths 12-17 was 56 percent higher than the national average, ranking the state third in the nation. It is logical to assume that usage by Wyoming youth, particularly those living close to the Colorado border, will increase for at least the short term. More reliable data is needed to determine the impact of Colorado's experience on Wyoming youth since recreational use was legalized in 2012.

SCENARIO 2: If Wyoming were to enact a law similar to Vermont's medical marijuana law.

Vermont has very restrictive laws regarding who may be issued a prescription for medical marijuana and although Vermont has among the highest overall use in the nation, the state has actually seen a decrease in youth marijuana use since it legalized medical marijuana in 2004 -- including 9th, 10th 11 and 12th graders. For both past-month prevalence and the share of students reporting use on ten or more days in the past month, the rates for 2013 were lower than they were for 2003 for all grades, according to the Youth Risk Behavior Surveys. In 2013, rates varied from 32 percent prevalence for 12th graders to 15 percent for 9th graders. In 2003, the rates were 37 percent and 20 percent, respectively.

It's probable that usage won't increase much, if at all, if Wyoming were to adopt Vermont's model.

SCENARIO 3: If Wyoming were to adopt the Peggy A. Kelley Cannabis Act of 2016.

Nationwide, past-month usage by youth aged 12-17 was higher in medical marijuana states than in non-medical marijuana states.[13] The rate in 2012 was 9.4 percent in the medical marijuana states and 6.7 percent in non-medical marijuana states.

Similar disparities were seen in 2013, according to the SAMHSA National Survey on Drug Use and Health 2012 and 2013. Average past month use by 12-to-17 year olds was 6.1 percent in non-medical marijuana states, 8.9 percent in medical marijuana states and 10.5 percent in states with both legal medical and recreational status. Additionally, the top 19 states for past-month

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[11] Assessing the effects of medical marijuana laws on marijuana and alcohol use: The devil is in the details, http://www.nber.org/papers/w19302.pdf

[12] Ibid

[13] The Legalization of Marijuana in Colorado: The Impact, Volume 2, August 2014.

usage by 12-to-17 year olds in 2012 were also medical marijuana states. Again, it has not been established that the association between legal medical marijuana and usage is causal. For the purposes of this scenario, we will assume a connection. And if the Peggy A. Kelley Act is considered a middle ground between Vermont and Colorado's medical marijuana laws and perhaps an "average" medical marijuana law, then it could be supposed that a rise of roughly 2 percent in youth usage might result if Wyoming passed the Kelley Act (the approximate gap between usage in medical marijuana states and non-medical marijuana states).

That would mean an increase of up to 3 percent of 6th graders, 9 percent of 8th graders, 18 percent of 10th graders and 19 percent of 12th graders. (The percentages represent 2 percent more than the highest percent of usage by those groups in any one year from 2008 to 2014.)

SCENARIO 4: If Wyoming were to adopt a law similar to Colorado's medical marijuana law.

In Colorado, a 26 percent increase in age 12-17 monthly marijuana use occurred in the three years after medical marijuana was commercialized (2009) compared to the three years prior to commercialization.[14] Put another way, past-month usage of Colorado youth aged 12-17 went from 8.29 percent pre-commercialization to 10.37 percent post-commercialization. As mentioned above, Colorado has lenient access to marijuana and it could be expected that Wyoming's youth usage rate would increase by a similar amount if a Colorado medical marijuana model, with its lax rules, were adopted in Wyoming.

SCENARIO 5: If Wyoming were to adopt full recreational marijuana.

In 2006, Colorado ranked 14th in the nation for current marijuana use among youth. When the state legalized marijuana in 2013, past-month marijuana use among those ages 12 to 17 years increased 6.6 percent and Colorado is now third in the nation for current marijuana use among youth, or 56 percent higher than the national average.[15] In 2013, the national average for past-month marijuana use among youth was 7.15 percent compared to Colorado's average of 11.2 percent.

If Wyoming were to legalize recreational marijuana to the extent that Colorado has, a similar rate might be seen in a few years after passage of the law. However, social and community mores in Wyoming might mitigate against a rise as sharp as seen in Colorado.

SECTION TWO: Usage Effects on the College-Aged Population

As mentioned above, 14.1 percent of Wyoming 18-25 year olds, or approximately 9,000 young adults, used marijuana in the past month according to surveys in 2012 and 2013. Past year usage for 18-25 year olds was 25.7 percent, or 16,000 individuals.

[14] The Legalization of Marijuana in Colorado: The Impact, Volume 3, September 2015.

[15] Ibid.

According to the National College Health Assessment, 14 percent of University of Wyoming students in 2011 had used marijuana in the past 30 days. Four years later, the number had risen to 17 percent. Daily use was 2.1 percent in 2011 and 5.1 percent in 2015 at UW.

Nationwide, annual marijuana use is lower among college students than for non-college individuals.[16] For example, in 2014, 40 percent of non-college young adults had used marijuana over the past year compared to 34 percent of college students. Likewise, past-month usage was 26 percent for non-college young adults compared to 20.8 percent for college students, and daily use was about twice as high for the non-college group compared to college students (10.8 percent vs. 5.9 percent).

SCENARIO 1: If no new legislation is passed addressing marijuana in Wyoming.

The main effect of no new legislation will be the continued effect of Colorado's lax marijuana laws. While the effect has not been quantified, it should be assumed that Wyoming may continue to see an increase in usage among the 18-25 population in the short term, including college students.

SCENARIO 2: If Wyoming were to enact a law similar to Vermont's medical marijuana law.

Vermont passed a medical marijuana law in 2004. Prior to passage, usage by young adults 18-25 was 27 percent for the past month and 44.6 percent for the past year. Five years later, the numbers were 30.6 and 45.0, respectively – very slight increases. Usage in Wyoming probably would not increase by an appreciable amount under a similar law.

SCENARIO 3: If Wyoming were to adopt the Peggy A. Kelley Cannabis Act of 2016.

As discussed in Section One, the Peggy A. Kelley Act represents a middle ground in terms of medical marijuana laws. Some research indicates that usage among 18-25 year olds increases as much as 6 percent after passage of medical marijuana laws. If that occurred in Wyoming, about 960 additional young adults would use the drug on a monthly basis.

SCENARIO 4: If Wyoming were to adopt a law similar to Colorado's medical marijuana law.

There was a 20 percent increase in Colorado's college age (18 to 25 years) monthly marijuana use in the three years after medical marijuana was commercialized (2009) compared to the three years prior.

The Colorado average use of 18-25 for the past month in 2012 was 26.8 percent, which was 42 percent higher than the national average, ranking Colorado third in the nation. Prior to commercialization, the rate was 22.4 percent among 18-25 year olds.

About 35,000 students are enrolled at the University of Wyoming and the state's seven community colleges. If we assume that the 17 percent rate of past-month usage at UW is the same across all colleges, then the number of students currently using marijuana monthly would

[16] "Monitoring the Future: National Survey Results on Drug Use 1975-2014," Vol.2, National Institute on Drug Abuse.

be 5,950. A 20 percent increase would represent 1,190 more college students using the drug monthly. The number of young adults 18-25 using it on a monthly basis would increase from 16,000 to 19,200.

SCENARIO 5: If Wyoming were to adopt full recreational marijuana.

Following legalization of recreational marijuana, usage among 18-25 year olds continued to increase, to 29.05 percent in 2013, compared to the national average of 18.91 percent. Colorado was ranked second in the nation for current marijuana use among college-age adults (53.62 percent higher than the national average). In 2006, Colorado was eighth in the nation.

In the first year after Colorado legalized medical marijuana (2013), past month marijuana use among college-age (18 to 25 years) use increased 8.4 percent.

If Wyoming's college-age rate were to increase to 29 percent, there would be 20,640 young adults using marijuana, up from 16,000.

SECTION THREE: Effects on Youth Infractions

As youth usage of marijuana increases, the number of youth incarcerated at the Wyoming Boys School and Girls School will also increase. Besides the obvious toll that incarceration takes on the students and their families, the financial cost to society and to taxpayers will also increase.

The cost to the state is $218 per day for each youth at the Wyoming Boys School, and the average stay is 6.5 months. The average cost per child is $42,510. Because of capacity limitations, the Boys School could handle only a 10 percent increase in headcount, or 73 children. Therefore, a 10 percent increase would cost an additional $3,103,230. Essentially, each increase of 1 percent costs an additional $31,032.

It costs the state $298 per day for each youth at the Wyoming Girls School, and the average stay is eight months. The average cost per child is $71,520. A 10 percent increase equates to 10 new children, or a cost to the state of $715,200.

Below is a count of Wyoming juvenile delinquents over the past five years[17]

2010 646
2011 549
2012 635
2013 571
2014 635
2015 447 year to date, 536 projected

SCENARIO 1: If no new legislation is passed addressing marijuana in Wyoming.

[17] Wyoming Department of Family Services data

As outlined in Section One above, if the state does not enact new legislation, Wyoming will likely continue to see the influence of Colorado's status as having legalized medical and recreational marijuana. In 2013, the usage rate of Colorado youths 12-17 was 56 percent higher than the national average, ranking the state third in the nation. It is logical to assume that usage by Wyoming youth, particularly those living close to the Colorado border, will increase for at least the short-term. More reliable data is needed to determine the impact of Colorado's experience on Wyoming youth since recreational use was legalized in 2012, even though the drug remains illegal for those under 21 to use.

SCENARIO 2: If Wyoming were to enact a law similar to Vermont's medical marijuana law.

It is predicted passage of a law similar to Vermont's would not increase usage by an appreciable amount so it follows there would also be little to no impact on juvenile delinquency rates in Wyoming and thus no impact on the Wyoming Boys School and Wyoming Girls School.

SCENARIO 3: If Wyoming were to adopt the Peggy A. Kelley Cannabis Act of 2016.

If the Peggy A. Kelley Cannabis Act results in a 2 percent gain in juvenile usage and using the costs delineated above, one can extrapolate a Wyoming Boys School population increase of 2 percent resulting in a $62,064 yearly and $143,040 increase at the Wyoming Girls School yearly.

SCENARIO 4: If Wyoming were to adopt a law similar to Colorado's medical marijuana law.

If Wyoming's increase in marijuana was similar to Colorado's 26 percent increase, both the Wyoming Boys School and the Wyoming Girls School would be over capacity and unable to house the increase numbers of juvenile delinquents.

SCENARIO 5: If Wyoming were to adopt full recreational marijuana.

In the first year after marijuana was commercialized, Colorado saw a 32.9 percent increase in drug-related suspensions or expulsions. In the 2013-14 school year, the state experienced a 6.4 percent increase in drug-related suspensions or expulsions. Also, there was a 20 percent increase among 12-17-year-old probationers testing positive for marijuana after the drug was legalized for recreational use. These percentage increases would also put the Wyoming Boys School and the Wyoming Girls School over capacity, resulting in their inability to house the increased numbers of Juvenile Delinquents.

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Revenue and Agricultural Subcommittee Report

Agricultural and Revenue Impacts of Legalized Marijuana in Wyoming

Summary and Key Findings Revenue and Agriculture Subcommittee of the Governor's Marijuana Impact Assessment Council

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Agricultural Impacts

Introduction

There are two separate agricultural commodities for consideration with regards to legalization of marijuana. The first commodity is marijuana and its by-products and the second is industrial hemp. Both of these commodities require separate regulatory mechanisms as they are quite varied in their growth, processing, distribution and uses. Relative to the Wyoming Department of Agriculture, there is little impact difference in the regulatory environment when analyzing the Vermont model, the Colorado model and the Peggy A. Kelly ballot initiative as most of our programs would be applicable to an equal degree under any of the three scenarios. A review of the Wyoming Department of Agriculture's existing regulatory authorities indicates that a review of both marijuana products and industrial hemp can be described relative to the following Divisions: (1) Technical Services, (2) Consumer Health Services, and (3) Analytical Services.

Discussion

1. Technical Services Division

The Technical Services Division provides assistance with compliance of mandated laws, training and truthfully marketed commodities in Wyoming. There are a number of statutory obligations carried out by the Technical Services Division that may be influenced by the legalization of marijuana including:

- Wyoming Pesticide Control Act (W.S. §35-7-350 through 375)
- Weights and Measures (W.S. §40-10-117 through 136)
- Seeds (W.S. §11-12-101 through 125)
- Seed Laboratory (W.S. §11-12-115)
- Commercial Feed (W.S. §11-113-101 et seq.)

Programs Impacted by Marijuana Legalization

- **Pesticide Regulation** –
    - **Worker Protection Standards.** Federal law for the application of pesticides under the Agricultural Worker Protection Standard (WPS) is aimed at reducing the risk of pesticide poisoning and injury among agricultural workers and pesticide handlers. The WPS offers occupational protections to agricultural workers (people involved in the production of agricultural plants) and pesticide handlers (people who mix, load, or apply crop pesticides) who work at farms, forests, nurseries and greenhouses.

The risk to workers from exposure to a pesticide is estimated through risk assessment, which is part of the process to determine if a product meets the safety standards and can be registered. If the risk to workers is determined to be of concern, risk management tools may be used to manage those risks by reducing exposure.

In addition, the employer must assure that the employees have been properly trained in the handling and use of pesticides, and provide the proper personal protective equipment.

The level of knowledge and expertise in this area for application of pesticides within a growing operation is minimal. Growing operations are considered a greenhouse under the law.

- **Lack of federally-approved pesticides.** Because marijuana is still illegal at the federal level, the Environmental Protection Agency will not approve any pesticide for use on marijuana. No risk assessments for residues or contaminants have been conducted. The use of pesticides within a growing operation is common place to control insects, mites, disease, mold, and other pathogens. Residues remaining on or within the plants are ultimately concentrated when the plant material is further processed, notably when concentrated into oils or other consumables. Some pesticides pose a further health risk to the user, and chemically change to known hazardous chemicals (e.g. cyanide) when heated through processing, or heated during consumption (smoking, vapor pens).

- **Storage.** Proper storage of pesticides is a noted safety item within a growing or edible producing facility. First responders are at risk in the event of a fire at a facility where unknown pesticides may be in use and stored.

- **Applications consistent with non-existent labels**. Pesticides go through extensive research and development to determine the amount of chemical necessary to reduce insects, mites, disease, mold, and other pathogens to acceptable levels of economic harm.

- **Fumigations.** Fumigations of pesticides within greenhouse growing operations is commonplace. Fumigations inherently carry their own risk to anyone who may enter the facility and be exposed to the pesticide. In addition, as stated above, no fumigant is legally registered for use on marijuana.

- **Applicator training and certifications**. The primary factor affecting the training and certification of applicators, include the general lack of knowledge and use of pesticides in the marijuana industry. Additionally, no legally registered restricted use or general use pesticides are available for use. The Colorado Department of Agriculture has made efforts to assist the marijuana industry in their knowledge level of the use of pesticides, application of, and worker protection standards. Reference Colorado Dept. of Agriculture brochure "Private Applicator Program; Concerning Use and Marijuana". However, the issue of using pesticides in the marijuana industry has proven challenging for Colorado, and a number of lawsuits have been filed, both from the application & use of pesticides -and- from residues present in the consumption in edibles.

- **Weights and Measures –**
  - **Packaging and the Retail sales of marijuana plant products including oils by mass or volume.** The Wyoming Weights & Measures law requires labeling of the net weight or volume of packaged products at the retail level. Additionally, any over the counter sales by weight will require a legal for trade scale certified by the Department.

- **Commercial Feed-**
  - **Specialty pet foods including product registration.** Interest in the use of marijuana in edibles for pets is increasing within the industry, notably specialty pet treats. Pet treats are defined as a commercial feed in Wyoming, may require product registration, and may be subject to sampling and laboratory analysis to assure the product meets any labeled guarantees. Dosage levels of THC and its effect on pets are a concern, as there is no known research in this area when provided as a pet treat.

Programs Impacted by Industrial Hemp Legalization.

- **Reference: "Hemp as an Agricultural Commodity"**, Congressional Research Service Report prepared for the Members and Committees of Congress. *See Attachment A*
  - This congressional report is the most comprehensive compilation of information relevant to the production of hemp within the United States.

- **Pesticide Regulations –**
  - Very little information exists on the use of pesticides for hemp production. A cursory search provides much information from the industry on statements that hemp does not require use of pesticides. However, as with any agricultural plant

commodity, it can be reasonably theorized that the hemp plant would be subject to the same insects, mites, disease, mold, and other pathogens that affect marijuana, such as hemp russet mites [*Aculops cannabicola*]. Hemp russet mites have been found to be present in the United States in localized infestations.

Per the University of Kentucky based on their hemp research - "Hemp is the potential host to a number of diseases and insects; however, many of these problems are not widespread or are considered insignificant. Canada indicates Botrytis gray mold, Sclerotinia white mold, European corn borer, and grasshoppers have been observed. No pesticides (herbicides, insecticides, fungicides, nematicides, etc.) are registered for hemp in the U.S, so growers must follow good cultural practices to reduce the impact of pests, especially weeds.

However, if pesticides were to be used, then the same regulatory concerns are present as marijuana.

- **Weights and Measures –**
  - Packaging and the Retail sales of hemp plant products including oils by mass or volume. The Wyoming Weights & Measures law requires labeling of the net weight or volume of packaged products at the retail level. Additionally, any over the counter sales by weight will require a legal for trade scale certified by the Department.

- **Seeds & Plant Stock –**
  - **Importation & interstate movement seeds.** The Agricultural Act of 2014 (U.S. Farm Bill) provided for the "Legitimacy of Hemp Research". However, a readily available supply of seeds is non-existent. Seed for hemp must be native in the state, or must be imported from foreign markets. Seed cannot be transported over state boundaries as it is still regulated under the Drug Enforcement Agency as a Schedule 1 controlled substance. A willing foreign supplier of seed would need to be secured. Canada will not export seed, Italy appears to be one of the very few who will export.
  - **DEA Schedule 1 Permit**. To obtain hemp seed, an applicant under the provisions provided for in the 2014 Farm Bill, the Wyoming Department of Agriculture would have to submit an application for registration to the DEA for the importation and research of "marijuana". Hemp is not distinct or separated under federal law from marijuana. One person within the agency would be required to sign the application, and be the sole responsible person for tracking

every gram of seed imported, where it went, and be present upon un-announced inspection by the DEA.

- **Testing for seed viability.** There are currently no U.S. standards for seed certification. The Wyoming State Laboratory would have to establish its own standards for seed testing and viability. Under the 2014 Farm Bill, the Department would have to secure the seed, and then parcel that seed out to the University of Wyoming for growing and research purposes. The University would have to grow out enough seed to develop its own unique cultivar for commercial production in the state. In addition, cultivars would have to be University developed to provide varieties that will grow under Wyoming's environmental conditions, and to produce no more than 0.3% THC.
- **Protected Plant Variety.** PPVs are commonplace in the seed industry. Seed companies provide unique seed varieties for commercial production. However, the variety is trademarked / copyrighted as a protected plant variety. Any hemp seed that is a PPV cannot be freely marketed to growers as the company's desire to retain the variety characteristics unique to their PPV.
- **No usage of postal service for transport of seeds or hemp plant.** Excluding importation of seeds under the Schedule 1 registration, no hemp seeds or plant parts can be sent through the postal mail system. To legally be hemp, the plants must be sampled and laboratory tested to validate that the THC level is 0.3% or less. All field collected samples would have to be done by regulatory authorities, and hand-delivered to the laboratory.

- **THC testing / Hemp vs. Marijuana**. No method is readily available to agriculture inspectors or law enforcement to distinguish between hemp and marijuana. In addition, environmental factors during the growing season will affect the level of THC present in the plants. It is not uncommon for hemp to produce more THC based on the environmental factors. Moisture availability or drought, elevation, temperature, etc. all can affect how much THC is produced. What may be a planted as hemp one day, can be legally defined as marijuana under the federal law when the THC goes above 0.3%.

- **Feed Additives.** For major hemp producing countries with abundant seed, hemp seed meal is being used as a feed additive.

Summary of Regulatory and Fiscal Impacts:

Marijuana: Expectation is that the Department would incur an elevated need for pesticide applicator training, certification and regulatory enforcement of the law. Based on the current

program in comparison to the Colorado model, we expect that 2 additional staff would be required for training and field inspection activities.

Hemp: Hemp production would require the most increase in resources, both monetarily and personnel. As hemp is still regulated as a Schedule 1 controlled substance, all seed and plant stock would have to be highly regulated and monitored. An entirely new regulatory mechanism would have to be developed to track seed, register / license farms for production, conduct field inspections, sample seed and plant material and hand-deliver those samples. Laboratory needs both at the State Seed Laboratory, and the WDA Analytical Services would increase the need for personnel and new equipment. Based on the Colorado model, program start-up costs would be very comparable at $250,000.00, and 3-4 additional personnel would be required.

2. **Consumer Health Services** – The Consumer Health Services Division is responsible for reducing food (including meat and meat products) safety hazards during manufacturing, processing, retail and distribution. The Division inspects all commercial food establishments to ensure safe preparation, processing, handling and packaging. In addition, the Consumer Health Services Division is responsible for ensuring the safe manufacturing, processing, retail and distribution of cosmetics and drugs within the State of Wyoming. There are a number of statutory obligations carried out by the Consumer Health Services Division that may be influenced by the legalization of marijuana including:

- Wyoming Food, Drug and Cosmetics Safety Act (W.S. §35-7-110 et. seq.)

Programs Impacted by Marijuana Legalization and associated considerations:

- **Manufactured Food / Retail Firms**
    - Classification as an Adulterant, treatment by the United States Food and Drug Administration (FDA)
    - Labeling Issues
        - Organic/Natural?
        - Labeling on Manufactured Food will need to be monitored for accuracy
    - FDA Funding/Defunding Issues
        - Various grants from the federal government may be implicated in our delegated authority to regulate while utilizing federal funds.
    - Increase in Staff Training
    - Risk of Inspector Health and Safety

- Control of Dosage Amounts
    - It will be critical to analyze appropriate and safe levels of adulterants in manufactured foods
- Increase in workload for additional processing plants and inspectors
- The Wyoming Food Safety Rule, Chapter 14 references the Federal Code of Regulations that is adopted by reference for manufactured foods. Since marijuana is still illegal at the federal level, the FDA will not approve the use of marijuana as a Generally Recognized as Safe (GRAS) food ingredient or additive to manufactured food products. Therefore, it would be considered an adulterant in any food or beverage product, including alcoholic beverages.
- All labeling of food products must meet requirements of the Wyoming Food Safety Rule, Chapter 4. The label must include identity statement, if two or more ingredients, a list of ingredients in descending order of prominence by weight, accurate quantity (net weight), name and place of business of manufacture. Labeling claims would have to be strictly enforced. Any claims in reference to diagnosis, cure, mitigation, treatment or prevention of a disease causes the product to become a drug, section 201 (g) 1) (B) of the Federal Food Drug and Cosmetic Act. Additionally on the label there would need to be warning statement and child proof packaging.
- Marijuana cannot be certified organic since it is still illegal at the federal level, organic and certified organic is regulated by the U. S. Dept. of Agriculture, Agricultural Marketing Service.
- Consumer Health Services contracts yearly with FDA to conduct contract inspections of food manufacturing firms in Wyoming. If a processor uses marijuana in a food or beverage product this would not be a workload firm that would be reimbursable through the FDA contract.
- Staff would need to have additional training on inspection and label approvals. There would be factors in the formulation and sampling of product to assure there are controls on dosage and special labeling required of warning label declarations.
- There are safety hazards to consider for inspectors due to the environmental exposures to pesticides and the use of hazardous materials used in the extraction of product processes.
- Controls of dosage would involve sampling and using proper sampling techniques, chain of custody, integrity procedures and delivery to the lab.

- **<u>Milk PMO</u>**
    - Possible Residues from feed fed to dairy animals could cause residue in the milk products.

- FDA regulates interstate shipment of milk and milk products marijuana would be considered an adulterant.

Programs Impacted by Industrial Hemp Legalization

- The impact for manufactured food/ retail, meat program and milk would be the same as it is for marijuana. Please see discussion above. In addition to manufactured food/ retail, Industrial Hemp also affects the Cosmetics industry as discussed below.

- **Cosmetics**
  - Oils
  - Lotions
  - Beauty products
  - Labeling requirements
- Labeling requirements for cosmetics claims would have to be strictly enforced. Any claims in reference to diagnosis, cure, mitigation, treatment or prevention of a disease causes the product to become a drug, section 201(g)(1)(B) of the Federal Food Drug and Cosmetic Act.
- According to the FDA:
- Under U.S. law, cosmetic products and ingredients are not required to have FDA approval before they go on the market, with the exception of color additives. However, cosmetics must not be adulterated or misbranded. This means that they must be safe for consumers when used according to directions in the labeling, or in the customary or expected way, and they must be properly labeled. With the exception of color additives and ingredients prohibited or restricted by FDA regulations, cosmetic firms may use any ingredient, provided it is safe and does not cause the product to be adulterated or misbranded in any way. Companies and individuals who manufacture or distribute cosmetics have a legal responsibility for the safety and labeling of their products.

- FDA does not have a regulation prohibiting or restricting the use of hemp seed oil in cosmetics. However, cosmetics may also be subject to requirements of other government agencies. For example, we found the Final Rule issued by the Drug Enforcement Agency of the U.S. Department of Justice (DOJ), "Exemption From Control of Certain Industrial Products and Materials Derived From the Cannabis Plant," on the DOJ website at http://www.deadiversion.usdoj.gov/fed_regs/rules/2003/fr0321.htm. The following information is quoted from that document:

- "This final rule revises the DEA regulations to add a provision exempting from CSA [Controlled Substances Act] control certain THC-containing industrial products, processed plant materials used to make such products, and animal feed mixtures, provided such products, materials, and feed mixtures are made from those portions of the cannabis plant that are excluded from the definition of marijuana and are not used, or intended for use, for human consumption. Among the types of industrial products that are exempted as a result of this final rule are: (i) Paper, rope, and clothing made from cannabis stalks; (ii) processed cannabis plant materials used for industrial purposes, such as fiber retted from cannabis stalks for use in manufacturing textiles or rope; (iii) animal feed mixtures that contain sterilized cannabis seeds and other ingredients (not derived from the cannabis plant) in a formulation designed, marketed, and distributed for animal (nonhuman) consumption; and (iv) personal care products that contain oil from sterilized cannabis seeds, such as shampoos, soaps, and body lotions (provided that using such personal care products does not cause THC to enter the human body)."

Summary of Regulatory and Fiscal Impacts

- If marijuana/hemp is legalized and CHS is required to perform inspections, it would tax our inspectors with an already increasing workload. Depending on the risk of these plants, there could be multiple inspections during a year.
- Based on wording in the Wyoming Food Drug and Cosmetic Safety Act and the Wyoming Food Safety Rule, marijuana/hemp could not be added to any food product that would be sold to the public through a licensed and inspected food establishment.

Analytical Services Laboratory

The Analytical Services Division provides accurate and precise chemical and bacteriological analyses to all clients, to ensure a quality environment and a healthy food supply through the application of quality science. The Division routinely analyzes manufactured foods, cosmetics and drugs for label consistency, product quality, contaminants and pathogens. The Division operates under the authority of W.S. §35-7-201 through 204.

Programs Impacted by Marijuana Legalization

- **Increased Sample Requirements for Laboratory**
  - **Potency of Edibles**

Many patients choose edible products containing marijuana because they cannot or chose not to smoke it. Edibles come in many different varieties including: tinctures (alcohol and glycerin based extractions), cooking oils, baked goods, drinks, snack foods, candies (gummy bears, chocolate), and even chewing gum. The potency of marijuana varies amongst the diverse types of products. Manufacturing processes of edibles can also impact the potency, such as cooking temperatures that went too high for too long. Potency testing is important to ensure that the correct/advertised concentration of active cannabinoids is found in each product. Potency testing on edibles is performed to ensure customer safety.

In a laboratory setting the diverse type of edible products makes potency testing a challenge. Each edible type must be treated differently to ensure proper sample preparation and analysis. A one-size-fits-all sample prep approach does not work. One challenge for baked goods is ensuring that the edible is homogenized, digested or adequately extracted to permit the sample to be correctly analyzed while preserving the character of the active ingredient. For every different category of edibles, a different preparation procedure method will have to be developed. Also, brownies, gummy bears and other edible products are full of sugars, fats and other compounds that can gum up laboratory instrumentation.

Researchers have identified over 70 compounds in marijuana, many of which possess distinct medicinal benefits. Most laboratories are currently testing for 7-11 common active compounds or cannabinoids. As research continues to reveal new compounds of interest, laboratories will be required to expand the scope of testing to ensure that marijuana is appropriately characterized. This will be a moving target for laboratories testing potency and will have financial impacts. Potency is measured using HPLC and/or LC-MS.

- **Homogenization of ingredients in edibles**

  Homogeneity ensures that THC or the active ingredient is spread throughout a product evenly and not concentrated in any area. As an example, Colorado requires that no more than 20% of the total THC may be located within 10% of the entire product. It is critical that products are tested to ensure potency is defined per portion and to ensure body responses are natural and safe.

  Homogeneity is performed on all cannabis infused products. To test products for homogeneity, laboratories are taking multiple samples from different areas of

a single edible to test for potency. This increases the testing load on laboratories because each edible must be run in multiples to test for even distribution of the active ingredient throughout the edible.

- **Contaminants**

  Residual Solvent Testing: Laboratories are testing to identify the presence of harmful solvents, impurities, and/or other added odorants or chemicals present in super-concentrated forms of cannabis. More consumers are seeking out super-concentrated forms of cannabis (ie: wax, hash oil, hemp oil, shatter, amber glass, crumble, budder, etc.). Concentrates are produced using a solvent such as acetone, butane, C02, propane, ethanol, heptane, etc. to extract cannabinoids and terpenoids from plant material. Laboratory testing is required to ensure that solvents have been properly purged from concentrated products and that products are safe for the consumer. Chemical residues and solvents are not safe for human consumption and can have a significant impact on the health of the consumer, especially over time and with repeated exposure. There are no long-term toxicity or carcinogenicity studies for many of the solvents commonly used in the cannabis industry, so safe levels for chronic use of these products have not been established.

  Laboratory testing for solvent residues is required because it is impossible to detect residues by smell or visual inspection. Laboratory testing for residual solvents is complex because solvents may only be present in trace, ppm or ppb, amounts, and acceptable tolerances have not been established for many of these compounds. Method development and validation for sample preparation and solvent testing would be required since the laboratory has not performed this testing previously. Laboratory testing is performed using Headspace GC-MS/FID.

  Aflatoxins are among the most carcinogenic substances known, and smoking or ingesting aflatoxin-contaminated cannabis can lead to serious health complications for consumers and growers who might be exposed to aflatoxins. The FDA has strict regulations concerning the presence of aflatoxins in agricultural products, as aflatoxins pose a significant danger to people or animals facing long-term exposure. Marijuana is no different in terms of risk. Aflatoxins are screened using LC-MS.

Other contaminants that need to be screened for are insect parts, foreign matter, and heavy metals. Microscopy is one method to visualizer foreign matter or insect parts. Heavy metals are digested using a microwave system and analyzed using ICP-MS.

- **Microbial screening**

  Microbial contamination refers to the non-intended or accidental introduction of infectious material like bacteria and fungi (molds/yeasts) into a product. Cannabis can become contaminated at any time during growing, harvest, storage, processing, distribution, handling or preparation processes. Primary sources of microbial contamination are soil, air, animal feed and by-products, plant surfaces, sewage and food processing machinery as well as being introduced by humans. Ingesting cannabis contaminated with pathogenic microbes or mycotoxins can lead to serious allergic reactions, serious illness and health complications. Immune compromised individuals are especially susceptible.

  Laboratories are screening for yeasts, molds, enteric pathogens such as E. coli, Salmonella, Shigella (STEC), and total microbial counts. PCR and manual culture technologies are being used for these samples. For medical uses, different microbial load levels for dried flowers, edibles/concentrates and tinctures have been established by other states performing this testing.

- **Pesticides**

  Ingesting pesticides, even at the smallest doses, can be dangerous. Patients/ consumers are searching for and deserve pesticide free products. Pesticide concerns are related to: (1) consumer exposure from inhalation, ingestion or absorption of pesticides residues from the product, (2) exposure to workers cultivating the plants and (3) environmental contamination and wildlife effects.

  Testing of pesticides is complex and complicated in the laboratory. Determining which pesticides to test for is part of the problem. Some laboratories test for broad classes of pesticides in a screening method, while other laboratories are testing for 60+ pesticides. Pesticide testing is expensive and very time consuming in the laboratory, especially if each sample has to be tested with multiple sample extractions to test for different pesticides. Reporting of pesticides and determining regulatory action when pesticides are detected is

complicated because there are no residual pesticide tolerance limits established. Pesticide testing is performed on LC-MS, and GC-MS/FID/ECD.

- **Terpenes**

  Terpenes are the aromatic compounds or pungent oils that give cannabis its unique scent. Terpenes may be the next frontier in medical marijuana. Terpene testing (using LC-MS) may come in to play if label guarantees were being performed to ensure that the amount of a certain terpene stated on a label was truly present in a product.

- **Sampling integrity**
  - **Who samples**

    A comprehensive sampling plan will need to be created by the Agriculture division that is responsible for submitting cannabis samples to the laboratory for testing. To ensure a representative cross-section of products, current sampling theory should be included in this sampling plan.
  - **Sample chain of custody**

    Chain of custody is the process of ensuring and providing documentation of proper sample identification and handling from the time of collection to the receipt of laboratory results. If the results come under legal challenge, the sample must have been handled according to chain-of-custody procedures exactly and accurately. The chain-of-custody protocol assures the sample collection and labeling, no adulteration or tampering has taken place, exactly who had possession of the sample and when, how the sample was transported and stored before it was analyzed, no unauthorized access to the sample was possible, and the sample was handled in a secure manner.

    The laboratory currently uses a rudimentary chain of custody procedure. When processing cannabis products in multiple forms, a comprehensive chain of custody procedure will be required. This chain of custody procedure will protect laboratory workers from scrutiny about handling samples and also protect the samples as they are collected, submitted and tested in the laboratory. Laboratory staff will require comprehensive training on chain of custody.

- **Authority to perform testing**

Authority for the laboratory to perform testing will have to be detailed by the legislature or other means.

- **Necessary infrastructure to perform testing**
  - **Instrumentation**

    Instrumentation to test marijuana will be a large cost outlay. Instrument required will be:
    - High Performance Liquid Chromatography (HPLC),
    - Liquid Chromatography –Mass Spectrometry (LC-MS),
    - Gas Chromatography with Mass Spectrometry (GC-MS), Headspace GC-MS, and other detectors (FID, ECD),
    - Rapid Pathogen Testing through PCR
    - Microscopy with digital imaging
    - Sample Preparation—homogenizers, automated extraction system, blenders, grinders, centrifuges, analytical balances, digestion microwave
    - Other technologies currently being developed such as Infrared (IR) spectroscopy.

    Equipment will have to be purchased to perform this testing. The instrumentation (LC-MS, HPLC, GC) currently being used by ASL is 10-15 years old and outdated for much of the testing being proposed. Along with getting new instrumentation, laboratory staff will have to be properly trained to operate this equipment and be taught how to develop the marijuana testing methods for this instrumentation. *See Attachment B*

  - **Staff**

    Laboratory staff at ASL is struggling to perform the regulator testing currently mandated and to keep our result turnaround times reasonable. More staff will have to be appropriated if the laboratory is to take on marijuana testing. The testing is complex and time-consuming and will require additional staff. The amount of staff may have to be determined by the scale of regulatory testing that is proposed/mandated. If additional staff is not appropriated for ASL and marijuana testing assumes a high priority, then other program testing (meat, milk, water, animal feed, pesticide complaints, fertilizer and forage) requested by inspectors and consumers will not be performed. Adding marijuana testing to this small laboratory will exceed our capacity very quickly.

    ASL staff have experience with the instrumentation required for marijuana testing including: HPLC, LC-MS, GC, PCR. Although staff has experience with

this equipment, more training will be required to ensure staff is competent on newer, more sophisticated equipment and methods specific to cannabis testing. Staff will use their current knowledge as building blocks to learn equipment and develop sample preparation and testing methods for the tests detailed above. Training costs may be significant as the laboratory expands our testing menu.

- **Safety**

  Safety is a topic that is of concern when adding testing such as this to ASL. With marijuana testing comes a range of safety issues for employees to deal with.

  - Sample of flowers and buds must be ground or blended to ensure homogeneity of the sample prior to testing (potency, pesticides, residual solvents). Grinding of plant material produces dust that can be inhaled or ingested by laboratory employees.
  - Processing edibles into a solution that can be tested also presents workplace hazards (dust, absorption through skin, exposure to solvents, liquid nitrogen, corrosive chemicals, carcinogens).

  Workplace safety solutions might include clean rooms, large biosafety cabinets/fume hoods for sample preparation, respirators or PAPRs for staff handling samples, and video monitoring systems for chain-of-custody/storage and security of samples/laboratory facility.

  Waste disposal will greatly increase for the laboratory.

  - Waste will include the by-products of testing such as solvents, chemicals and microbacterological material (pathogens and culture materials) that will have to undergo proper disposal (autoclaving, contracted disposal of chemical waste).
  - Marijuana itself will also be a waste disposal issue once testing is complete. When testing, there is always product left over that may/may not be processed in some way. Disposal of marijuana will need to be done by an authorized company to ensure an environmentally acceptable disposable and also to ensure that it does not fall into the wrong hands.

- **Analytics**

  Space: Laboratory space is a big concern when discussing adding marijuana testing to the current ASL testing menu. The laboratory building is getting old and more difficult to add air filtering system to it. Also, we are running out of space. With the advent of more equipment and staff, adding laboratory space will have to be a consideration.

LIMS: ASL's current LIMS (laboratory information system) is a good tool for tracking samples, reporting of results, and record storage for marijuana testing.

Supplies: In addition to bringing in more instrumentation to handle new tests and increased volume, the laboratory's usage of reagents, standards, quality control and proficiency testing materials will greatly increase. This could be estimated once we have better idea of the scale of operations.

Storage: With the laboratory handling a Schedule 1 substance, storage of the samples while on-site will present a challenge. Storage would best be accomplished by a locked, secured access, video monitored room. Barcoding samples would also be a smart feature to install for tracking purposes. This could be a costly endeavor, but necessary to protect employees.

Pet Supplements: Cannabinoid supplements for pets is a growing market. Many of the tests above for medicinal/recreational marijuana also apply to pet supplements. Testing pet supplements for label guarantees would increase our testing volume even more and contribute to quickly exceeding our capacity.

Programs Impacted by Industrial Hemp Legalization

- **Increased Sample Requirements for Laboratory**

  Laboratory testing for hemp seems to be limited to potency testing of the hemp product to rule out marijuana. Hemp plants have a THC level of 0.3% or less while marijuana plants have a THC level between 5-30%. Several states and Canada require that industrial hemp have THC concentrations of not more than 0.3% by weight to be classified as hemp. Several states require that hemp be tested prior to harvest to prove the THC level.

  Since hemp cultivation is still not a large crop in the United States, research does not show a lot of other testing currently being performed on hemp/hemp products. Aside from products made from the fiber itself, the other principal product made from hemp seeds today is hemp oil. Refined hemp seed oil is primarily used in body care products. Industrial hempseed oil is used in fuel, paint, plastics, etc. The potential for the other types of hemp testing (pesticides, microbial contaminants, solvent contamination) exists but until there are more food type uses in place, laboratory testing may not be done as frequently as for medicinal/recreational marijuana.

As with marijuana, industrial hemp will have the same complexities for sample preparation, analysis, storage, waste disposal, and employee safety as described for marijuana above.

Summary:

The ASL would likely be very involved in assisting with the regulation and consumer protection with the legalization of marijuana and industrial hemp commodities. It will require additional infrastructure, equipment and staff training to accommodate the needs of legalizing either commodity.

Recommendations and Future Directions from the Department of Agriculture:

Marijuana and Industrial Hemp are both commodities with extensive regulatory implications. In addition, both commodities will require special attention in the consumer protection arena. Legalization will require an increase in staff, funding and training to ensure that the Department provides adequate services to the citizens of our state.

Sources:

Availability of Industrial Hemp Seed, Colorado Department of Agriculture, Division of Plant Industry, February 2015

Rules Pertaining to the Administration and Enforcement of the Industrial Hemp Regulatory Program Act, 8 CCR 1203-23, Colorado Department of Agriculture, Plant Industry Division

Criteria for potential pesticide products for SLN Cannabis Use, Colorado Department of Agriculture, Division of Plant Industry

Hemp as an Agricultural Commodity, Congressional Research Service, Renee Johnson, February 2, 2015

C.R.S. § 35-61-101-109

Memorandum to Colorado marijuana producers and other stakeholders, Re: Pesticides, Colorado Department of Agriculture, June 2, 2015

Memorandum for all United States Attorneys, Re: Guidance Regarding Marijuana Enforcement, James. M. Cole, Deputy Attorney General, August 29, 2013

Correspondence from United States Environmental Protection Agency, Re: Special Local Needs Registration for Pesticide uses for legal marijuana production in Colorado to Colorado Department of Agriculture, May 19, 2015

Correspondence from State of Colorado To Tom Vilsac, Secretary, U.S. Department of Agriculture, Re: Obtaining, safe, verifiable seed for cultivation of industrial hemp, February 20, 2014

CDA Industrial Hemp Inspection, Sampling and Testing Protocol, Colorado Department of Agriculture

Criteria for Pesticides Used in the Production of Marijuana in Colorado, Colorado Department of Agriculture, Division of Plant Industry, March 25, 2015

Revenue Impacts

Introduction

The Department of Revenue and the Department of Agriculture have been tasked with evaluating the requirements of the Wyoming Cannabis Act of 2016 and developing a framework for administering the program should the ballot initiative become law. In developing this framework the Departments have focused on the testing requirements, labeling of product and product standards, auditing requirements, budgetary requirements, licensing and revenue generation.

This portion of the report will focus on the Administration of Cannabis from the Department of Revenue, Liquor Division's requirements under the proposed ballot initiative. The proposed initiative tasks the Liquor Division with regulation of the acquisition, growth, cultivation, extraction production, processing manufacture, testing distribution, retail sales, licensing and taxation of medical marijuana and medical marijuana infused products.

It is important to note that the ballot initiative does not directly impose the responsibility for the State to be the "sole wholesaler" of medical marijuana however it does state the following: "This chapter vests the Wyoming Department of Revenue Liquor Division (the "Liquor Division") to regulate the state's marijuana industry in a manner similar to the state's regulation of alcohol." Wyoming currently functions as the sole wholesaler of alcoholic spirits and wine in Wyoming. The critical difference between state regulation of alcohol and marijuana is the fact that alcohol is a legal product at both the state and federal level. Marijuana is not a legal product at the federal level. Because of this difference we will assume that the Liquor Division will not regulate medical marijuana by acting as the wholesaler and will instead regulate the distribution network.

Because the Liquor Division has no expertise in administration of this product we felt that we would need to work with states that are currently involved in the regulation of medical and recreational marijuana. Additionally the Department researched existing statutes to analyze the various requirements imposed on the regulatory agencies. The following is a report on the actions taken by the Department and our findings.

- **Data collection**
    - Representatives of the Liquor Division began research of the states which currently regulate medical marijuana in their jurisdictions. At this writing there are 23 states that have legalized the production and use of medical marijuana.

- The amount allowed to be possessed by individuals for medical purposes varies widely. Some states only allow the use of non-smokable marijuana. Others allow only purchased product and do not allow individuals to own plants. Still other states allow personal growth of a limited number of plants. The Wyoming ballot initiative allows for the purchase use, display or transport of no more than three (3) ounces of medical marijuana. It also allows for the personal possession and growth of no more than six (6) medical marijuana plants, with three or fewer being mature, flowering plants.

- The medical conditions which are allowed to be treated using medical marijuana vary slightly from state to state but are relatively consistent. Commonly allowable medical conditions are:

    - Cancer, glaucoma, HIV/AIDS, Hepatitis C, ALS, Crohn's disease, Parkinson's disease, multiple sclerosis, epilepsy, cachexia, wasting syndrome, post-traumatic stress disorder, severe pain, severe nausea and muscle spasms. In almost all states there is discretion granted to regulating parties.

- One of the tasks assigned to the Department was to review the Vermont statutes and rules and regulations to determine why the certified patient population was so small in that state. Vermont requires as part of their approval of a patient for the program that there be a "bona fide physician-patient relationship". This is defined as "a treating or consulting relationship of not less than six months duration, in the course of which a physician has completed a full assessment of the registered patient's medical history and current medical condition, including a personal physical examination." This is unique to Vermont's statutes and certainly limits the patient population that qualifies for the use of medical marijuana. Additionally the State of Vermont has specifically limited the number of medical marijuana dispensaries to four (4) and these are to be non-profit organizations.

- A review of the licensing and registration requirements for patients, dispensaries, testing facilities and Marijuana infusion facilities shows wide disparity among the states. Generally the states require separate application fees, licensing fees and renewal fees for dispensaries, cultivators and Marijuana infused products manufacturers. Application fees range anywhere from $250 to

$25,000 depending on the state and type of facility applying. Licensing fees range from $1,000 to $200,000 with renewal fees ranging from $1,000 to $125,000 depending on the type of facility. Patient registration fees range from $0 to $200 depending on the state.

- The Department contacted Administrators of the Washington State Marijuana program and discussed their approach to administering their new recreational program as well as their current medical marijuana program. The topics were related to staffing, rules promulgation, auditing, experiences with medical marijuana and budgetary issues. The Department also scheduled a meeting with the Director of the Colorado Marijuana Enforcement Division (MED) of their Department of Revenue. We had a general discussion of their operations and discussed similar issues with the leadership team.

- Three site visits were conducted of medical and retail marijuana establishments in Fort Collins and Denver. The purpose of the visits was to see how the product is grown in Colorado and distributed to the consumers. We discussed how the plants are grown, and processed including use of pesticides and fungicides. We asked about the audits conducted by the MED and how often they occurred and how time consuming they were. We reviewed the tagging system used by the MED which monitors the growth and processing of plants from seed to sale. We monitored the sales process and the packaging of product.

- **Statutory Analysis**

  - A review of the various statutes around the country revealed some level of consistency. The Peggy A. Kelly model which is currently being proposed in Wyoming is very similar to many of the states we reviewed when identifying the medical conditions covered. Of particular interest is a comparison of the statutes describing the approved conditions for the states of Colorado and Vermont.

    - Colorado:

      - Debilitating medical condition means:
      - Cancer, glaucoma, positive status for human immunodeficiency virus, or acquired immune deficiency syndrome, or treatment for such conditions;

- A chronic or debilitating disease or medical condition, or treatment for such conditions, which produces, for a specific patient, one or more of the following, and for which, in the professional opinion of the patient's physician, such condition or conditions reasonably may be alleviated by the medical use of marijuana: cachexia; severe pain; severe nausea; seizures, including those that are characteristic of epilepsy; or persistent muscle spasms, including those that are characteristic of multiple sclerosis, or
- Any other medical condition, or treatment for such condition, approved by the state health agency, pursuant to its rule making authority or its approval of any petition submitted by a patient or physician as provided in this section.

▪ Vermont:

- Debilitating medical condition means, provided that, in the context of the specific disease or condition described in subdivision (A) or (B) of this subdivision (2), reasonable medical efforts have been made over a reasonable amount of time without success to relieve the symptoms, means:
  - (A) Cancer, multiple sclerosis, positive status for human immunodeficiency virus, or acquired immune deficiency syndrome, or the treatment of these conditions, if the disease or the treatment results in severe, persistent, and intractable symptoms; or
  - (B) a disease, medical condition, or its treatment that is chronic, debilitating, and produces severe, persistent, and one or more of the following intractable symptoms; cachexia or wasting syndrome, severe pain; severe nausea; or seizures.
- The diseases listed above are very similar to the diseases and afflictions enumerated in the Wyoming Act. What makes Vermont's statute restrictive is not the listing of the debilitating diseases but the requirement to insure that "reasonable medical efforts have been made over a reasonable amount of time without success in treatment of these illnesses.
- There was discussion held during the committee's last meeting regarding the interpretation of the Wyoming Act and

the definition of "Debilitating medical condition" and the list of conditions, specifically "severe pain". The group felt that the Wyoming Act was more restrictive than the Colorado statutes asserting that the second list of conditions were descriptive of the symptoms of the first list of illnesses. It is our belief that the second list of conditions stand on their own separate from the first list. As an example "post-traumatic stress disorder", can in no way be associated with the illnesses in the definition. Also, seizures are listed specifically associated with epilepsy, also not related to any illness in the first list.

- It is the Department's position that the Wyoming Act would have to be administered much like the medical marijuana statutes in Colorado and other states with similar language in their definition of "debilitating medical condition". A "condition which produces, for a specific patient, one or more of the following, and which, in the professional opinion of the patient's physician, foreseeably may be alleviated by the use of medical marijuana:" severe pain is one of those conditions which would be allowable.
- The licensing and regulation of the defined facilities, including dispensaries, cultivation facilities, medical marijuana-infused product manufacturing facilities, and testing facilities is similar to the current practices in Colorado and Washington. We would expect to have staff and auditors assigned to conduct licensing of these facilities and auditing production and sales according to procedures developed by the Department.
- Taxation of medical marijuana based on the current language in the Wyoming Act would be limited to sales and use tax based on the location of the sale. Property taxes would be assessed on the facilities' real and personal property.

- **Budgetary assumptions**
  - The department assumes that the staffing of the Marijuana Division will be similar to that of Colorado scaled to represent our relative population but recognizing the similar duties. The Division would be staffed with 18 employees divided between two sections, Accounting and Compliance. Start-up costs would include office

space, furniture and computer equipment and vehicles for the field staff. Estimated cost to begin operations is $2,724,693. Ongoing budget for administration of the program are estimated at $1,737,800 annually.

- **Revenue Projection**
  - Revenue from the administration and sale of medical marijuana are projected to come from two sources; licensing fees for dispensaries, cultivation, marijuana infused products facilities and testing facilities and from sales taxes paid on the retail sale of medical marijuana. The ballot initiative does limit the taxes which are allowed to be imposed on the sales of medical marijuana. 12-11-105 states as follows:

    "Each medical marijuana establishment shall be subject to, and pay any state commercial activities tax, including any applicable sales, use or excise taxes as apply to businesses in general, and all other local taxes, assessments, fees and charges as apply to businesses in general."

  - In the current projection the department is assuming that licensing fees will be similar to what is already charged for liquor licenses. Currently local governments impose a $1,500 annual fee for liquor licenses. We're assuming that there will be 23 dispensaries opening in the state and 23 cultivation facilities. Marijuana infused products facilities are estimated at 5 in the state and possibly 2 testing facilities. Total annual licensing revenue from the facilities is estimated at $79,500.
  - Revenue from sales taxes will depend on the number of patients registered for medical use and the amount of product sold. The department reviewed the number of patients registered in Colorado and adjusted that figure based on Wyoming's population relative to Colorado. We assumed that there would be 10,000 patients registered in Wyoming for the purposes of estimating the product sold.
  - We then looked to Colorado dispensaries to determine the average price of the product. Average price in Colorado for an ounce of marijuana was $160/ounce. This does vary by strain sold but is a reasonable average. The average dosage prescribed varies widely depending on the source of information but an ounce of product per month looked to be a reasonable estimate. We estimated that 120,000 ounces of product would be sold annually. The estimated revenue generated would be $529,920 in state general fund revenue from sale of medical marijuana. The local taxes distributed to the counties would be $504,960.
- **Revenue Analysis**
  - Based on the assumptions made, the revenue generated from licensing and sales will not be sufficient to pay for the administration of the program. It is certainly possible to adjust the licensing fees to cover the administration. It is also important to note

that if more dispensaries and cultivation facilities are licensed, more revenue could be generated from licensing.

- Without further revenue support the program administration would have to be funded by other state revenue.
- Depending on the interpretation of the ballot initiative related to allowable revenue sources it may be possible to impose excise taxes similar to the taxes imposed on liquor and/or cigarettes. Currently Wyoming imposes an excise tax on alcoholic spirits of two and one-half cents ($.025) per one hundred (100) milliliters of spirituous liquor (3.4 ounces). Additionally the Liquor Division marks up the wholesale sale of the same spirit by seventeen and 6 tenths (17.6) percent of the wholesale price.
- Cigarette taxes in Wyoming are based on a price per cigarette, currently 3¢ per stick or 60¢ per pack. A tax of 25¢ per marijuana cigarette based on 60 cigarettes per ounce would generate $15 per ounce of product or approximately $1.8 million in revenue. This assumes 120,000 ounces of product sold annually.

Criminal Justice Subcommittee Report

Introduction

The Governor's Marijuana Impact Assessment Council was convened, and met for the first time July 29th, 2015. The Council has been charged with collecting and reviewing all available research and data in order to assess the impact on public health and safety in Wyoming from the possible legalization of medical and recreational use of marijuana in our state. At our August meeting, subcommittees within the council were formed to focus on their subject matter area of expertise. The subcommittees were instructed to address marijuana impact to our state utilizing three different scenarios:

1. **Status Quo**, or what we're experiencing right now, considering the amount of illicit narcotics being trafficked through Wyoming, and diversion impact from other states which have medical marijuana laws or fully legalized marijuana, such as Washington, Oregon, California, Colorado, etc.

2. **Medical marijuana**, or more specifically what Wyoming would likely experience if the **Peggy A. Kelly ballot initiative** or other medical marijuana legislation comes to pass.

3. Finally, we were asked to address fully legalized **recreational marijuana**, as well, should more liberal legislation be introduced. As such, this report will be broken into those three responses.

The Criminal Justice Subcommittee met twice, and has discussed and shared a number of topics of concern including but not limited to: the usefulness of the Rocky Mountain High Intensity Drug Trafficking Area (RMHIDTA) Report, where marijuana is legal (states and countries) and to what extent, crime surrounding dispensary and grow operations, drug related vehicle crash/fatality rate, crime rates and recidivism, budgetary impact to law enforcement/courts/crime labs, effect on jail/prison/juvenile facility population, law enforcement training, and whether there may exist cartel involvement in legalized marijuana.

Members of the criminal justice committee are: Col. Kebin Haller- WHP, Director Bob Lampert- DOC, Rachel Campbell- DFS, Diane Lozano- Public Defender's Office, S/A Darrin Cregger- DCI, Chief Jim Hloucal- Gillette Police Department and Lt. Col. Shannon Ratliff- WHP.

The following report is a result of data and material gathered by the subcommittee.

Status Quo

The Controlled Substances Act (CSA), prescribes federal U.S. drug policy under which the manufacture, importation, possession, use and distribution of certain substances is regulated. It was passed by the 91st United States Congress as Title II of the Comprehensive Drug Abuse Prevention and Control Act of 1970. Marijuana is listed by the Drug Enforcement Agency (DEA) as a schedule I drug. **Schedule I drugs** are those which have the following characteristic according to the United States Drug Enforcement Agency:

- The drug or other substance has a high potential for abuse.
- The drug or other substance has no currently accepted medical treatment use in the U.S.
- There is a lack of accepted safety for use of the drug or substance under medical supervision.

No prescriptions may be written for Schedule I substances, and they are not readily available for clinical use. Tetrahydrocannabinol (THC, marijuana) is still considered a Schedule 1 drug by the DEA, even though some U.S. states have legalized marijuana for personal, recreational use or for medical use. Legalizing medical marijuana at the state level would also subvert the U.S. Food and Drug Administration's drug approval process.

James M. Cole, Deputy Attorney General, sent a memorandum to all United States Attorneys, which was dated August 29, 2013. The memorandum states in part:

"As the Department noted in its previous guidance, Congress has determined that marijuana is a dangerous drug and that the illegal distribution and sale of marijuana is a serious crime that provides a significant source of revenue to large-scale criminal enterprises, gangs, and cartels. The Department of Justice is committed to enforcement of the CSA consistent with those determinations. The Department is also committed to using its limited investigative and prosecutorial resources to address the most significant threats in the most effective, consistent, and rational way. In furtherance of those objectives, as several states enacted laws relating to the use of marijuana for medical purposes, the Department in

recent years has focused its efforts on certain enforcement priorities that are particularly important to the federal government:

- *Preventing the distribution of marijuana to minors;*
- *Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs and cartels;*
- *Preventing the diversion of marijuana from states where it is legal under state law in some form to other states;*
- *Preventing state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs of other illegal activity;*
- *Preventing violence and the use of firearms in the cultivation and distribution of marijuana;*
- *Preventing drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use;*
- *Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands; and*
- *Preventing marijuana possession or use on federal property."*

Wyoming State Statute, Title 35, Chapter 7, Article 10 prohibits marijuana use, possession, distribution, etc., and as such, Wyoming law enforcement and judiciary adhere to state law. State law requires all departments, officers, agencies, and employees of the state of Wyoming to cooperate with the commissioner of drugs (Wyoming Attorney General) and substances control in carrying out his functions under this or any other act. The commissioner shall place a substance in Schedule I if he finds that the substance has high potential for abuse; and has no accepted medical use in treatment in the United States or lacks accepted safety for use in treatment under medical supervision. Wyoming has 20 drug and DUI courts.

Wyoming's 2015 general legislative session passed a hemp extract bill, which allows for an exemption from Wyoming's controlled substances act. It allows Wyoming residents who are at least 18 years of age, and who suffer from intractable epilepsy or seizure disorders, or parents of minor children who suffer from intractable epilepsy or seizure disorders, to receive a hemp extract registration card, and to be exempt from civil and criminal penalties, per Wyoming State Statute 35-7-1803.

Crime and Traffic Related

Data compiled by the Wyoming Association of Sheriffs and Chiefs of Police indicates 12.83% of misdemeanors and 31.62% of felonies in Wyoming, in 2014, involved drugs. Meth involved arrests have almost doubled, and drug involved arrests have increased by 37% in the past two years. 75% of all arrests in 2014 involved alcohol and/or other drugs. Marijuana comprised 6.35% of meth, alcohol and other drug involved arrests.

11.43% of DUI arrests in Wyoming in 2014 involved drugs. 15.83% of traffic crashes which resulted in arrest(s) involved drugs. 1.8% of all crashes involved drugs, 4% of all injury crashes involved drugs, and 17% of all fatality crashes involved drugs.

5.62% of all persons arrested for driving under the influence (DUI) were under the age of 21, and that number would represent alcohol and drug impairment. 18.18% of all juvenile arrests involved marijuana, 1.01% of juvenile arrests involved methamphetamine and 27.27% involved other drugs.

Based on observed trends, it is reasonable to conclude each of these figures will likely increase over time. While it was not tracked, it has been reported heroin use/arrests have increased, and it has been reported meth use/arrests have increased. Some experts are attributing this to cartel activity shifting to drugs other than marijuana, due to lost revenue from government regulated legalized marijuana.

Wyoming law enforcement agencies have observed an uptick in interdictions and other enforcement activity believed to be directly related to our proximity (**Montana- medical marijuana, Colorado- "recreational" marijuana**). There is an observed increase in combined alcohol and drug related DUI's.

Wyoming is in the beginning stages of engaging in the 24/7 sobriety program. In the 24/7 Program model, every DUI offender is either tested twice daily (seven days a week) at a breath-

testing center, or they wear SCRAM Continuous Alcohol Monitoring technology. If a subject fails or misses a test, or if they have a confirmed drinking event on SCRAM CAM, they are swiftly, immediately escorted to the local jail. Some important statistics from South Dakota:

- In South Dakota, alcohol-related traffic deaths declined by 33% from 2006 to 2007, the highest decrease in the nation, after implementation of statewide 24/7
- Since then South Dakota has seen an additional 25% decrease in alcohol-related traffic fatalities
- SD has had a 93% compliance rate with 24/7 participants monitored by SCRAM CAM
- 98% of participants in South Dakota's 24/7 program successfully complete the program

While this is proving to be a valuable and undoubtedly life-saving program, the subcommittee is obviously concerned that given the rise in combined substance DUI arrests, there will need to be more toxicology data collected and transmitted to ensure total compliance. Currently, the SCRAM devices only collect and transmit alcohol information, and no drug information is collected. Likewise, Wyoming has an ignition interlock law, which requires that an ignition interlock device (IID) be installed on all vehicles of anyone convicted of a DUI with a blood alcohol concentration (BAC) level of .15 or greater, as well as for all second and subsequent DUI offenses. Depending on the driver's record, the interlock must be installed for a period of 6 months to one's entire lifetime. The subcommittee is also concerned these devices detect and measure the presence of alcohol only and do not indicate drug toxicology.

Training

Wyoming law enforcement agencies are training their personnel as a reaction to increased drug related activity. Many agencies have drug recognition experts (DRE's), who have been trained to identify people whose driving is impaired by drugs other than, or in addition to, alcohol. DRE's often testify in court, where the term "expert" has important legal implications. This training is extensive, and typically involves sending officers out of state for initial training, so that they may observe actual drug impairment. Out-of-state travel and prolonged absences from one's department can creates difficulties for many of Wyoming's smaller agencies. Currently, there are approximately 78 DRE's in Wyoming; however it appears that number may

diminish after December if all do not recertify. The National Traffic Law Center published an article recognizing the need for DRE prosecutors in the court room. The Wyoming law enforcement community is beginning to recognize the significance this may have on the outcome of DUI cases, given the rise of combination (alcohol and drugs) DUI's. Many agencies are training their officers in Advanced Roadside Impaired Driving Enforcement (ARIDE), which was developed by the National Highway Transportation Administration (NHTSA). ARIDE training is less intensive and can be administered locally, allowing agencies to train more of their personnel. Currently, over 600 law enforcement officers in Wyoming, to include all Wyoming Highway Patrol troopers, are trained in ARIDE. Wyoming law enforcement continues to train in basic and advanced drug interdiction techniques, as well as case law and search and seizure.

Currently, officers rely upon a subject's performance of standardized field sobriety tests (SFST's) to determine impairment. Field testing is made much more difficult with Driving Under the Influence of Drug (DUID) cases or combined substance DUI cases. There are devices available which can indicate the presence of THC in a subject's system; however, those devices are extremely expensive. Purchasing of such devices would again most certainly impact an agency's budget.

The Wyoming Highway Patrol and other Wyoming law enforcement agencies are expanding their K-9 narcotics detection programs in response to an observed increase in activity stemming from Colorado legalized marijuana, and because it is believed there are large amounts of narcotics moving into and through our state, which are going undetected. Interestingly enough, if medical or legalized recreational marijuana comes to pass in Wyoming, all law enforcement agencies with K-9 programs will face a dilemma. Currently, we rely upon a K-9's alert as probable cause for a search or a warrant. We may no longer be able to rely solely on a dog's alert when determining probable cause for a search or a warrant. Obviously, the dog cannot discern between "personal use" and "intent to sell" amounts of marijuana. Many agencies in states with legalized marijuana are no longer training their K-9's to detect marijuana, due to possible unwarranted investigatory detentions of people who are not breaking any laws. We understand that many agencies are not altering their training programs or policy, which could place the officer, as well as the agency, in a predicament until sufficient case law is developed to prompt those sorts of changes. The possibility certainly exists that dependent upon what our courts communicate to us, we may have to retrain or replace our existing K-9's. That could be extremely costly, given the average cost of a new K-9 with training is approximately $15,000.

Washington and Colorado have established that 5 nanograms per milliliter of whole blood will be the legal threshold for DUI or DUID.

The Walsh Group, a substance abuse research and consulting firm, published "The Feasibility of Per Se Drugged Driving Legislation Consensus Report" in 2002. While, admittedly, this report may be dated, it contains several points of concern worth discussing, especially since this report predates states having legislated medical, marijuana, decriminalization and legalized marijuana laws. The following are key findings of the consensus group:

- *Driving under the influence of illegal drugs (DUID) has become a significant problem worldwide.*
- *Drugged drivers are less frequently detected, prosecuted, or referred to treatment compared with drunk drivers.*
- *There is a lack of uniformity or consistency in the way the 50 U.S. states approach drugged drivers.*
- *Current laws in most U.S. states make it difficult to identify, prosecute, or convict drugged drivers.*
- *Too few police officers have been trained to detect drugged drivers.*
- *Per se DUID laws are feasible and represent a good strategy for dealing with drugged drivers.*
- *Per se DUID laws can assist in the prosecution of DUID.*

The consensus group also offered the following recommendations:

- *Initiatives should be developed to raise public awareness about drugged driving.*
- *States should consider per se laws which prohibit driving, operating, or being in actual physical control of a motor vehicle when any amount of a drug is present as measured in blood, urine, saliva, or other bodily substance. A model per se law should include:*

- *Sanctions for refusal to test that should be equivalent to a positive test.*
- *Provisions to stipulate that legal prescription use of a drug is an affirmative defense to a DUID charge, however, knowingly using a drug which incapacitates should be prohibited.*
- *A mandatory tiered system of evaluation, counseling, treatment (if required), and supervision for convicted individuals.*

- *License reinstatement and provisional restricted licenses for convicted DUID offenders should be tied to successful participation in a treatment program.*
- *When treatment is required for those convicted of DUID, there should be a formal monitoring process through completion.*
- *New drug detection technologies should be used to facilitate the enforcement and prosecution of per se DUID laws, and to monitor treatment compliance.*
- *Training programs in DUID issues should be developed for police, prosecutors, defense attorneys and judges.*
- *A model statute should be developed and made available to states.*

Wyoming Highway Patrol

Marijuana Related Contacts

	MARIJUANA			*ALL CONTROLLED SUBSTANCES*		
YEAR	**CO Related*	*All*	*% Related to CO*	**CO Related*	*All*	*% Related to CO*

2015	*604*	*1299*	*46%*	*1058*	*2424*	*44%*
2014	*481*	*1229*	*39%*	*859*	*2493*	*34%*
2013	*335*	*1187*	*28%*	*713*	*2750*	*26%*
2012	*335*	*870*	*39%*	*538*	*2026*	*27%*
2011	*239*	*907*	*26%*	*452*	*1845*	*24%*
2010	*251*	*829*	*30%*	*524*	*1944*	*27%*
2009	*99*	*550*	*18%*	*226*	*1291*	*18%*

*CO Related - Address for subject one or two is in CO, Origin is CO, or Destination is CO.

Query was by Category Type

MJ: CS-Hashish, CS-Marihuana, CS-Marihuana Edibles, CS-Marihuana High Grade, and CS-Marihuana Plant.

All CS: CS-Amphetamine, CS-Cocaine, CS- Cocaine Crack, CS-Ecstacy, CS-Hashish, CS-Heroin, CS-LSD, CS-Marihuana, CS-Marihuana Edibles, CS-Marihuana High Grade, CS-Marihuana Plant, CS-MDMA/Ecstacy, CS-Mescalin, CS-Methamphetamine, CS-Methamphetamine ICE, CS-Paraphernalia, CS-PCP, CS-Peyote, CS-Psilocybin, CS-Spice, CS-Syringes,

***This query was run in October, and is obviously year-to-date.**

Peggy A. Kelly Ballot Initiative

It is absolutely reasonable to presume law enforcement and the rest of the criminal justice system would encounter a dilemma with legalizing marijuana within the state when it is against federal law. Peace officers take an oath of office to uphold the U.S. Constitution and the Constitution and laws of the state of Wyoming. Should Wyoming authorize and license individuals to possess, cultivate and sell marijuana, it could present a conflict in those duties

and, therefore, it would seem reasonable for law enforcement to request a legal opinion from the Attorney General. This legal opinion would be to clarify the issue related to federal pre-emption. We understand that the state is not required to have the same laws as the federal government. However, the question is "can a state, by legislative action, affirmatively authorize individuals and/or business entities to violate federal law?" **This dilemma continues to create concerns for law enforcement in the States of Colorado, Montana and Washington**.

Traffic Related

The State of Colorado has been experiencing medical marijuana from 2006 to present. According to RMHIDTA report: *The Legalization of Marijuana in Colorado: The Impact*, Colorado marijuana-related traffic deaths increased 92 percent from 2010-2014. Marijuana-related traffic deaths were approximately 20 percent of all traffic deaths in 2014, as compared to 2009, when they were 10 percent.

An article from the Missouri Substance Abuse Prevention Network, titled "Marijuana Facts for Law Enforcement", states the following:

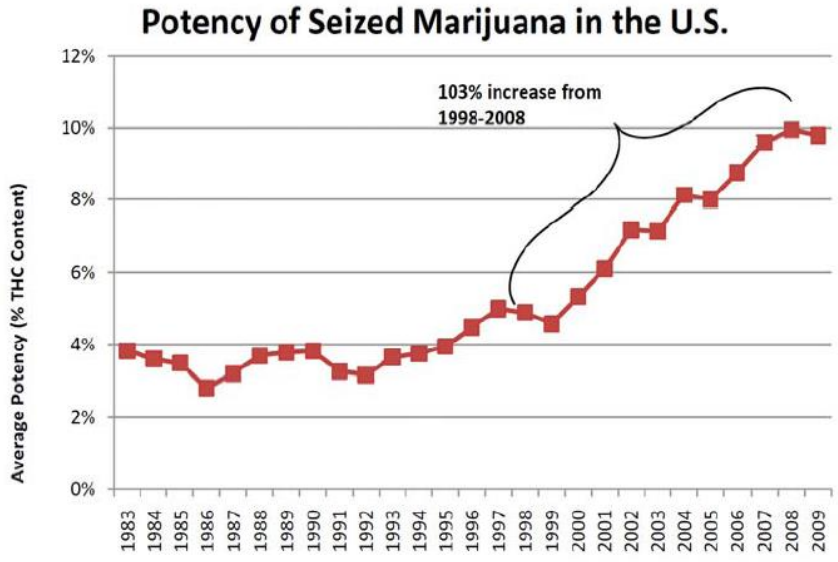
- *Marijuana is the most prevalent illegal drug detected in impaired drivers, fatally injured drivers, and motor vehicle crash victims.*
- *Marijuana impairs motor coordination and reaction time and is the second most prevalent drug (after alcohol) implicated in automobile accidents.*
- *In the five years following the establishment of the California Medical Marijuana Program (Jan. 2004), there were 1240 fatalities in fatal car crashes involving marijuana, compared to 631 for the five years prior, for an increase of almost 100%.*
- *In 2008 there were 8 counties where more than 16% of the drivers in fatal car crashes tested positive for marijuana. Five of the 8 counties had rates over 20%.*
- *More people are driving on weekend nights under the influence of marijuana (8.3) than alcohol (2.2%).*

- *In the first six months that marijuana became legal in state of Washington:*

    - *745 drivers stopped by police tested positive for the drug's psychoactive ingredient, THC, in their blood*
    - *Over half of those were over the state's new legal limit of 5 nanograms of THC per milliliter of blood.*
    - *By contrast, in each of the last two full years, about 1,000 drivers who were pulled over tested positive for THC.*

Marijuana Potency

An article from ONDCP relates that, "Marijuana is classified as a Schedule I drug, meaning it has a high potential for abuse and no currently accepted medical use in treatment in the United States. In recent decades, marijuana growers have been genetically altering their plants to increase the percentage of delta-9-tetrahydrocannabinol (THC), the main active ingredient in marijuana. The average potency of tested marijuana from Federal seizures more than doubled from 1998 to 2008, as shown below."



Source: University of Mississippi, National Center for Natural Products Research, *Potency Monitoring Project Quarterly Report 107 (January 2010)*

Forms of Marijuana

Marijuana and THC laden material are available for consumption in many different forms and manners. The readily recognizable plant material may be smoked or may be infused into different food products such as baked goods or candy. Hash, which is produced by utilizing the resin glands from marijuana flowers (buds), can be smoked. Concentrates, such as oils, resins, waxes or "shatter" can be consumed by heating the substance into a vapor then inhaling. Oils and tinctures can actually be used topically and absorbed into the skin. Edibles, such as backed goods or candy, are attractive to youth and those who prefer not to smoke or inhale the chemicals.

The many different forms, uses and methods of consumption make marijuana and THC detection and subsequent field testing difficult. Law enforcement is continuously receiving new information and new training, as different methods are discovered.

Youth Marijuana Use

An American Psychiatric Association position paper released in 2014 stated, "There is no current scientific evidence that marijuana is in any way beneficial for the treatment of any psychiatric disorder. In contrast, current evidence supports, at minimum, a strong association of cannabis use with the onset of psychiatric disorders. Adolescents are particularly vulnerable to harm, given the effects of cannabis on neurological development.

An article written for Medical Daily Pulse July 28th, 2015 speaks to the Center for Disease Control's concern for edible marijuana or THC:

"Following the death of Levy Thamba — a 19-year-old student who jumped to his death from the fourth floor of his hotel in Denver after consuming marijuana edibles — the risks associated with so-called "pot brownies" have been thrust into the national spotlight. Now the Centers for Disease Control and Prevention wants the public to be fully aware of the "potential danger" that awaits anyone looking to enjoy smokeless marijuana.

Thamba, who had no history of alcohol abuse, drug use, or mental illness, obtained the marijuana cookie from a 23-year-old friend he had been visiting Colorado with. As directed by the sales clerk at the marijuana dispensary, Thamba only consumed a small piece of the cookie. However, he consumed the rest of the cookie after 30 to 60 minutes.

An ingredients list on the cookie read: "65 mg THC/6.5 servings (THC, tetrahydrocannabinol, the principal psychoactive agent in cannabis)." The label also stated: "This marijuana product has not been tested for contaminants or potency."

Thamba's friends reported that he started to act hostile and speak erratically approximately two hours after eating the entire cookie. Three and a half hours after eating the first piece of the cookie, Thamba leaped to his death, becoming the first reported death associated with the consumption of marijuana edibles. Thamba's autopsy listed "marijuana intoxication" as a chief contributing factor.

"This case illustrates a potential danger associated with recreational edible marijuana use," the CDC said in a statement. "Some studies have suggested an association between cannabis and psychological disturbances. Second to alcohol, marijuana is the most commonly used recreational drug in the United States, with an estimated 19.8 million past-month users during 2013. In 2012, Colorado and Washington became the first states to permit recreational use of marijuana under their state laws."

Although Thamba's death is the first associated with marijuana edibles, it was most certainly not the last. Back in March, the family of Luke Goodman blamed the 23-year-old's suicide on peach tart candies containing 10mg of THC per piece of candy. Goodman's cousin, Caleb Fowler, said he began acting "pretty weird and relatively incoherent" a few hours after consuming five times the recommended dosage.

Goodman's mother, Kim, said her son did not read the labels which stated: "The intoxicating effects of this product may be delayed by two or more hours. The standardized serving size for this product includes no more than 10mg."

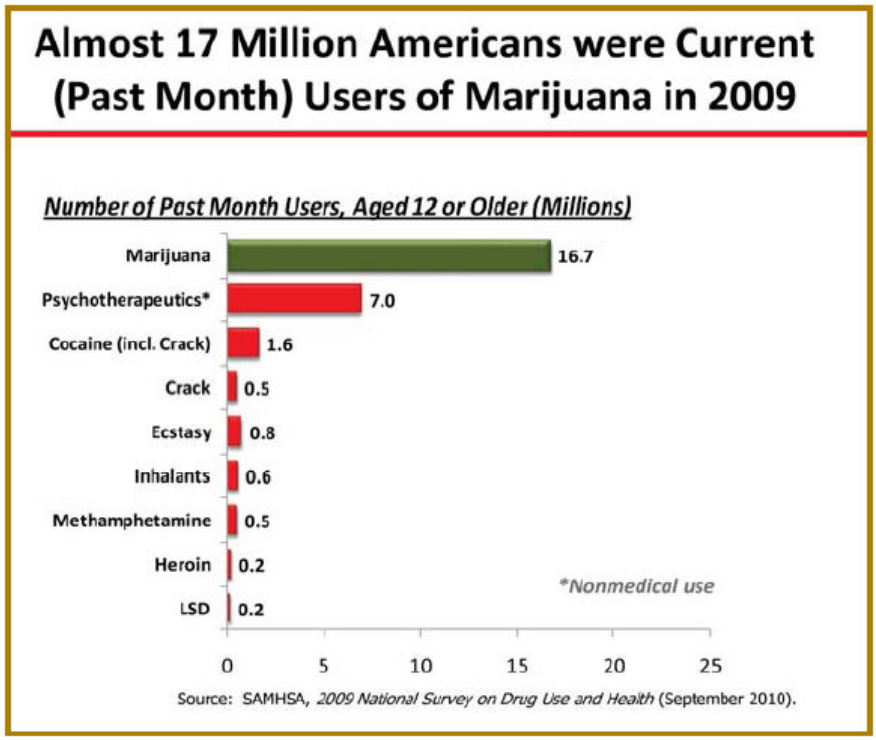
"It was 100 percent the drugs," Kim Goodman told CBS Denver. "It was completely because of the drugs — he had consumed so much of it. It was completely out of character for Luke. There was no depression or anything that would leave us being concerned, nothing like that. I would love to see edibles taken off the market. I think edibles are so much more dangerous.""

It should be noted that Levy Thamba was a student at Northwest College in Powell, Wyoming.

An article from The Office of National Drug Control Policy (ONDCP) related that:

"Marijuana is the most commonly used illicit drug. Although marijuana is sometimes characterized as a "harmless herb,'' the cultivation, trafficking and use of the drug have

a negative impact on many aspects of our lives, from public health to national security, transportation, the environment, and educational attainment."



National Trends

- Rates of marijuana use among 8th, 10th, and 12th graders are higher than rates for any other illicit drug.
- According to the 2009 National Survey on Drug Use and Health (NSDUH), 16.7 million people age 12 or older were current marijuana users, meaning they used the drug during the month prior to taking the survey (see chart, above).

- NSDUH also shows that from 2008 to 2009, the rate of current illicit drug use among young adults aged 18 to 25 climbed 8 percent, from 19.6% to 21.2%, driven largely by a 10 percent rise in marijuana use (from 16.5% to 18.1%).
- In 2009, there were 2.4 million new past-year users of marijuana. The average age of initiation dropped from 17.8 in 2008 to 17.0 in 2009.
- The average potency of marijuana has more than doubled since 1998.

According to RMHIDTA report, in 2009, 10.17 percent of Colorado youth (12 to 17 years of age) used marijuana, and the national average was 7.03 percent. Wyoming's average was less than 6 percent. In 2013 Colorado ranked 3rd in the nation for youth marijuana use, and was 56 percent higher than the national average. Drug-related suspensions and expulsions from school increased by 40 percent from 2008/2009 to 2013/2014, and the majority were for marijuana violations.

Adult Marijuana Use

TheGazette.com reported in part:

"Richard Kirk, 49, is charged with first-degree murder in the shooting death of his wife, Kristine, 44, in April 2014. Defense attorneys have suggested that Kirk was so impaired by "Karma Kandy Orange Ginger" that he may not have intended to kill her.

The shooting stoked concerns about the effects of the marijuana snacks, which have become popular since the state legalized recreational marijuana stores. Colorado lawmakers last year tightened regulations on edible marijuana, responding to the Kirk case and the death of a college student who jumped from a hotel balcony after eating a potent marijuana cookie."

According to RMHIDTA report, in 2013, Colorado ranked 2nd in the nation for college age marijuana use (18 to 25 years of age), and was 54 percent higher than the national average. Colorado ranked 5th in the nation for adult marijuana use (26 years of age and older), and was 86 percent higher than the national average.

Crime and Homelessness

According to RMHIDTA, crime increased in Denver 12.3 percent from 2012 to 2014. Homelessness in Colorado has increased. There has been a noticeable increase in people using shelters and soup kitchens and the majority are reporting they have traveled to Colorado because of the availability of marijuana.

An article from the Missouri Substance Abuse Prevention Network, titled "Marijuana Facts for Law Enforcement", states the following:

"*Since medical marijuana was approved in California, the Los Angeles Police Dept. reported that areas surrounding cannabis clubs had:*

- *200% increase in robberies*
- *52% rise in burglaries*
- *57% increase in aggravated assaults*
- *131% increase in auto burglaries near dispensaries*

Legalization would not ease the burden on law enforcement. According to The American Society of Addiction Medicine (ASAM) "Nationally, there are an estimated 2.7 million alcohol-related arrests each year compared to 750,000 annual marijuana possession arrests. If marijuana use increased, as can be expected under legalization, it is likely that there would be an increase in the number of arrests at the state level for marijuana-related incidents such as public use violations, violations in laws regulating age limits, and marijuana-related arrests for driving under the influence (DUI)."

Legalized Marijuana

Traffic Related

An article from the National Institute on Drug Abuse offers that:

- Conservative estimates show that 20% of crashes in the U.S. are caused by drugged driving. This translates into about 6,761 deaths, 440,000 injuries and $59.9 billion in costs each year.
- In a national survey, drugs were present more than 7 times as frequently as alcohol among weekend nighttime drivers in the U.S., with 16% testing positive for drugs, compared to 2% testing at or above the legal limit for alcohol.

A Denver Post article, dated 1/2015 stated the Colorado State Patrol reported that 12% of their DUI cases are marijuana related. It related that "CDOT last year spent $1 million on an ad campaign called "Drive High, Get a DUI." Even after the campaign, a CDOT study found that 21 percent of recreational marijuana consumers didn't know they could be cited for driving under the influence of pot."

Law enforcement agencies in Wyoming have experienced the following. There is a small percentage of citizens who genuinely believe that if marijuana is legal to purchase in Colorado, Montana, California or Washington (medical and recreational), it should be legal to possess in other jurisdictions. They do not understand they cannot possess it or use it in Wyoming. There have been a large number of Wyoming license plated vehicles observed at dispensary locations in Colorado.

A web-based article authored by the Colorado Department of Transportation (CDOT) states:

In 2012, the Colorado Department of Human Services collected 23,519 drug and alcohol evaluations. Of the total evaluations, 1,045, or nearly 5 percent, involved marijuana. Also in 2013, there were 103 fatalities involving a drugged driver, and 36 of the 288 drivers tested for drugs had cannabis only in their system.

Colorado law enforcement officers are trained in the detection of impairment of alcohol and drugs, and many are specially trained Drug Recognition Experts (DRE). These officers have the ability to detect physical signs of drug impairment. DREs are viewed as one of the most effective law enforcement tools in efforts to reduce drugged driving.

DREs also use chemical tests for drugs. Colorado's Express Consent Law requires any driver to consent to a chemical test if a police officer has reasonable grounds to believe the person is driving under the influence or their ability to operate a motor vehicle is impaired because of alcohol, drugs or both. Any driver who refuses to take a chemical test will immediately lose their driver's license and will be classified

as a persistent drunk driver. Consequences of refusal include revocation of a drivers' license for one year, mandatory ignition interlock for two years and alcohol education and therapy classes as specified by law.

The Institute for Behavior and Health issued a commentary dated June 10th, 2013, which is titled, "*Marijuana Use is a Serious Highway Safety Threat: 5 ng/ml Marijuana Impairment Limits Give Drivers a Free Pass to Drive Stoned."* It states:

"The threat to public safety on the roadways posed by marijuana-impaired driving has been pushed to the top of nation's agenda by the legalization of marijuana in Colorado and Washington as well as by the legalization of "medical" marijuana in 18 states and the District of Columbia. Marijuana has significant impairing psychological and physiological effects on driving. Marijuana use by drivers puts everyone at risk on our nation's roadways; research shows that marijuana is a major cause of impaired driving and serious and fatal injury crashes. To address marijuana-impaired driving, there has been an interest in identifying an impairment standard for marijuana that is the equivalent to the 0.08 g/dl Blood Alcohol Concentration (BAC) now used to prosecute alcohol-impaired drivers. Proposals have been put forward ranging from 2 ng/ml to 5 ng/ml tetrahydrocannabinol (THC) in whole blood. The science on this issue is clear: it is not possible to identify a valid impairment standard for marijuana or any other drug equivalent to the 0.08 g/dl limit for alcohol.

Alcohol is a poor model for studying the impairing effects of drugs because it is metabolized in simpler ways. Unlike alcohol, there is no close relationship between blood levels of drugs (or drug metabolites) and impairment. The vast number of impairing drugs and drug combinations often used with marijuana prevent any single measure from effectively covering all drivers. For example, a combination of low levels of alcohol and low levels of marijuana is severely impairing. Tolerance is another important factor preventing setting blood limits for marijuana and other drugs.

Crucially important new research has shown that daily chronic marijuana users show observable deficits in driving skills as long as three weeks of abstinence compared to controls. It is possible that impairment was even longer lasting given that subjects were not tested after three weeks following their last use of marijuana. This is part of a large body of research that supports the use of the zero tolerance per se limit for marijuana."

Diversion of Marijuana

According to the RMHIDTA report, during 2009 to 2012, when medical marijuana was commercialized, the yearly average number interdiction seizures of Colorado marijuana increased 365 percent. The average pounds of Colorado marijuana destined for 36 other states increased 33 percent from 2010 to 2014. This information is from "The Legalization of marijuana in Colorado: The Impact":

- During 2009 – 2012, when medical marijuana was commercialized, the yearly average number interdiction seizures of Colorado marijuana increased **365 percent** from **52** to **242** per year.

- During 2013 – 2014, when recreational marijuana was legalized, the yearly average interdiction seizures of Colorado marijuana increased another **34 percent** from **242** to **324**.

- In 2014, there were **360** interdiction seizures of Colorado marijuana destined for other states. When compared to the pre-commercialization average of **52** from 2005 – 2008, this represents a **592 percent** increase.

- The total average number of pounds of Colorado marijuana seized from 2005 – 2008 compared to 2009 – 2014 increased **33 percent** from **2,763 pounds** to **3,671 pounds**.

- Of the 360 seizures in 2014, there were **36** different states destined to receive marijuana from Colorado. The most common destinations identified were Kansas, Missouri, Illinois, Oklahoma and Florida.

- A 2014 survey of approximately 100 interdiction experts estimates they seize 10 percent or less of what gets through undetected.

SOURCE: El Paso Intelligence Center, National Seizure System, as of March 20, 2015

The following is also taken from "The Legalization of marijuana in Colorado: The Impact", and is significant because it illustrates diversion by parcel:

- From 2010 – 2014, the number of intercepted U.S. mail packages of marijuana from Colorado, has increased **2,033 percent** from 15 to 320.

- In just one year, from 2013 to 2014 when retail marijuana businesses began operating, there was a **55 percent** increase in Colorado marijuana packages seized in the mail.

- From 2010 – 2014, the total pounds of marijuana seized from U.S. packages mailed from Colorado has increased **722 percent** from 57 to 470 pounds.

- Between 2010 and 2014, the number of states destined to receive marijuana mailed from Colorado has increased each year from 10 to 38.

- From 2006 – 2008, compared to 2013 – 2014, the average number of parcels containing Colorado marijuana seized that were destined outside the United States increased over **7,750 percent** and the pounds of marijuana seized in those parcels increased over **1,079 percent**.

0

SOURCE: United States Postal Inspection Service, Prohibited Mailing of Narcotics, as of January 21, 2015

The significance in illustrating the diversion concerns Colorado is experiencing, which are obviously founded, is that Wyoming is on the receiving end of some of that marijuana right

now. We have a University and a Community College which are within easy driving distances of several dispensaries. I think it is significant to mention the diversion because of what Deputy US Attorney General James Cole's message to all US Attorneys was, as well. He stated it was important to prevent "the diversion of marijuana from states where it is legal under state law in some form to other states".

It is also important to illustrate what is happening in Colorado right now, as it could just as easily be, and certainly will be Wyoming should marijuana be legalized.

Crime

From a February, 2015 news article:

"It's not worth it," Colorado Attorney General Cynthia Coffman told dozens of fellow state attorneys general at a conference in the nation's capitol, referring to $76 million in taxes and fees collected from pot sales last year.

The recently inaugurated Republican rebuked legalization advocates' long-standing argument that regulating sales will eliminate the black market for marijuana and associated criminal activity.

"Don't buy that argument, "she told her peers. "The criminals are still selling on the black market. … We have plenty of cartel activity in Colorado [and] plenty of illegal activity that has not decreased at all."

A publication, "Colorado's Legalization of Marijuana and the Impact on Public Safety: A Practical Guide for Law Enforcement, offered by the Police Foundation, states:

"When Colorado state regulators commissioned a look at the new legalized industry in mid-2014, the study conducted by the Marijuana Policy Group for the Colorado Department of Revenue's Marijuana Enforcement Division, entitled "Market Size and Demand for Marijuana in Colorado," turned up some

unexpected numbers: Demand for marijuana through 2014 was estimated at 130 metric tons but legal supplies could only account for 77 metric tons. The rest, according to a widely quoted Washington Post article, was coming through continuing illegal sales – either by criminals in a black market, or by legal cultivators selling under the table in a growing "gray" market.

Colorado law enforcement officials interviewed by the Police Foundation are convinced that the black and the gray markets are thriving in Colorado primarily through unregulated grows, large quantities of marijuana stashed in homes, and by undercutting the price of legitimate marijuana sales. In fact, police have stated that legalized marijuana may have increased the illegal drug trade. Low-level drug dealers, looking to profit from access to an abundance of marijuana, have an open market to grow illegal amounts of marijuana and sell through the black market. Or they can purchase excess marijuana from caregivers growing marijuana for patients but divert their excess crop illegally – the gray market.

It is difficult for Colorado law enforcement to prove when a marijuana cultivation site is producing for the gray market. Medical marijuana growers may have a license, but ensuring that all of their plants are registered can be time-consuming and difficult to accomplish without a warrant and can be costly in staff time to check hundreds of plants. Focus

group members said that recreational growers may also have an easy means of growing off-market plants. A resident might grow their limit of six marijuana plants, but could conceivably grow additional plants for family members, friends, and neighbors who are all over twenty-one. With the passage of Amendment 64, there is an increasing trend toward co-op growing, which state officials have suggested has created a shortage of warehouse space in Denver. This practice has become popular as growers have found they can save on operating costs such as rent and utilities when they section off the warehouse for their cultivation space. The presence of multiple growers sharing one facility has created a time-consuming challenge to law enforcement agencies trying to track down illegal marijuana growers, focus group members said.

The challenge of locating and shutting down illegal growers has spread to residential neighborhoods as well, law enforcement officials said. Growers have rented homes solely to grow marijuana, according to media reports, destroying the interior of the home as every room is converted to the growing operation.

The Gray/Black market issues are obviously a real concern, and not only siphon funds from the tax base the medical and recreational marijuana is supposed to feed, but is believed to set the stage for other criminal activity, including cartel involvement and diversion.

Lab Considerations

In reaction to current legislation, there was testimony in a recent Joint Judiciary meeting, which indicated Wyoming does not have the capability of testing something (edible, plant material, etc.) for its THC content. The crime lab can test for presence, but not content. That sort of equipment is extremely expensive, and would perhaps be vital if legalized marijuana were to come to pass. It would be reasonable to expect evidence submissions to the crime lab may increase, given what we've learned from our counterparts in states with legalized marijuana, as well.

Court Considerations

Anecdotally, it has been said that legalization of marijuana would clear dockets of marijuana arrests, would save peace officers and the courts time, as they could concentrate on other criminal activity, and that ultimately legalized marijuana would save tax payers money because there would be less prisoners incarcerated. Included in this report is information to the contrary. From lessons we've learned from our peer agencies, it would appear that crime will actually increase, that dockets will be fuller than ever, and in listening to information derived from Departments of Corrections and jails, there are actually very few individuals in jail or in prison for marijuana use and/or possession. One could certainly question what the impact will be on Wyoming's Drug/DUI court programs, as their focus and intent is intensely monitored treatment and rehabilitation. According to what is being discovered from states who've opted for legalized marijuana, it is reasonable to predict the court systems will not have less defendants to hear, but may actually become overwhelmed.

Police Recruiting

Recruiting and hiring qualified candidates for vacant peace officer positions has never been an easy task, as it involves a fairly arduous process, which may include drug testing, aptitude testing, physical agility testing, some form of interview panel, a psychological screening process, and all this is generally capped off with an in-depth background investigation. This

has been made more difficult in the recent past by such things as negative media exposure, low pay, officer assault and mortality rates increasing, and more liberal marijuana laws.

Most, if not all, law enforcement agencies have an automatic disqualifier behavior list for new candidates. Many agencies are finding that their strict drug policy on new-hires is limiting the number of candidates, from an already small pool, who can qualify for their open positions. Pre-employment drug use is becoming one of the most troublesome areas for police recruits. Agencies are finding themselves in a quandary. Should they relax their standards or should they leave positions open? This question is generally answered by relaxing standards to fill positions. This may not be a negative thing. Many agencies have been using policies or standards which have been in place for years, and in examining other agency's policies, they've opted for the change.

Safety for First Responders

From Colorado's Legalization of Marijuana And The Impact On Public Safety: A Practical Guide For Law Enforcement:

There are many public safety hazards with homegrown marijuana. First responders entering a home growing operation need to be aware of the types of dangers and the importance of using personal protective equipment before entering. Just like methamphetamine houses, marijuana houses contain numerous health and safety hazards that require special practices. Growing marijuana requires high-intensity lighting for the growing and flowering season, increased carbon dioxide levels, high humidity levels, and heat. Law enforcement officials working with National Jewish Health in Denver issued a checklist of potential hazards for officers entering a growing operation:

- Toxic mold, which grows in constant wet conditions, can be dangerous even in small quantities for some people.

- When removing illegal growing operations, officers should be wary of THC levels in the air, on the surfaces of the home, and on the hands of the investigating officers. Therefore, officers should use gloves and possible surgical masks when handling plants.
- Growers have been known to disconnect the vent system for the furnace and hot water heater, to enhance plant growth. This creates high carbon dioxide levels and a potential for carbon monoxide poisoning.
- Fertilizers and pesticides can pose a hazard if improperly handled.

Quite obviously, this is certainly a public health concern, as well as a health concern for first responders, but first responders must be prepared; therefore, they must train and have proper equipment, which may result in further budgetary concerns.

Summary

There has been testimony that marijuana has many positive benefits, and that it is no more dangerous than alcohol. Some testimony would suggest that marijuana has many positive medical benefits, and that it will "help" small children or others suffering from life-limiting or severely debilitating conditions, and for whom current therapies are inadequate. This report serves to illustrate several points and concerns which controvert what we've received from marijuana supporters.

Marijuana is and remains a Schedule I **dangerous drug**, for which no prescription may be written. The American Academy of Pediatrics, the American Medical Association, American Psychiatric Association, American Society of Addiction Medicine, and other major medical groups have voiced opposition to legalization. Our own Wyoming Medical Society recently published a position paper opposing the Peggy A. Kelly ballot initiative.

Marijuana will obviously bring unwanted elements with it. We've learned it will likely increase crime, it will attract homeless people from all over the US, it will invite organized crime to our state, it will negatively affect our youth, it will negatively affect other states, and while it is purported to be a proverbial cash cow, it will cost the state money.

Legislative Subcommittee Report

Governor's Marijuana Impact Assessment Council (GMIAC)

Legislative Subcommittee Report

Table of Contents

Contributors

- Representative Bunky Loucks
- Representative Tyler Lindholm
- Representative James Byrd
- Legislative Aid Misty Heil

Overview

The term marihuana as referenced is Wyoming Statutes will be used interchangeably with the common spelled version marijuana. There is no distinction between the two words for the purpose of this document.

Terms and Definitions

Marijuana – Common name substituted for the taxonomic genus Cannabis sativa.
Marihuana – traditional spelling from the original Spanish language. The primary descriptive reference in Wyoming statutes.

Medical Marijuana – All varieties of marijuana distributed and consumed as … for a medical condition.
Recreational Marijuana – All varieties of marijuana generally distributed and consumed for no specific medical purpose.
Hemp- A sub-species of the Cannabis differentiated by low THC levels. Grown and produced for material product rather than ingestion.

Current pending measures in Wyoming

Referendum – Medical

- Status: signature collection

Reciprocity – Medical 16LSO-0069

- Status: Filed awaiting numbering

Decriminalization – Possession medical or recreational 16LSO-0067

- Status: In final draft before numbering

Statutory Evaluation & Recommendations

Current

- Under current law all forms of marijuana except a diluted extract of CBD oil are illegal to have in ones possession in Wyoming.

Proposed Changes

Referendum Ballot initiative

a. Intent: Legalize marijuana for medical purposes through election referendum process.
b. Problems:
    i. The language was adopted from the recreational statutes in Colorado.
    ii. Incomplete definitions as to what “chronic pain

iii. Administrative agency authority not clear
iv. Revenue, taxing, and lessening not correct or clearly defined.
v. Rulemaking authority not defined.

Legislative Process - Agency Assignment and Effects

1. Dept. of Revenue (WYDOR) - suggested controlling agency
2. Creation of New Division - Marijuana Enforcement Division (MED)
    a. Separate from Liquor
3. Stand up cost of division
    a. Estimated number of personnel
    b. Administrative Staff
    c. Inspectors
    d. Support staff
    e. Facilities
4. Related costs and impacts to other agencies
    a. Law enforcement – local, county, state
    b. WDEQ
    c. Employment & Labor
    d. Health
5. Conforming to existing statutes and federal law.
    a. Where applicable the MED should have the ability to construct "day-to-day" regulations and process to facilitate governance.
    b. The legislature should adopt conforming language that would redefine DEA classifications removing the Class I status.
    c. The legislature should adopt conforming language to allow for banking practices for the licensed marijuana entities.
    d. The legislature should adopt conforming language to address the Cole Memo (U.S. District Attorney)
    e. The legislature shall take any action necessary to complete all regulatory and oversite process even when conflicting language will occur with the federal statutes.
        i. The legislature/Attorney General shall notify the federal government of the conflict to federal statutes and the intent of the state of Wyoming to execute the new state rule/statute as a states right stated in the 10th amendment to the U.S. constitution.

Legislative Oversight

House & Senate Revenue committees

Agency Administration

Department of Revenue

Boundaries on the regulations

Recreational use still considered illegal.

Medical – Strict requirements to obtain card.

1. Not any one can prescribe. An additional pharmaceutical endorsement should be required from the board of pharmacy for any degreed medical doctor (MD) requesting to prescribe marijuana for medical purposes.
2. Not all ailments can be covered
    a. A list of ailments shall be generally agreed upon by a commission of currently practicing professional MD and pharmacologist with periodic review for additions and deletions.
    b. The ailment list shall not require legislative authority to add, edit, delete or review effectiveness.

Government Obligations to:

General public – non users
Public users

Local Control

1. Local cannot block medical permissions.
2. Local political subdivision can limit:
    a. Number and location of grow operations
    b. Number and location of retail locations

New statute and Rule Creations – abbreviated

Banking regulations

1. Allowing for the deposit and withdrawal of marijuana generated capital
2. Allowing for the transport/electronic transfer of funds in accordance with current practices

Consumable product definitions and regulation

1. Edible/Oral
2. Smoke able
3. Topical
4. Injectable
5. THC concentration definitions

Medical Marijuana - specific

1. Medical Law
2. Employment law
3. Unemployment benefits
4. Age restrictions and exemptions
5. Licensees & Certified Testing Facilities

Recreational – Commercial Dispensaries

1. Licensure (state)
2. Licensure (local)

3. Age restrictions
4. Geographic restrictions on retail locations

Home Cultivation Personal Use

1. Number of mature plants
2. Number of seedling to premature plants
3. Seed stocks
4. Accounting for plants "life of plant"

Cultivation Commercial

1. Licensure (state & local)
2. Geographic restrictions
3. "Seed to Sale" tracking
4. Department of Ag inspections
    a. Pesticides
    b. Fertilizers
    c. GMO integrated processes

Paraphernalia

1. Sales
    a. Pipes, papers, smoking utensils
    b. Vapor smoking devices
    c. Additional devices generally considered in conjunction with marijuana consumption.
2. Possession of related consumptive items and hardware
3. Minimum age requirements
    a. 21 years of age or older
4. Prohibited Items
    a. TBD

Recommendations

It is recommended by the subcommittee that the items discussed above and not limited to this list be addressed in the following manner.

The overall template from the state of Colorado MED be adapted with conforming language and researched for state constitutionality.

1. Create placeholder bills that would enable the necessary sub-agencies to be created.
2. Create placeholder bills that would define the financial enterprise.
    a. State licensure
    b. Local licensure
    c. State Tax assessment and collection
    d. Local Tax assessment and collection
    e. Fine (noncompliance/violation) schedule and receipt structure

f. Statutory allowance of marijuana collected funds to be deposited by the department of revenue for MED operations with the unused portion tipping to the general fund
g. Sub-agency funding stream (MED) independent from general funds generated from license fees

3. Create placeholder bills that would allow for additional agencies to have access to data necessary for inspection, evaluation, violations enforcement

Summary

The most important thing learned on the legislative/statutory side is to be ready to roll-out an agency or group of agencies with rules and statutory guidelines already in place. This requires that agency structural templates be designed along with statutory and rule promulgation. All of these items should “stood-up” and beta tested for viability as soon as possible even if there is no immediate need now there will be one in the future.

As stated repeatedly by the Colorado MED director the biggest problem was to stay ahead of the legalization.

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LAURA HANCOCK Star-Tribune staff writer
Evan Bush Seattle Times http://SeattleTimes.com

Citations

UW Survey -Wyoming Residents Disapprove of Personal Marijuana Use (recreational)

December 3, 2014 — Wyoming residents have mixed opinions on the use of marijuana, according to a recent University of Wyoming survey.

Thirty-five percent of survey respondents supported personal use of marijuana by adults and 60 percent opposed. At the same time, 72 percent of Wyoming residents support adult use of marijuana if prescribed by a physician, while only 25 percent oppose.

"We've seen referenda concerning personal marijuana use pass in Colorado, Washington state and elsewhere in recent years," says Jim King, UW professor of political science and a co-director of the survey. "It appears that a similar movement in Wyoming would be unsuccessful."

Survey responses concerning personal marijuana show a modest increase supporting personal marijuana use and consistency on the issue of medical marijuana use, King says.

“Our 2000 poll showed 23 percent approving legalization of marijuana in general, so, there has been a bit of a shift in public opinion on this aspect of the marijuana debate,” he says. “On the other hand, the 2000 and 2014 surveys have the same proportion of Wyoming residents, 72 percent, accepting medical marijuana use.”

Although Wyoming residents do not support legalization of marijuana for personal use, they accept reduced penalties for those apprehended in possession of marijuana. Nearly two-thirds of those surveyed, 62 percent, believe the penalty for marijuana possession should not include time in jail; 32 percent support jail sentences.

Citizens’ responses to the question of legalizing marijuana for either personal use or medical are linked to political ideology and age. Eight out of 10 self-identified conservatives oppose marijuana for personal use by adults, while two-thirds of liberals approved; moderates split evenly on this issue. On medical use of marijuana when prescribed by a physician, 61 percent of conservatives, 86 percent of moderates and 91 percent of liberals supported the policy.

Disapproval of legalizing personal marijuana use by adults increases with age. Roughly 55 percent of individuals under 45 years of age oppose the policy, with opposition reaching 82 percent of those over the age of 65. All age groups demonstrate support for medical marijuana use, although support is lowest (66 percent) among senior citizens.

The statewide telephone survey of 768 Wyoming residents was conducted in October by UW’s Survey Research Center and was sponsored by the Department of Political Science, Wyoming Public Radio and the Wyoming Survey and Analysis Center. The survey has a margin of error of plus or minus four percentage points.

Washington State Liquor and Cannabis Board
http://www.liq.wa.gov/mj2015/faqs_i-502

Washington State Bill I-502
Partial Text

BILL REQ. #: I-2465.1/11
ATTY/TYPIST: AI:crs
BRIEF DESCRIPTION:

BE IT ENACTED BY THE PEOPLE OF THE STATE OF WASHINGTON:
PART I INTENT
NEW SECTION. **Sec. 1.** The people intend to stop treating adult marijuana use as a crime and try a new approach that:
(1) Allows law enforcement resources to be focused on violent and property crimes;
(2) Generates new state and local tax revenue for education, health care, research, and substance abuse prevention; and
(3) Takes marijuana out of the hands of illegal drug organizations and brings it under a tightly regulated, state-licensed system similar to that for controlling hard alcohol.

This measure authorizes the state liquor control board to regulate and tax marijuana for persons twenty-one years of age and older, and add a new threshold for driving under the influence of marijuana.

Colorado State Constitution
LexisNexis (online)

5. Colo. Const. Art. XVIII, Section 14 (2015), CONSTITUTION OF THE STATE OF COLORADO, ARTICLE XVIII MISCELLANEOUS, Section 14. MEDICAL USE OF MARIJUANA FOR PERSONS SUFFERING FROM DEBILITATING MEDICAL CONDITIONS, COLORADO REVISED STATUTES
6. Colo. Const. Art. XVIII, Section 16 (2015), CONSTITUTION OF THE STATE OF COLORADO, ARTICLE XVIII MISCELLANEOUS, Section 16. PERSONAL USE AND REGULATION OF MARIJUANA, COLORADO REVISED STATUTES

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LexisNexis (online)

2. C.R.S. 8-73-108 (2015), TITLE 8. LABOR AND INDUSTRY, LABOR III - EMPLOYMENT SECURITY, ARTICLE 73. BENEFITS - ELIGIBILITY - DISQUALIFICATION, 8-73-108. Benefit awards - repeal, COLORADO REVISED STATUTES

Colorado Dept. of Revenue Marijuana Enforcement Division (CO DoRMED)

- Barbra Brohl ED MED CO Div. of Revenue

- RonKammerzell Sr. Dir. Enforcement Div. (CODoRMED)
- (CO DoRMED)

The Cole Memo: 8 federal guidelines on marijuana law enforcement

PUBLISHED: FEB 14, 2014, 4:31 PM

By The Denver Post

The U.S. Department of Justice in August 2013 issued the Cole Memo in which it offers guidance to prosecutors and law enforcement on where to focus its marijuana efforts. These are those priorities:

• Prevent distribution of marijuana to minors
• Prevent marijuana revenue from funding criminal enterprises, gangs or cartels
• Prevent marijuana from moving out of states where it is legal
• Prevent use of state-legal marijuana sales as a cover for illegal activity
• Prevent violence and use of firearms in growing or distributing marijuana
• Prevent drugged driving or exacerbation of other adverse public health consequences associated with marijuana use
• Prevent growing marijuana on public lands
• Prevent marijuana possession or use on federal property

Source: U.S. Department of Justice

This story was first published on DenverPost.com

TOPICS: COLE MEMO, FEDERAL REGULATIONS

Cole Memo

HTTP://WWW.JUSTICE.GOV/SITES/DEFAULT/FILES/USAO-WDWA/LEGACY/2014/02/14/DAG%20MEMO%20-%20GUIDANCE%20REGARDING%20MARIJUANA%20RELATED%20FINANCIAL%20CRIMES%202%2014%2014%20(2).PDF

U.S. Department of Justice

Office of the Deputy Attorney General

The Deputy Attorney General — *Washington, D.C. 20530*

February 14, 2014

MEMORANDUM FOR ALL UNITED STATES ATTORNEYS

FROM: James M. Cole
Deputy Attorney General

SUBJECT: Guidance Regarding Marijuana Related Financial Crimes

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On August 29, 2013, the Department issued guidance (August 29 guidance) to federal prosecutors concerning marijuana enforcement under the Controlled Substances Act (CSA). The August 29 guidance reiterated the Department's commitment to enforcing the CSA consistent with Congress' determination that marijuana is a dangerous drug that serves as a significant source of revenue to large-scale criminal enterprises, gangs, and cartels. In furtherance of that commitment, the August 29 guidance instructed Department attorneys and law enforcement to focus on the following eight priorities in enforcing the CSA against marijuana-related conduct:

- Preventing the distribution of marijuana to minors;
- Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs, and cartels;
- Preventing the diversion of marijuana from states where it is legal under state law in some form to other states;
- Preventing state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity;
- Preventing violence and the use of firearms in the cultivation and distribution of marijuana;
- Preventing drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use;
- Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands; and
- Preventing marijuana possession or use on federal property.

Under the August 29 guidance, whether marijuana-related conduct implicates one or more of these enforcement priorities should be the primary question in considering prosecution

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Memorandum for All United States Attorneys

Subject: Guidance Regarding Marijuana Related Financial Crimes

For example, if a financial institution or individual provides banking services to a marijuana-related business knowing that the business is diverting marijuana from a state where marijuana sales are regulated to ones where such sales are illegal under state law, or is being used by a criminal organization to conduct financial transactions for its criminal goals, such as the concealment of funds derived from other illegal activity or the use of marijuana proceeds to support other illegal activity, prosecution for violations of 18 U.S.C. §§ 1956, 1957, 1960 or the BSA might be appropriate. Similarly, if the financial institution or individual is willfully blind to such activity by, for example, failing to conduct appropriate due diligence of the customers' activities, such prosecution might be appropriate. Conversely, if a financial institution or individual offers services to a marijuana-related business whose activities do not implicate any of the eight priority factors, prosecution for these offenses may not be appropriate.

Seeing green: Most Wyominigites support medical marijuana

Legislature will consider at least three pot bills in upcoming session

- By LAURA HANCOCK Star-Tribune staff writer
- Dec 8, 2014

Wyomingites' long-standing support for medical marijuana may move toward reality, as the Legislature will be alight in cannabis bills next month.

Three bills that would loosen Wyoming's prohibition on the drug may go before lawmakers.

Meanwhile, a new University of Wyoming poll shows that a majority of Wyoming residents, 72 percent, continue to support adult use of marijuana if the drug is prescribed by a physician.

Twenty-five percent of Wyomingites oppose medical marijuana, according to the October poll, in which 768 residents were interviewed by phone.

Political observers said marijuana has been on the minds of Wyomingites since its legalization in Colorado and other states.

Sen. Bruce Burns, R-Sheridan, believes medical marijuana will be legalized in Wyoming in his lifetime. Burns helped a dying uncle obtain marijuana decades ago and believes it can help patients with mood and appetite.

The Wyoming Legislature is overwhelmingly conservative. Of the lawmakers heading into the session, which begins Jan. 13, 86 percent are Republicans.

"Keep in mind that in addition to conservative, the Legislature tends toward libertarian, too," Burns said. "This can be viewed through that prism. It would not surprise me to see some form of one of the bills pass."

Wyomingites continue to oppose recreational use, however.

The poll found that only 35 percent support personal use of marijuana by adults, and 60 percent said they are opposed.

"Our 2000 poll showed 23 percent approving legalization of marijuana in general, so there has been a bit of a shift in public opinion on this aspect of the marijuana debate," said Jim King, a UW political science professor who worked on the poll. "On the other hand, the 2000 and 2014 surveys have the same proportion of Wyoming residents, 72 percent, accepting medical marijuana use."

The bills

Rep. Jim Byrd, D-Cheyenne, plans to sponsor a bill that would decriminalize 1 ounce of pot or less. Violators would face civil fines. Byrd said his goal is sentence reform.

Last session, Byrd sponsored a similar bill, which would have fined people $50 for up to a half ounce and $100 for amounts greater than a half ounce up to 1 ounce.

The bill failed because it did not receive enough votes on introduction to be assigned to a committee. Because lawmakers aren't passing a budget next year, bills won't be required to have a vote for committee assignment.

Rep. Robert McKim, R-Afton, has filed paperwork to sponsor a bill that would legalize cannabidiol, known by the initials CBD, which can help some patients with epilepsy. CBD oil does not contain the psychoactive agents of the drug, McKim said.

McKim doesn't describe the oil as a form of medical marijuana, which he said he opposes. He also opposes recreational use of marijuana.

About 200 people in Wyoming suffer from epilepsy, McKim said. The oil doesn't work on everyone. But pharmaceutical drugs taken for seizures can harm children, and the oil is a hope for parents, he said.

The conservative Legislature of Utah legalized the oil earlier this year, McKim noted.

Rep. Gerald Gay, R-Casper, might sponsor a bill on vegetable-derived analgesics, "a $64 word for painkillers," he said.

Gay is working on the bill with a physician who specializes in pain. Technology exists to isolate the chemicals in cannabis to create pain medicine that is as effective as or more effective than pharmaceutical drugs and doesn't have the side effects, he said.

The pain medicine wouldn't result in marijuana abuse or intoxication, he said.

Gay needs more time to meet with the physician, whom he declined to identify, and hammer out details.

Gay said his bill may stand alone or be added to McKim's bill. But McKim told the Star-Tribune he wasn't interested in marrying his and Gay's legislation.

Initiatives

NORML Wyoming is writing an initiative for the ballot in 2016 that would legalize marijuana for recreational use for anyone older than 21.

The group has submitted four versions of the initiative to the state, but officials haven't yet certified it, said Peggy Nighswonger, state elections director.

State certification is the first of many steps before the measure appears on the ballot.

The group is looking for an attorney to help write the initiative, said Jackson resident Chris Christian, who leads NORML.

If it lands on the ballot, NORML may struggle finding support, since most Wyomingites oppose marijuana for recreational use, according to the UW poll.

"We've seen referenda concerning personal marijuana use pass in Colorado, Washington state and elsewhere in recent years," said King, of UW. "It appears that a similar movement in Wyoming would be unsuccessful."

Christian is undaunted. A public education campaign will change people's minds, she said. NORML will launch the campaign to gather support for the initiative.

Wyoming Cannabis Activists also plans an initiative for 2016.

Its initiative would legalize medical marijuana and industrial hemp, said Marcia Stuelpnagel, of Casper, co-founder of the group.

The group is planning fundraisers to pay for the initiative effort.

"We have it all written out," she said. "We're just looking for money."

Odds

While Burns, the Sheridan senator, is optimistic that medical marijuana will be allowed in Wyoming, others do not believe any use of marijuana will be legalized soon.

Byrd, sponsor of the decriminalization bill, believes the pharmaceutical industry will oppose legalization because marijuana would compete.

"The majority party is too concerned about the screamers from the wings of their party," he said of Republicans. "If they were more concerned with policy over yelling and screaming, I believe Bruce Burns would be right."

Byrd doesn't think his bill will pass this year, either. He's sponsoring it, he said, to start discussion about sentencing of criminals and drug policy.

Christian believes that one of the lawsuits challenging the federal government's prohibition of marijuana may be successful.

She also believes the federal government may act faster.

"It's going to happen federally before it ever happens here," she said.

Poll: Wyoming supports medical marijuana, but not fully legal weed

-
- THE CANIBIST
  PUBLISHED: DEC 8, 2014, 2:04 PM

By The Associated Press
LARAMIE, Wyo. — A University of Wyoming survey finds that Wyoming residents oppose legalizing marijuana for personal use but are OK with it for medical treatment.
The statewide telephone survey of 768 Wyoming residents was conducted in October by UW's Survey Research Center.

Sixty percent of respondents oppose the personal use of marijuana by adults, compared to 35 percent who support it.

But 72 percent of respondents support adult use of marijuana if prescribed by a physician, while 25 percent oppose.

Although Wyoming residents do not support legalization of marijuana for personal use, the poll indicates acceptance for reduced penalties for those apprehended in possession of marijuana. Sixty-two percent believe the penalty for marijuana possession should not include time in jail while 32 percent support jail sentences.

Marijuana ranks at bottom of drug threats in 2015 DEA police survey
Heroin, meth lead the list in a national survey of more than 1,000 law enforcement agencies

PUBLISHED: NOV 5, 2015, 2:41 PM

By **Christopher Ingraham**, *The Washington Post*

WASHINGTON — America's cops overwhelmingly do not see marijuana as a major threat to their communities, according to results of a survey released this week as part of the Drug Enforcement Administration's "2015 National Drug Threat Assessment Summary."

The DEA asked a nationally representative sample of more than 1,000 law enforcement agencies what they saw as their biggest drug threats. Marijuana came in at the bottom of the list, named by only 6 percent of survey respondents. The share of law enforcement agencies naming weed has been declining steadily since the mid-2000s, even as states have moved to legalize medical and recreational marijuana during that time period.

By contrast, nearly three-quarters of police departments named heroin and meth as their top drug threats this year. The perceived threat of heroin has more than quadrupled since 2007, according to the survey. And after rising sharply from 2007 to 2013, the threat posed by prescription painkillers has subsided considerably in the past two years.

The findings indicate a statement by law enforcement of a fact that drug policy experts and researchers have known for a long time: compared to other recreational substances, including alcohol, marijuana doesn't cause that much harm. It's probably even safer than many people think. And whether you're worried about potential harms to individuals or to communities, marijuana is very low on the list of recreational substances.

The state and local police also say that marijuana is not a big driver of crime. Only 6 percent said that marijuana was the most serious driver of violent crime in their communities in 2015, and 5 percent said it was the biggest contributor to property crime. This contradicts arguments made by some high-ranking law enforcement officers recently that marijuana is somehow driving an increase in murders this year.

Despite all shift in thinking, arrests for marijuana possession continue unabated. Cops keep arresting people for marijuana possession. This might be a simple question of low-hanging fruit: marijuana is by far the most widely used illegal drug, and more users means more potential arrestees. But these arrests have serious consequences for the people caught up in them, and they divert precious police time and resources away from more serious crimes, like rape and murder.

Beyond that, the Department of Justice has continued to aggressively prosecute marijuana cases even in places where some use of the plant is legal, such as California. This led to a federal judge giving a scathing rebuke to the Department last month, accusing it of openly defying congressional efforts to put an end to these raids.

The DEA also continues to pump millions of dollars into its endless campaign to "eradicate" marijuana plants in the U.S., funding expensive weeding operations that spend, in some cases, $60 or more to uproot a single plant.

The DEA's latest drug threat assessment makes an implicit argument for smarter policing: If marijuana is of little concern while heroin and meth are a big worry, then devote less time and resources to the former and more to the latter. The report notes that over 46,000 people died from

drug overdoses in 2013. What it does not mention is that none of those overdoses was caused by marijuana.

Wyo. State Patrol: Don't bring pot here

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- PUBLISHED: JAN 2, 2014, 9:45 PM

By **Kieran Nicholson**, *The Denver Post*

Marijuana is legal in Colorado, but the neighbors to the north sent out a reminder Thursday: "Do not bring your Colorado-purchased marijuana into Wyoming."

The Wyoming Highway Patrol put out a media release saying troopers have "no plans to increase patrols on highways near the state line to look for those transporting marijuana…from Colorado," but the drug remains illegal in Wyoming and violators will be prosecuted.

"It will be business as usual for the troopers who always are on alert for any criminal activity," the highway patrol said.

The release warned against driving stoned, which is also against the law in Colorado.

In addition, the highway patrol reminded, possession of drug paraphernalia is a violation of Wyoming law.

Kieran Nicholson: 303-954-1822, knicholson@denverpost.com or twitter.com/kierannicholson

This story was first published on DenverPost.com

In one Nebraska town near Colorado, 50% of traffic stops end in pot arrest

- PUBLISHED: OCT 12, 2014, 4:56

By The Associated Press

HASTINGS, Neb. — Law enforcement officials in small Nebraska communities near the Colorado border are struggling to keep up with the amount of marijuana crossing the state line as drug arrests climb and county budgets are strained.

In Sidney, Nebraska, a small city of less than 7,000 people located 10 miles from the Colorado border, officers made the same number of marijuana arrests in the first five months of this year as all of last year, Police Chief B.J. Wilkinson said. Five of every 10 traffic stops results in a marijuana arrest, he told KHAS-TV in Hastings, Nebraska.

The department ran through their overtime budget within six months, most of it to pay officers overtime to go to court for prosecutions.

Authorities are asking for state lawmakers to enforce stricter penalties.

"You know if you can smoke marijuana and walk out of court with $120 fine and nothing else that may not be as much of an impact as if you walk out of court with a $1,200 dollar fine," Wilkinson said.

He said the strain on resources "is deteriorating a quality of life here if we don't do something."

Deule County Sheriff Adam Hayward complains the county is getting so many felony drug cases stemming from Colorado marijuana that it is draining resources to house those arrested in the jail and to pay defense attorneys.

Cheyenne County made 60 marijuana arrests last year, up from 45 in 2010 and just 15 in 2009.

"It has affected on the budget side just because on the jail side we've had an increase of people," Sheriff John Jensen said.

Those operating marijuana businesses said they frequently get questions about what happens if they travel into a state in which it remains illegal.
"I would say that once a day somebody's like 'so what do you think about me traveling with this?' And our point is, hey, if you're going to Denver do whatever you want but if you're leaving the state throw it away, don't leave with it," said Mike Kollartis, owner of Sedgwick Alternative Relief, a marijuana dispensary located in Sedgwick, Colorado, less than an hour drive from Cheyenne and Deule counties.
"My goal with this store really is to be an ambassador, if you will, for marijuana," he said.

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Information from: KHAS-TV

How Oregon's marijuana law compares with Washington's

Originally published October 1, 2015 at 9:59 am Updated October 1, 2015 at 8:45 pm

By Evan Bush

Seattle Times enterprise producer

With Voodoo doughnuts in hand, some Portlanders got their first taste of legal, recreational, purchased-in-Oregon weed early Thursday morning.

With cheaper taxes, legal home grow and a regulated medical marijuana system, some in the Washington pot industry worry the state will struggle to compete once Oregon's market gets running at full speed.

Here's how Oregon's law compares:

Possession

In Washington, people 21 and over can possess up to an ounce of marijuana. An ounce is the equivalent of about 60 average size joints.

Oregon allows people 21 and over to possess eight times as much (8 oz.) at home and grow up to four plants per household. The Oregonian actually put together a video series that teaches people how to grow their own marijuana. As in Washington, Oregonians can carry an ounce around with them.

Medical marijuana patients in both states are allowed to possess more pot and grow their own marijuana.

Sales

For now, pot is only being sold through Oregon's early sales program, which allows small amounts of marijuana to be sold through the state's medical marijuana dispensaries.

People are allowed to buy seven grams of pot, but not edibles or concentrates until the Oregon Liquor Control Commission launches its regulated market. The state is still working on permitting and rules for that marketplace.

In Washington, more than 200 recreational stores are licensed, and more than 180 report sales. Dispensaries are still serving some medical-marijuana patients in Washington, but their number is not known and they will be folded into the state's regulated system soon or be shut down.

In Oregon, more than 200 medical dispensaries told the state they would be selling recreational pot as part of the early sales program.

Where you can consume

Neither state lets you consume pot in public.

Taxes

Pot-buying cheapskates, celebrate: Recreational pot is tax free in Oregon until Jan. 4, when a 25-percent sales tax will be assessed. Once Oregon gets its recreational marijuana system fully operating, taxes will be between 17-20 percent.

Taxes will go toward schools, mental health, drug and alcohol services, drug-abuse prevention, state police, cities and counties.

Washington taxes marijuana at 37 percent. Legislators waged a war over marijuana money last session, but in the end left much of the funding for social services and the state's general fund. The state now shares pot revenue with cities and counties.

Employment law

Neither state protects pot-consuming employees from discrimination. You can still get fired if your employer prohibits marijuana use.

Can you fly from Seattle to Portland with marijuana now?

It's certainly not advisable because airports are under federal jurisdiction. But, the TSA says it is not screening for marijuana or other drugs.

Can you drive across the border with pot?

Technically, crossing state lines with pot is a federal offense. But that doesn't seem to have stopped people.

Some of Washington state's best-selling stores are near the Oregon border in Vancouver, Wash. One store told an Oregonian reporter it planned to ramp up concentrates and edibles sales to compete with Portland dispensaries.

***Evan Bush**: 206-464-2253 or ebush@seattletimes.com; on Twitter: @EvanBush.*

http://www.seattletimes.com/seattle-news/marijuana/dueling-state-budgets-split-over-which-pot-gets-pot-money/

Dueling state budgets split over which pot gets pot money

Originally published April 9, 2015 at 8:06 pm Updated April 10, 2015 at 2:13 pm

Corrected

By Evan Bush

Seattle Times staff reporter

The initiative approved by voters to legalize recreational marijuana included a specific shopping list for spending the tax revenue, but the state Legislature looks poised to tweak those instructions, or even lose them entirely.

To the dismay of public-health officials, that could mean cutting millions in prevention and treatment funds intended to offset the costs to society of legalizing pot.

Complicating matters: No one really knows how much marijuana money the Legislature has to work with because both the House and Senate plan substantial changes to the pot law, such as regulating medical marijuana.

Right now, marijuana is taxed at 25 percent for each rung in the supply chain. Most of the revenue was intended to fund substance-abuse prevention and treatment programs and health care, and to study marijuana's effect on society.

In February, the Washington State Economic and Revenue Forecast Council forecast the pot industry would bring in $221 million during the next two-year budget term, though the House and Senate budget proposals expect more.

Republicans want to use marijuana revenue to avoid raising taxes while paying for education. Democrats seek to funnel more money into social services and low-income health care.

Two years after voters approve an initiative, the Legislature can alter it with a simple majority vote.

The Republican-led Senate estimates the marijuana industry will generate about $296 million in the next two years. Save for $8 million a year for the Liquor Control Board and $6 million a year split among cities and counties, that money will go toward education funding, a priority for the Legislature after the state Supreme Court ruled the state was legally obligated to increase funding to public schools.

The Senate budget assumes that medical marijuana becomes part of the state system. It would condense marijuana taxes to a single tax of 37 percent, paid by the consumer when pot is sold.

Rejiggering the tax structure should help marijuana businesses, because it would allow them to avoid some federal taxes.

But public-health officials are concerned about the Senate's budget plan. Dr. Gary Goldbaum, the director of Public Health for Snohomish County, did not support the initiative to legalize marijuana because he was concerned there wouldn't be a focus on prevention and substance-abuse treatment.

The Senate's budget "raises a real concern for me that the Legislature is not taking seriously the need for investments in prevention," he said. "It's really important whenever we legalize any drug that we pay attention to how we avoid hooking a next generation on those substances. Once people get hooked, there are adverse social consequences."

ACLU lawyer Alison Holcomb, who sponsored Initiative 502, said the Senate plan would make it easier to produce and sell marijuana while also "gutting the balancing features of Initiative 502" like prevention.

Rep. Reuven Carlyle, D-Seattle, accused the Republicans of "sweeping away the spirit of the initiative" by seeking to use the revenue to fund education.

Sen. Andy Hill, the GOP's chief budget writer, balked at that characterization.

"We're upfront, we're transparent," the Redmond Republican said of the plan, noting the Senate increases mental-health spending, which he believes goes hand in hand with substance abuse.

The Democrat-led House budget expects about $270 million in marijuana revenue. About $7.4 million a year would go to the Liquor Control Board, $720,000 to fund studies and $6 million a year for cities and counties. The rest is distributed, by percentage, to a number of prevention, treatment and health-care programs.

As in the Senate, the House plan would condense marijuana taxes into one, but at a lower rate of 30 percent.

Although that plan closely follows the initiative's outline for spending, Hill noted the Democrats redirect funds, too.

The House budget expands how agencies can use the money. For example, the Department of Social and Health Services would get funding for pregnant and parenting women's services and life-skills training for youth. The Department of Health would be able to use pot revenue to help fund the Washington Poison Center.

The revenue also would supplant other budget considerations, like funding for community health centers.

Carlyle said the House budget still gives voters what they approved in I-502.

"The House budget invests those dollars in prevention, low-income health care, which was the essential promise of the initiative," said Carlyle. "It's hard to write good policy in the initiative process. You can reform and update it."

Complicating matters further, legislators know they face a moving target.

Because the recreational-marijuana market has only been running for about nine months, forecasters don't have much historical data to work with. Just 137 stores of the 334 allowed under Liquor Control Board rules have opened. Local moratoriums can affect predictions.

"Forecasting is difficult, period," said Steve Lerch, of the revenue-forecasting council. Marijuana forecasting "is a little more difficult."

Plus, the Legislature must consider how substantial changes to the law, such as the regulation of medical marijuana, would affect future revenue projections.

Rep. Cary Condotta, R-East Wenatchee, said he thought the Senate's projection of $296 million was "a little enthusiastic" compared with the House's estimate. Condotta believes lowering the tax rate on marijuana will sell more pot, and ultimately bring in more revenue.

So far, revenue has outpaced projections. In November, forecasters predicted the state would make about $10 million on the cannabis excise tax for the fourth quarter of 2014. The state actually made nearly $12 million, according to a follow-up report in February.

Hill said the forecasters have been very conservative.

"If you look at receipts coming in this fiscal year, (marijuana tax revenues) are ahead of schedule," he said.

The House and Senate will negotiate a compromise budget in the coming weeks.

"It's like a puzzle," said Condotta, "You just have to keep moving the pieces around."

Unclear of size, marijuana revenue might be one of the trickier pieces to fit.

Illinois medical pot users erroneously told to give up guns

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Joshua Gillan looks inside his home on Friday, Dec. 4, 2015, in Rockford, Ill. Nearly two years after Illinois decided gun owners could also use medical marijuana, official letters revoking patients’ firearms cards and wording on the Illinois State Police website indicate the police agency is still struggling with the conflict between state and federal laws on pot. Gillan said it came as quite a shock when he received a letter last week from state police ordering him to surrender his firearm owner’s ID card because he was an unlawful user of a controlled substance.

Joshua Gillan looks outside from his home on Friday, Dec. 4, 2015, in Rockford, Ill. Nearly two years after Illinois decided gun owners could also use medical marijuana, official letters revoking patients' firearms cards and... (AP Photo/Nam Y. Huh)

Nearly two years after Illinois decided medical marijuana users shouldn't be prohibited from owning guns, several patients received letters from police telling them their firearms cards were being revoked.

By CARLA K. JOHNSON

The Associated Press

CHICAGO (AP) — Nearly two years after Illinois decided medical marijuana users shouldn't be prohibited from owning guns, several patients received letters from state police telling them their firearms cards were being revoked.

Although the agency insists the letters were sent to just four people before the mistake was corrected, some cannabis supporters say the error signifies an underlying ambivalence about medical marijuana in the 23 states where it's now legal.

For example, a checklist for firearm owners on the Illinois State Police website includes this requirement: "I am not a medical marijuana patient registry card holder." That, too, was an error that a vendor is now working to remove from the site, ISP spokesman Matt Boerwinkle said.

But Tyler Anthony, a Chicago attorney with the Canna Law Group, said he's skeptical the prohibiting language was added inadvertently.

"The opposite is probably true," Anthony said. "Even taking their word for it, they shouldn't be careless with citizens' constitutional rights, especially when their position lacks any clear legal basis."

Guns and marijuana caused a stir two years ago when Illinois started its medical cannabis pilot program and, in draft rules, told future patients they couldn't keep their firearms. Irate gun owners complained and got the language removed.

Joshua Gillan said it came as quite a shock when he received a letter last week from state police ordering him to surrender his firearm owner's ID card because he was an unlawful user of a controlled substance.

"The very first thing I said was: 'From my cold, dead hands,'" said Gillan, 31, of Rockford, quoting a gun-rights slogan. The father of three said he uses the drug to relax since suffering a traumatic brain injury when a roadside bomb went off during an Army tour in Iraq.

Boerwinkle said the patients' FOID cards are still active and that state police are "working to ensure that future issues associated with these card holders are addressed."

But Gillan lost a gun in the Illinois confusion, he said, and until late Wednesday his status still said "DENIED" on an ISP website used by consumers to check FOIDs before private gun sales. The link is now disabled with an error message that says "temporarily unavailable."

The recent confusion likely stems from a clash between state and federal views on the issue.

Like in other states, Illinois' law doesn't address gun ownership among medical marijuana patients or their caregivers, said Karmen Hanson, medical marijuana policy expert for the National Conference of State Legislatures. But it does include a general protection of patients' rights, said Chris Lindsey, legislative analyst for the Marijuana Policy Project.

"Illinois's law is clear that it protects medical marijuana patients from being denied any right or privilege, and this is certainly one of those areas we believe state lawmakers intended to protect," Lindsey said.

On the federal side, in 2011, an open letter from the federal Bureau of Alcohol Tobacco Firearms and Explosives spelled out to firearms dealers that medical marijuana users are prohibited by federal law from possessing firearms and ammunition. And, in Oregon, the issue landed in the courts when sheriffs in two counties withheld concealed handgun licenses from medical marijuana users. The Oregon Supreme Court ordered the sheriffs to allow the gun licenses. The U.S. Supreme Court declined to hear an appeal, a decision hailed as a victory for gun owners and medical marijuana users.

As for Gillan, a gun dealer wouldn't return to him a pistol he'd left at the shop pending a trade because his FOID card status was in question, he said. "I don't believe the state can produce a document that supersedes the Constitution that I fought for with my bloody hands," Gillan said.

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