Medical and Recreational Marijuana from a Public Health Perspective

Policy Recommendations to Protect Public Health

A collaboration between the Michigan Association for Local Public Health
and the Michigan Association of Preventive Medicine and Public Health Physicians

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Introduction

The Michigan Association of Local Public Health's (MALPH) Mission is to unite and support a vibrant collaborative of Michigan's local public health departments as they work to assure healthy communities. The Mission of the Michigan Association of Preventive Medicine and Public Health Physicians (MAPPP) is to improve the health of individuals through the application of population-based preventive and public health interventions.

MALPH and MAPPP acknowledges the differing positions of expanded marijuana use both nationally and locally. The financial and legal implications of recreational legalization, as well as some philosophical positions, have compelled many states to move forward with this process. In Michigan, there have been several efforts to put recreational marijuana legalization on the ballot, as well as legislative positions to reform the current medical marijuana policies and access issues. This review paper is devoted primarily to the public health implications of expanded marijuana access and use. MALPH/MAPPP feels strongly that the health and safety of our citizens should be the primary focus of legislative consideration. Our hope is to inform and educate policy makers on the potential harms and risk factors of expanded marijuana use when considering any policy change.

We are fortunate to have states that have expanded marijuana use and this paper relies heavily on the experiences of Colorado and Washington. In 2012, Colorado and Washington became the first two U.S. states to allow sales of recreational, or retail, marijuana. These states have four years of experience and growing data that we can learn from, prior to making changes in Michigan's law. In addition, more research is available on the health and safety effects of marijuana. The goal of this paper is to summarize the public health, legal, and commercialization implications of recreational, or retail, marijuana use.

Background

Marijuana has a long history of regulation in the United States. Currently, marijuana remains a Schedule I substance under federal regulation, making possession and sale of it illegal by federal law because it has no accepted medical use and has a high potential for abuse[1]. Although federal law classifies marijuana as a Schedule I substance, states can pass legislation that legalizes marijuana use and/or sale. Today, 29 states and the District of Columbia have legalized medical use of marijuana and 7 states have legalized the recreational, or retail, sale of marijuana. In 2008, Michigan voters approved the use of medical marijuana.

Medical Use of Marijuana

Under the U.S. Food and Drug Administration (FDA) scientific review process, marijuana is not an approved prescribed medicine. The FDA process for approving medicine remains the only scientific and legally recognized procedure for bringing safe and effective medications to the American public. To date, the FDA has not found smoked marijuana to be safe or effective medicine for treatment of any condition.

[1] Nickles, D. M. (2016, March). Federalism and state marijuana legislation. *Notre Dame Law Review*, *91*(3), 1253+. Retrieved from http://go.galegroup.com/ps/i.do?p=EAIM&sw=w&u=lom_umichanna&v=2.1&it=r&id=GALE%7CA453918537&sid=summon&asid=a0b2ddb36acf83338ccb24497a2bcc14

Medical Use of Marijuana (Continued)

In 2017, the National Academies of Sciences, Engineering, and Medicine, Health and Medicine Division (formerly the Institute of Medicine) published an extensive review of the health effects of marijuana, also referred to as cannabis[2]. Cannabis is any product or chemical compound derived from the marijuana plant. Cannabinoid (CBD) is a chemical derived from marijuana. CBD acts only on the cannabinoid receptors, which elicits the main medicinal effects[2]. The other major component of marijuana is the psychoactive chemical called tetrahydrocannabinol (THC).

The National Academies of Sciences, Engineering, and Medicine (or the National Academies) found substantial evidence from studies conducted outside the U.S. that isolated CBDs is an effective treatment for adult chronic pain[2]. They also found significant evidence that oral cannabinoids were effective in treating chemotherapy-induced nausea and vomiting as well as *patient-reported* multiple sclerosis spasticity[2]. There was moderate evidence that cannabinoids can improve short-term sleep outcomes in sleep disturbances due to obstructive sleep apnea, fibromyalgia, chronic pain, and multiple sclerosis[2]. The National Academies also concluded there was limited evidence that cannabis or cannabinoids are effective for increasing appetite in HIV/AIDS patients, improving *clinician-measured* multiple sclerosis spasticity, improving anxiety, improving outcomes after traumatic head injury, improving symptoms associated with dementia, improving intraocular pressure associated with glaucoma, and reducing depressive symptoms in individuals suffering from chronic pain or multiple sclerosis[2]. However, there was no evidence to support the use of cannabis or cannabinoids as an effective treatment for cancers, increasing appetite in cancer or anorexia nervosa, treatment of irritable bowel syndrome or epilepsy, spasticity due to spinal cord injury, symptoms from amyotrophic lateral sclerosis, symptoms from Huntington's disease and Parkinson's disease, dystonia, and improving mental health of schizophrenics[2]. While the National Academies did find evidence for derivatives of marijuana for treatment of some indications, they did **not** recommend smoking marijuana for these conditions due to the adverse health consequences that accompany the act of inhaling smoke[2].

Most of the studies evaluating the effect of marijuana on chronic pain were performed outside of the United States and utilized encapsulated marijuana derivatives[3]. Derivatives of marijuana are currently passing through the rigorous FDA approval process and may be available for use soon. Sativex®, an oral mouth spray developed from a blend of two marijuana extracts (one strain is high in THC and the other in CBD, which counteracts THC's psychoactive effect), has already been approved in several countries for spasticity due to multiple sclerosis, neuropathic pain due to multiple sclerosis, and/or cancer pain, and is in late stages of approval in the U.S[4,5]. Epidiolex® is another medication that contains a compound taken from the marijuana plant that has shown tremendous promise for young people with seizure disorders and should be on the market later this year[4].

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[2] National Academies of Sciences, Engineering, and Medicine. (2017). *The health effects of cannabis and cannabinoids: The current state of evidence and recommendations for research*. National Academies Press.

[3] (Whiting, P. F., Wolff, R. F., Deshpande, S., Di Nisio, M., Duffy, S., Hernandez, A. V., ... & Schmidlkofer, S. (2015). Cannabinoids for medical use: a systematic review and meta-analysis. *Jama*, *313*(24), 2456-2473.).

[4] Smart Approached to Marijuana (SAM). (n.d.). Marijuana as Medicine. Retrieved July 18, 2017, from https://learnaboutsam.org/marijuana-as-medicine/

[5] GW Pharmaceuticals. (2016, October 27). Sativex® Prescriber Information. Retrieved July 19, 2017, from https://www.gwpharm.com/products-pipeline/sativex/prescriber-information-full

Medical Use of Marijuana (Continued)

Preliminary evidence from past studies showed that marijuana use might curb the rising epidemic of opiates[6]. One study found that cannabis use was associated with 64% lower opioid use in patients with chronic pain, better quality of life in patients with chronic pain, less medications used, and fewer medication side effects[6]. Recent studies, however, have found that individuals using cannabis are more likely to abuse opioids and those receiving prescription opioids are at risk for developing cannabis use disorder, previously referred to as abuse or dependence on marijuana[7]. Pain specialists often refrain from prescribing opioids to individuals using medical marijuana, due to the uncertainties of interactions that may occur[8]. Physician concerns of this dual-consumption may contribute to the lower use of opioids by medical marijuana users observed in preliminary studies.

Despite the fact that there is **insufficient evidence** to support the use of inhaled marijuana for a variety of medical conditions, the dispensing of medical marijuana cards has steadily increased. To date, an estimated 211,000 Michiganders have legally issued cards and there is considerable variation between counties with regard to the number of cards and access to medical marijuana[9]. The typical individual presenting for medical marijuana is an adult male, 18 to 34 years old, requesting it for chronic pain[10]. According to the American Academy of Pain Medicine, adults, 45 to 64 years old, are among those most likely to report persistent pain, which is discordant from the typical medical marijuana applicant, calling into question the legitimacy of requests to treat chronic pain[10,11]. Adolescents in states with medical marijuana laws show higher marijuana use and lower perceptions of risk from use than non-medical marijuana states[12,13]. By labeling marijuana as medicine and legal by states, it increases marijuana's perception as safe and accessible.

The lack of FDA approval and the need for safe and tested derivatives of the medicinal parts of marijuana may be why no major-medical association supports the use of marijuana for widespread medical use. Major health organizations (below) have weighed in against medical marijuana use until further research is conducted.

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[6] Medical Cannabis Use Is Associated With Decreased Opiate Medication Use in a Retrospective Cross-Sectional Survey of Patients With Chronic Pain. Boehnke, Kevin F. et al. The Journal of Pain , Volume 17 , Issue 6 , 739 – 744

[7] Hefner, K., Sofuoglu, M., & Rosenheck, R. (2015). Concomitant cannabis abuse/dependence in patients treated with opioids for non-cancer pain. *The American Journal on Addictions*, *24*(6), 538-545

[8] Gary M. Reisfield (2010) Medical Cannabis and Chronic Opioid Therapy, Journal of Pain & Palliative Care Pharmacotherapy, 24:4, 356-361, DOI: 10.3109/15360288.2010.519431

[9] Medical Marijuana Act Statistical Report for Fiscal Year 2015. Prepared by Kimberly Gaedeke, Director, Bureau of Professional Licensing. January 4, 2015.

[10] Nunberg H, Kilmer B, Pacula RL, Burgdorf J. An Analysis of Applicants Presenting to a Medical Marijuana Specialty Practice in California. *Journal of drug policy analysis*. 2011;4(1):1. doi:10.2202/1941-2851.1017.

[11] Ilgen, M. A., Bohnert, K., Kleinberg, F., Jannausch, M., Bohnert, A. S., Walton, M., & Blow, F. C. (2013). Characteristics of adults seeking medical marijuana certification. *Drug and alcohol dependence*, *132*(3), 654-659.

[12] Martins, S. (2016, October 19). No Uptick in Marijuana Use by Adolescents After States Pass Medical Marijuana Laws. Retrieved July 18, 2017, from https://www.mailman.columbia.edu/public-health-now/news/no-uptick-marijuana-use-adolescents-after-states-pass-medical-marijuana-laws

[13] Stolzenberg, L., D'Alessio, S. J., & Dariano, D. (2016). The effect of medical cannabis laws on juvenile cannabis use. *International Journal of Drug Policy*, *27*, 82-88.

Medical Use of Marijuana (Continued)

American Society of Addiction Medicine (ASAM):

"ASAM asserts that cannabis, cannabis-based products, and cannabis delivery devices should be subject to the same standards that are applicable to other prescription medications and medical devices and that these products should not be distributed or otherwise provided to patients unless and until such products or devices have received marketing approval from the Food and Drug Administration. ASAM rejects smoking as a means of drug delivery since it is not safe. ASAM rejects a process whereby State and local ballot initiatives or legislative efforts approve medicines because these initiatives are being decided by individuals not qualified to make such decisions."[14]

American Cancer Society (ACS):

"The ACS is supportive of more research into the benefits of cannabinoids. Better and more effective treatments are needed to overcome the side effects of cancer and its treatment. The ACS does not advocate the use of inhaled marijuana or the legalization of marijuana."[15]

American Glaucoma Foundation:

"Marijuana, or its components administered systemically, cannot be recommended without a long-term trial which evaluates the health of the optic nerve," said the editorial. "Although marijuana can lower IOP [intraocular pressure], its side effects and short duration of action, coupled with a lack of evidence that its use alters the course of glaucoma, preclude recommending this drug in any form for the treatment of glaucoma at the present time."[16]

National Multiple Sclerosis Society:

"Although it is clear that cannabinoids have potential both for the management of MS [multiple sclerosis] symptoms such as pain and spasticity, as well as for neuroprotection, the Society cannot at this time recommend that medical marijuana be made widely available to people with MS for symptom management. This decision was not only based on existing legal barriers to its use but, even more importantly, because studies to date do not demonstrate a clear benefit compared to existing symptomatic therapies and because issues of side effects, systemic effects, and long-term effects are not yet clear."[17]

[14] ASAM Public Polict Statement on Marijuana, Found at: http://www.asam.org/docs/default-source/public-policy-statements/1medical-marijuana-4-10.pdf?sfvrsn=0

[15] Medical Use of Marijuana: ACS Position, Found at: http://medicalmarijuana.procon.org/sourcefiles/american-cancer-society-position.pdf

[16] Marijuana for Glaucoma: Patients Beware! Found at: https://www.glaucomafoundation.org/news_detail.php?id=161

[17] Recommendations Regarding the Use of Cannabis in Multiple Sclerosis: Executive Summary. National Clinical Advisory Board of the National Multiple Sclerosis Society, Expert Opinion Paper, Treatment Recommendations for Physicians, April 2, 2008.http://www.nationalmssociety.org.

Medical Use of Marijuana (Concluded)

American Academy of Pediatrics (AAP):

"Any change in the legal status of marijuana, even if limited to adults, could affect the prevalence of use among adolescents." While the AAP supports scientific research on the possible medical use of cannabinoids as opposed to smoked marijuana, it opposes the legalization of marijuana.[18]

American Medical Association (AMA):

The AMA calls for more research on the subject, but indicates that such a call "should not be viewed as an endorsement of state-based medical cannabis programs, the legalization of marijuana, or that scientific evidence on the therapeutic use of cannabis meets the current standards for a prescription drug product."[19]

Adverse Cognitive and Health Consequences of Marijuana Use

Colorado was required to form the Retail Marijuana Public Health Advisory Committee as part of the bills legalizing recreational marijuana[20]. This committee studies the most current evidence of the potential public health effects of marijuana and monitor changes in drug use patterns. The findings of this committee's most recent report are as follows[20]:

- **Marijuana use among adolescents and young adults:** Weekly use by adolescents is associated with impaired learning, memory, math, and reading, as well as failure to graduate from high school. Adolescents and young adults who use marijuana are more likely to have psychotic symptoms as adults, which include hallucinations, paranoia, delusional beliefs and feeling emotionally unresponsive.
- **Marijuana use and cancer:** Strong evidence shows that the same cancer-causing chemicals found in tobacco smoke are also present in marijuana smoke. However, there is conflicting research whether or not marijuana smoke is associated with lung cancer. There is limited evidence that suggests an association between marijuana use with testicular and prostate cancers.
- **Marijuana use and cardiovascular effects:** Moderate scientific evidence exists showing that marijuana use increases the risk for some forms of stroke in those younger than 55 years of age, and limited evidence that marijuana use may increase the risk of heart attack.
- **Marijuana and medication interactions:** There is credible evidence of clinically significant drug interactions between marijuana and several important medications, including anti-seizure medications and blood thinners.
- **Marijuana use and gastrointestinal effects:** Evidence has shown that long-term daily or near daily marijuana use is associated with cyclic vomiting, called cannabinoid hyperemesis syndrome.

[18] Committee on Substance Abuse and Committee on Adolescence. "Legalization of Marijuana: Potential Impact on Youth." Pediatrics Vol. 113, No. 6 (June 6, 2004): 1825-1826. See also, Joffe, Alain, MD, MPH, and Yancy, Samuel, MD. "Legalization of Marijuana: Potential Impact on Youth." Pediatrics Vol. 113, No. 6 (June 6, 2004): e632-e638h.

[19] AMA Policy, Found at: http://medicalmarijuana.procon.org/sourcefiles/AMA09policy.pdf

[20] Retail Marijuana Public Health Advisory Committee (2016). Monitoring Health Concerns Related to Marijuana in Colorado: 2016. Retrieved on May 2, 2017 from https://www.colorado.gov/pacific/cdphe/marijuana-health-report.

Adverse Cognitive and Health Consequences of Marijuana Use (Concluded)

- ***Marijuana use and injury*:** Evidence shows that marijuana use may increase the risk of workplace injury if working while impaired. There have also been many reports of severe burns due to explosion of electronic smoking devices, as well as explosion of home-extraction of butane-hash oil.
- ***Marijuana use and neurological, cognitive and mental health effects:*** Strong evidence shows that daily or near daily marijuana users are more likely to have impaired memory, which lasts a week or more after quitting. Tetrahydrocannabinol (THC), the main psychoactive component of marijuana, has been found to cause acute psychotic symptoms, such as hallucinations, paranoia and delusional beliefs during intoxication. These symptoms are worse with higher doses. Daily or near daily marijuana use is associated with developing a psychotic disorder such as schizophrenia.
- ***Marijuana use during pregnancy and breastfeeding:*** Biological evidence shows that THC can pass through the placenta to the fetus if the mother uses marijuana during pregnancy. THC exposure is not limited to unborn children as THC can also pass through breast milk and be harmful during breastfeeding. Marijuana use during pregnancy may also be associated with an increased risk of heart defects or stillbirth. Stronger evidence highlights the effects seen months or years after birth if a child's mother used marijuana during gestation. Some of these effects include decreased growth, impaired cognitive function, and attention. Decreased academic ability and increased depression symptoms may also occur.
- ***Marijuana use and respiratory effects:*** Strong evidence shows an association between daily or near-daily marijuana use and chronic bronchitis. Additionally, daily or near daily marijuana use may be associated with bullous lung disease and pneumothorax in individuals younger than 40 years of age. There is still limited research regarding any possible association between marijuana use and chronic obstructive pulmonary disease (COPD), emphysema or respiratory infections.
- ***Marijuana use and addiction:*** According to the National Institute on Drug Abuse, 9% of people who use marijuana will become dependent on it and the risk of addiction increases to about 17% for those who start using it in their teens[21]. In 2014, 4.176 million people in the U.S. abused or were dependent on marijuana; 138,000 voluntarily sought treatment for their marijuana use[19]. Cannabis use is more strongly associated with other illicit drug use than tobacco or alcohol use[22]. Adolescents that are regular cannabis users are much more likely to use other illicit drugs, such as heroin and cocaine, and the younger cannabis is first used, the more likely the use of other illicit drugs[22].

Safety Implications

Since retail legalization, marijuana-impaired driving may be responsible for more traffic fatalities in Colorado and Washington. According to the AAA Foundation for Traffic Safety, the percentage of traffic deaths related to marijuana doubled in Washington the year following legalization of retail marijuana[23]. In Colorado, marijuana is involved in more than one of every five deaths on the

[21] National Institute on Drug Abuse (NIDA). (2017). Marijuana. Retrieved May 2, 2017 from https://www.drugabuse.gov/drugs-abuse/marijuana

[22] Repp, K., & Raich, A. (2014). Marijuana and health: a comprehensive review of 20 years of research. *Washington County Oregon: Department of Health and Human Services*.

[23] AAA Foundation for Traffic Safety. *Prevalence of Marijuana Involvement in Fatal Crashes: Washington, 2010-2014.* May 2016; Washington Traffic Safety Commission. *Driver Toxicology Testing and the Involvement of*

Safety Implications (Concluded)

road, and that number is rising[24]. It has been found that the higher the blood level of THC in the driver, the higher the motor vehicle crash risk[22]. Since the average cost to society of a traffic fatality is over $6 million, according to the U.S. Department of Transportation, the rising rate of marijuana-related traffic deaths implies large economic and social costs[25]. More research is needed to identify the threshold and absorption of THC levels that can impair driving and to establish metrics for intoxication[26].

The development of standardized dosing levels, guidance for novice users, or an infrastructure for addressing food safety and contamination issues during manufacturing has received little attention. The commercialization of marijuana in Colorado has allowed the proliferation of new consumable marijuana products, including candies, lozenges, baked goods, and beverages called 'edibles'. Most of these products use extracted hashish or concentrates containing THC levels upwards of 80% to 90%. Products with high THC concentrations look and taste like their non-THC counterparts.

Calls to poison control centers increased in Washington by 68% from 2012 to 2015, and 109% in Colorado over the same timeframe[27]. The availability of diverse edibles puts young children at risk for unintentional poisoning. Calls to poison control centers in Colorado related to children, under eight years of age, rose by 200%[27]. In addition, emergency room visits in Colorado related specifically to marijuana have increased by 44% in residents and 109% in out-of-state visitors[27]. Moreover, hospitalizations due to marijuana have increased by 70% since legalization of recreational marijuana[27].

With recent amendments to Michigan's medical marijuana legislation, these edibles will be legal for medical use. It can take up to four hours for edible marijuana products to take their full effect, which can be the cause for inadvertent overdoses in the attempt to reach the desired effect more quickly. In Colorado, as of 2015, there have been four deaths related to injuries or instances of violence attributed to intoxication from edibles[28].

Marijuana in Fatal Crashes, 2010-2014. Feb. 2016; Kaste, Martin. "More Washington drivers use pot and drive; effect on safety disputed." *NPR.org.* 19 Aug. 2015.

[24] Fatality Analysis Reporting System and Colorado Department of Transportation (CDOT), as reported in Rocky Mountain HIDTA Investigative Support Center Strategic Intelligence Unit. The Legalization of Marijuana in Colorado: The Impact, Volume 4. Sept. 2016. Web. 23 Oct. 2016.

[25] U.S. Department of Transportation, *Treatment Of The Economic Value Of A Statistical Life In Departmental Analyses – 2011 Interim Adjustment.* 2011 (USDOT guidance on valuing reduction of fatalities and injuries by regulations or investments and setting value of life at $6.2 million in 2011 dollars), available at https://www.transportation.gov/sites/dot.gov/files/docs/Value_of_Life_Guidance_2011_Update_07-29-2011.pdf

[26] "What needs to change to maximize marijuana's benefits to Washington residents?" *Columbian* [Vancouver, WA], 7 Aug. 2016. *General Reference Center GOLD*, go.galegroup.com/ps/i.do?p=GRGM&sw=w&u=lom_umichanna&v=2.1&it=r&id=GALE%7CA460112751&sid=summon&asid=98f47421cb8830544b07ff24cb047b93. Accessed 24 May 2017.

[27] Smart Approaches to Marijuana (SAM). (2016). Lessons Learned After 4 Years of Marijuana Legalization. Retrieved on May 1, 2017 from https://learnaboutsam.org/wp-content/uploads/2016/11/SAM-report-on-CO-and-WA-issued-31-Oct-2016.pdf

[28] Ghosh, T. S., Vigil, D. I., Maffey, A., Tolliver, R., Van Dyke, M., Kattari, L., ... & Wolk, L. (2017). Lessons learned after three years of legalized, recreational marijuana: The Colorado experience. *Preventive Medicine*.

Environmental Health Implications

Colorado has struggled with marijuana growers misusing pesticides, as there are no commercial pesticides labeled for legal use on cannabis plants[29]. Quarantines of plants have occurred because of unknown chemical mixtures used as pesticides[30]. Farmers in Colorado have been worried about the potential spread of pests, molds, fungi, or other parasites from marijuana plants that may cross contaminate with their crops, particularly fruit trees[27].

Societal Implications

Between 2013 and 2014 as the U.S. moved out of the recession, Colorado experienced a 50% increase in homelessness while other states had decreases[27]. At least 1 in 3 homeless youth at a Denver shelter reported that they arrived because of the legalization of marijuana[27]. Quest Diagnostics, a major drug testing firm, recently reported Colorado had a 178% increase in employee drug screens positive for marijuana from 2011 to 2015[27]. Employers in Colorado have gained interest in out-of-state residents to find employees that can pass a pre-employment drug screen[24]. Marijuana users in Colorado report a higher work absenteeism (15%) compared to the general population (7.4%) and compared to alcohol users (7.9%) [27].

Arguments for Decriminalization

In the United States, 80% of all drug arrests are for possession rather than intent to sell, and 45% of drug arrests are for marijuana possession[31]. One argument for the legalization of marijuana is that it will decriminalize its use, particularly in communities of color. Health equity advocates support the decriminalization of marijuana to reduce the law enforcement and imprisonment for marijuana possession disparities between communities of color and whites.

According to Kathleen Hoke, JD, director of the Eastern Region for the Network for Public Health Law, such criminalization acts "force people into the criminal justice system and those convicted have a difficult time getting jobs and the related access to health insurance"[32]. However, in the two years after Colorado legalized recreational marijuana, the number of Hispanic and African-American teens arrested for possession with intent to sell *rose* 29% and 58%, respectively[33]. However, in the same period, the number of white teens arrested for identical crimes dropped eight percent[30]. The legalization of marijuana, particularly in Colorado, did not diminish criminalization in communities of color. In contrast, the increased access and use of marijuana and exacerbated a larger disparity of incarceration between communities of color and whites. Legalization of marijuana may not be a protective factor for the ongoing criminalization of communities of color.

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[29] Haun, M. (2016, April 02). The Unexpected Side Effects of Legalizing Weed. Newsweek. Retrieved May 02, 2017, from http://www.newsweek.com/unexpected-side-effects-legalizing-weed-339931

[30] Repp, K., & Raich, A. (2014). Marijuana and health: a comprehensive review of 20 years of research. *Washington County Oregon: Department of Health and Human Services*.

[31] Dumont, D. M. & Allen, S. A. & Brockmann, B. W. & Alexander, N. E. & Rich, J. D. (2013). Incarceration, Community Health, and Racial Disparities. *Journal of Health Care for the Poor and Underserved* 24(1), 78-88. The Johns Hopkins University Press. Retrieved May 22, 2017, from Project MUSE database.

[32] McGill, N. (2014, September 01). As marijuana decriminalization spreads, public health prepares: Health effects, regulations examined. *The Nation's Health.* Retrieved May 01, 2017, from http://thenationshealth.aphapublications.org/content/44/7/1.3.full

[33] Colorado Department of Public Safety, Division of Criminal Justice, Office of Research and Statistics. *Marijuana Legalization in Colorado: Early Findings*. Denver, Mar. 2016.

Arguments for Decriminalization (Concluded)

Another argument motivating the legalization of marijuana has been the perception that it will eliminate illegal drug activities and drug cartels. This has not been the case in Colorado and further public health concerns have arisen. According to Lt. Mark Comte of the Colorado Springs Police Vice and Narcotics Unit, legalization "has done nothing more than enhance the opportunity for the black market"[27]. Even after legalization, Colorado continues to struggle with a persistent black market that now involves increased Mexican cartel activity[27]. Drug cartels are trading marijuana for heroin and taking marijuana back to Mexico[27]. This drug trade has also opened the door to human trafficking, and prostitution in Colorado has increased 223% between 2014 and 2016[27]. The overall crime rate in Denver has increased, as well as serious crimes like murder, motor vehicle theft, aggravated assault, and burglaries, since recreational marijuana was legalized[27]. More juveniles on probation are testing positive for marijuana than ever before[27].

Tax Revenue

The promise of tax revenue has been one driving force toward legalization. Tax revenue from retail marijuana comprises less than 1% of the Colorado state budget, and after costs of enforcement, there is very little remaining revenue[27]. Tax dollars promised from marijuana sales for prevention and schools funds have been largely diverted to the state's general fund[27]. Colorado has more marijuana businesses than McDonalds and Starbucks combined, despite 68% of all Colorado jurisdictions banning medical and recreational marijuana businesses[27]. However, it was recently determined that more than 30% of Colorado's marijuana businesses are non-compliant with legal regulations and/or have committed tax evasion[27]. Any revenue from legalization may not translate to a gain for the state. For example, national revenue from alcohol and tobacco taxes and fees are $39 billion per year. However, the legal, health, social and regulatory costs exceed $449 billion per year[34,35].

Recommendations

In jurisdictions that legalize the commercial sale of marijuana, or decriminalize its use, there is evidence that supports regulating marijuana for the health and safety of its citizens. Michigan can learn from the experiences of other states as it considers expanding its marijuana legislation. Based on the lessons learned from other states, MALPH/MAPPP is providing the following recommendations to assist and guide discussions regarding the expansion of marijuana use and access.

1. Add standardized marijuana survey questions to the state's surveys (i.e. BRFSS and PRAMS) to inform decision making on marijuana use, health and safety.

2. Lawmakers should receive annual updates from reports and data released from states that enacted marijuana legalization.

[34] Derek Franklin; Marijuana Legalization: Policy Implications, Washington Association for Substance Abuse and Violence Prevention, www.wasavp.org

[35] Sacks, J. J., Gonzales, K. R., Bouchery, E. E., Tomedi, L. E., & Brewer, R. D. (2015). 2010 National and State Costs of Excessive Alcohol Consumption. American Journal of Preventive Medicine.

Recommendations (Continued)

3. Youth are most at risk for increasing marijuana use with legalization. Regulation and prevention strategies focused on youth include:
    - Regulate marijuana, similar to tobacco and alcohol, with a minimum age of 21 years for purchase. These regulations should include strict penalties for those who sell marijuana or marijuana products to those younger than 21 years and point-of-sale restrictions.
    - Provide education and diversion programs for people younger than 21 years who possess marijuana.
    - In areas with high density of dispensaries and medical cards, create and establish aggressive youth prevention programs and funding.
    - Restriction of retail locations from areas with vulnerable populations (i.e. schools).
    - Strict enforcement of rules and regulations that limit access to and marketing toward youth.
    - Prohibit advertising to minors.
    - Educational outreach that discourages the use of marijuana by adults in the presence of minors. The effects of secondhand marijuana smoke are unknown.
    - Oppose the use of inhaling marijuana because of the known association of lung damage due to smoke.

4. Workplace safety and unintentional injury safeguards and protections should include:
    - Establishment of regulation and protective measures to ensure that workers who cultivate commercial marijuana have reduced exposure to pesticides, fertilizers, and other unhealthy adulterants.
    - Amend state indoor air laws to include marijuana due to the potential risk of secondhand smoke exposure.
    - Ensure that marijuana in all forms has childproof packaging to prevent accidental ingestion.
    - Restrict cannabis-containing products attractive to minors (i.e. gummy bears).
    - Rigorous monitoring through poison control, emergency room utilization and other surveillance methods to identify potential "hot spot" areas."
    - Collaborate with employers to maintain a safe workforce.

5. Education and counseling for women who are pregnant or considering pregnancy about the potential risks to fetus and/or infant with marijuana use[36].
    - Standardized questions to ask all women about marijuana usage before pregnancy and in early pregnancy to include marijuana usage.
    - Women who are pregnant or contemplating pregnancy should be encouraged to discontinue marijuana use.
    - Women reporting marijuana use should receive counseling about potential adverse health consequences of continued use during pregnancy.

[36] The Impact of Marijuana Policies on Youth: Clinical, Research, and Legal Update. Pediatrics. March 2015, VOLUME 135 / ISSUE 3

Recommendations (Concluded)

- Pregnant women or women contemplating pregnancy should be encouraged to discontinue use of marijuana for medicinal purposes in favor of an alternative therapy for which there are better pregnancy-specific safety data.
- There are insufficient data to evaluate the effects of marijuana use on infants during lactation and breastfeeding, and in the absence of such data, marijuana use should be discouraged.

6. The roadside evaluation of those driving impaired due to marijuana is still under study. Therefore, protocols and standards for determining impairment when operating a motor vehicle is highly recommended.

7. Because marijuana remains illicit, there are no mechanisms currently in place to monitor the safety and quality of its production, potency and labeling. To reduce potential harm to consumers, we recommend the following:
   - All cannabis and cannabis-containing product labels include evidence-informed health warnings, contraindications, and harm reduction messages.
   - Ensure the development and availability of linguistically competent educational and informational materials for individuals with limited English proficiency.
   - Establish a maximum THC content level.
   - Develop and fund standards for the quality and potency of commercial marijuana and ensure safe working conditions for those cultivate marijuana.
   - Regulate commercially legalized marijuana in partnership with state and local health departments, including the provision of resources to local and state public health agencies for the purpose of reducing and preventing marijuana's use, misuse, and abuse.

8. Tax commercial marijuana and dedicate the revenue to funding prevention, treatment, research, and regulatory frameworks to offset the costs and effects incurred through the increased availability of marijuana and other products containing tetrahydrocannabinol (THC).