



Marijuana Legalization in the Midwest: The Impacts

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Introduction

The Midwest HIDTA Region

The Midwest HIDTA's seven-state area consists of Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and the three Illinois counties of Madison, Rock Island, and St. Clair. The region spans over 428,000 square miles, encompasses 73 HIDTA-designated counties, and is considered the largest of the Office of National Drug Control Policy's 33 HIDTA regions. It is as varied as it is vast, and incorporates major urban cities, separated by suburban sprawl and rural bucolic settings. Within the Midwest HIDTA are more than 4,300 miles of interstate highways and an international border stretching over 300 miles. Its central location and intertwining roadways make the region ideal for drug trafficking organizations and criminal entrepreneurs intent on transporting drugs into or through to other destinations.

Purpose

This is the second report on the impact of marijuana legalization in the Midwest. The purpose of this report is to measure the impact of marijuana legalization in both the Midwest and the United States. This report will utilize data and trends from states with operational medical and/or recreational marijuana programs in order to mitigate the future consequences of the marijuana programs of Midwestern states. California, Colorado, Oregon, and Washington will frequently be cited and used for comparison, as their marijuana programs have existed long enough for an adequate amount of data to be collected. This data includes, but is not limited to:

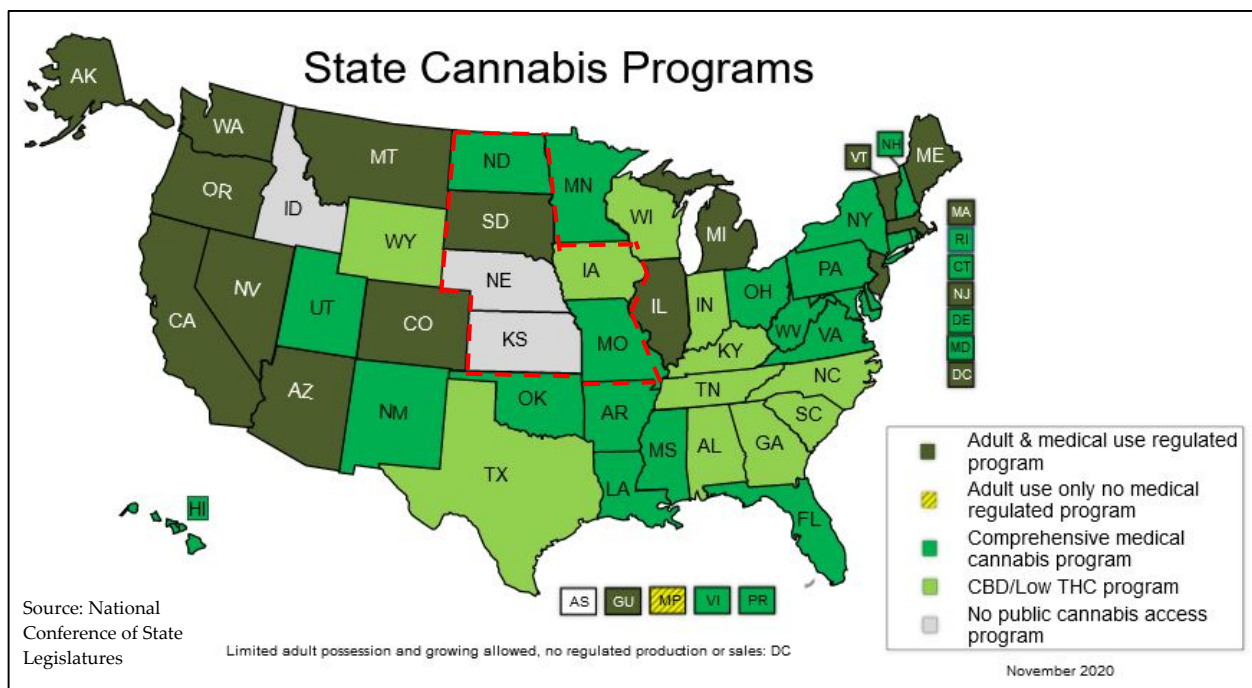
- marijuana-related crime;
- marijuana diversion;
- drugged driving and traffic fatalities;
- adult and youth marijuana use;
- impacts on health; and
- environmental impacts.

Background

As of October 2021, five Midwest HIDTA states have adopted some form of legalized marijuana within their jurisdiction. Both Missouri and North Dakota have implemented medical marijuana programs, Iowa has authorized the medical use of cannabidiol (CBD) for those with a qualifying medical condition, and South Dakota has approved a medical marijuana program, although it is not yet operational.

Missouri’s marijuana program is currently active, but only about one-fifth of its cultivation sites are in operation.¹ North Dakota’s marijuana program is also operational and the state Department of Health stated that more North Dakotans are participating in the program than they originally expected.² Iowa’s program authorized medical cannabidiol (mCBD) products containing no more than three percent delta-9-tetrahydrocannabinol (THC) for non-smoking use, although Senate Bill 2363 (2021) removed the restriction on THC levels. South Dakota passed both medical and recreational marijuana initiatives in 2021, however, South Dakota Gov. Kristi Noem recently issued a legal challenge to the constitutionality of the voter-approved amendment to legalize recreational marijuana.³

Figure 1: Map of State Cannabis Programs



Executive Summary

Marijuana is the most widely available and commonly abused illicit drug in the United States. The legalization of marijuana invokes consequences that are both extensive and underreported, and its impacts on public health, safety, and the economy are observable in many states with legalized access. The Midwest is not immune to the adverse effects of marijuana legalization. This report will examine those and other potential effects in the following sections.

Chapter 1: Legal Overview

- ❖ Iowa, Missouri, and North Dakota are the three states in the Midwest HIDTA region with operational marijuana programs.
- ❖ Iowa operates an mCBD program,^A while Missouri and North Dakota both operate medical marijuana programs.

Chapter 2: Marijuana Reporting Systems

- ❖ Seed-to-sale tracking systems are ineffective at preventing the diversion of marijuana from “legal” dispensaries and cultivation facilities.
- ❖ Despite claims otherwise, no marijuana reporting system is capable of providing total accountability of commercially-grown marijuana.

Chapter 3: Diversion & Illegal Marijuana Grows

- ❖ Illegal growing operations and the diversion of marijuana from legal markets are the primary suppliers of marijuana to illicit markets.
- ❖ Marijuana represented 89 percent of the total drug weight seized by Midwest HIDTA enforcement initiatives in 2020.
- ❖ Of the 1,268 Domestic Highway Enforcement seizures involving marijuana, 64 percent (n=809) originated from states with recreational marijuana programs and 74 percent (n=935) originated from states with either a medical or recreational marijuana program.

^A Iowa’s mCBD program now allows for products containing delta-9 THC.

- ❖ Eighty-seven percent of the marijuana and marijuana products mailed into Midwest HIDTA between July 2020 and July 2021 originated from California, Colorado, Oregon, and Washington.

Chapter 4: Marijuana-related Crime

- ❖ Iowa, Missouri, and North Dakota all experienced increases in crimes against persons offenses following passage of medical marijuana legalization.
- ❖ Between 2017 and 2019, the number of incidents where marijuana was recovered from a crime increased by 13 percent nationwide.
- ❖ Following the legalization of medical marijuana in Missouri in 2018, the number of homicides, aggravated assaults, and weapons violations involving marijuana^B increased in St. Louis between 2018 and 2020.
- ❖ The Drug Enforcement Administration (DEA) found that illicit marijuana markets are increasing in states that have legalized the possession, use, and cultivation of marijuana.

Chapter 5: Impaired Driving & Traffic Fatalities

- ❖ Numerous studies have demonstrated that marijuana use impairs an individual's ability to safely operate a motor vehicle.
- ❖ Following medical marijuana legalization, the percentage of total traffic fatalities involving a driver testing positive for cannabinoids increased in each of the three Midwest HIDTA states with a marijuana program.
- ❖ Many other states with a legalized marijuana program experienced an increase in traffic fatalities following legalization, including California, Colorado, Oregon, and Washington.

Chapter 6: Accessibility & Use

- ❖ Seventy-five percent of states with a legalized recreational marijuana program and 57 percent of states with a legalized medical marijuana program moved up in the national ranking of past month marijuana usage by those aged 12 to 17 from 2017 to 2019.

^B Violations involving marijuana were determined by the number of crimes in which marijuana was positively identified by the St. Louis Metropolitan Police Department crime laboratory.

- ❖ Past-month marijuana usage for youth aged 12 to 17 increased following legalization in Iowa and Missouri.
- ❖ Past-month marijuana usage for adults aged 18 and older increased following legalization in Missouri and North Dakota.
- ❖ The Iowa Youth Survey found the percentage of past-month marijuana use increased 7.5 percent between 2016 and 2018.Error! Bookmark not defined.
- ❖ The Missouri Student Survey found the percentage of past-month marijuana use increased 48 percent between 2018 and 2020.

Chapter 7: Impacts to Health

- ❖ Marijuana-related emergency department visits increased in Iowa, Missouri, and North Dakota following the legalization of medical marijuana.
- ❖ Marijuana-related hospitalizations increased in Missouri and North Dakota following the legalization of medical marijuana.
- ❖ Marijuana-related exposure calls to state poison centers increased in Iowa, Missouri, and North Dakota following medical marijuana legalization.
- ❖ Frequent marijuana use is associated with several adverse health effects, including brain development, anxiety, depression, psychosis, schizophrenia and suicide.
- ❖ Marijuana use in adolescence and young adulthood increases the likelihood of abusing other illicit drugs later in life.

Chapter 8: Environmental Impacts & Concerns

- ❖ The marijuana industry accounted for one percent of all electricity used in the U.S. in 2016.
- ❖ The cultivation and processing of marijuana emits volatile gases that contribute to ground-level air pollution.
- ❖ Water diversion, wildlife poisoning, and the destruction of habitats are common characteristics of illegal outdoor marijuana growing operations.

Chapter 9: Regulatory Overview

- ❖ All three states require individuals who are authorized to purchase medical marijuana to carry a medical marijuana identification card.
- ❖ All three states require manufacturing facilities and dispensaries to implement inventory tracking systems.

Chapter 1: Legal Overview

Introduction

As of October 2021, 17 states have legalized recreational marijuana and 36 states have legalized some form of medical marijuana. Nearly every state surrounding those of the Midwest HIDTA region have enacted some form of marijuana legalization. This includes Montana, Colorado, Oklahoma, Arkansas, Kentucky, Illinois, Wisconsin, and Minnesota. Kansas and Nebraska are the only two states within the Midwest HIDTA region without state-sanctioned marijuana programs.

State Marijuana Programs of the Midwest HIDTA Region

North Dakota became the first state in the Midwest HIDTA to approve a medical marijuana program in 2016. The following year, Iowa approved an mCBD program in 2017. Missouri voters approved a medical marijuana program in 2018. Most recently, South Dakota approved both a medical and recreational marijuana program in 2020, although a circuit court ruling overturned recreational marijuana in early 2021. A timeline of the marijuana legislation that passed is included below:

- ❖ 2016: North Dakota Medical Marijuana Legalization (Statutory Measure 5)
- ❖ 2017: Iowa Medical Cannabidiol Act (Code Chapter 124E)
- ❖ 2018: Missouri Medical Marijuana and Veteran Healthcare Services Initiative (Amendment 2)
- ❖ 2020: South Dakota Marijuana Legalization Initiative (Amendment A)

As of May 2021, the medical marijuana programs of North Dakota and Missouri and the mCBD program of Iowa are all currently active. South Dakota's medical and recreational marijuana programs are pending further legal review.

Since the passing of the *Agriculture Improvement Act of 2018*, every state within the Midwest HIDTA now participates in the production, cultivation, and retail sale of industrial hemp. While industrial hemp is classified as non-psychoactive due to THC content below 0.3%, it is virtually indistinguishable from marijuana grown for psychoactive properties. In addition to the state-sanctioned hemp programs throughout the region, at least twelve Indian Nations have received approval to cultivate industrial hemp from the U.S. Department of Agriculture.⁴

Chapter 2: Marijuana Reporting Systems

Introduction

Marijuana businesses are legally required to monitor their supply chains and forward the data to their respective state authorities. Similar to pharmaceutical companies, inventory management is vital to preventing the theft and diversion of marijuana to illicit markets. Seed-to-sale tracking systems are the predominant methods of supply chain management used by the marijuana industry. This system may benefit marijuana businesses through enhanced inventory management, but it does little to prevent diversion to illicit markets.^c

Key Findings

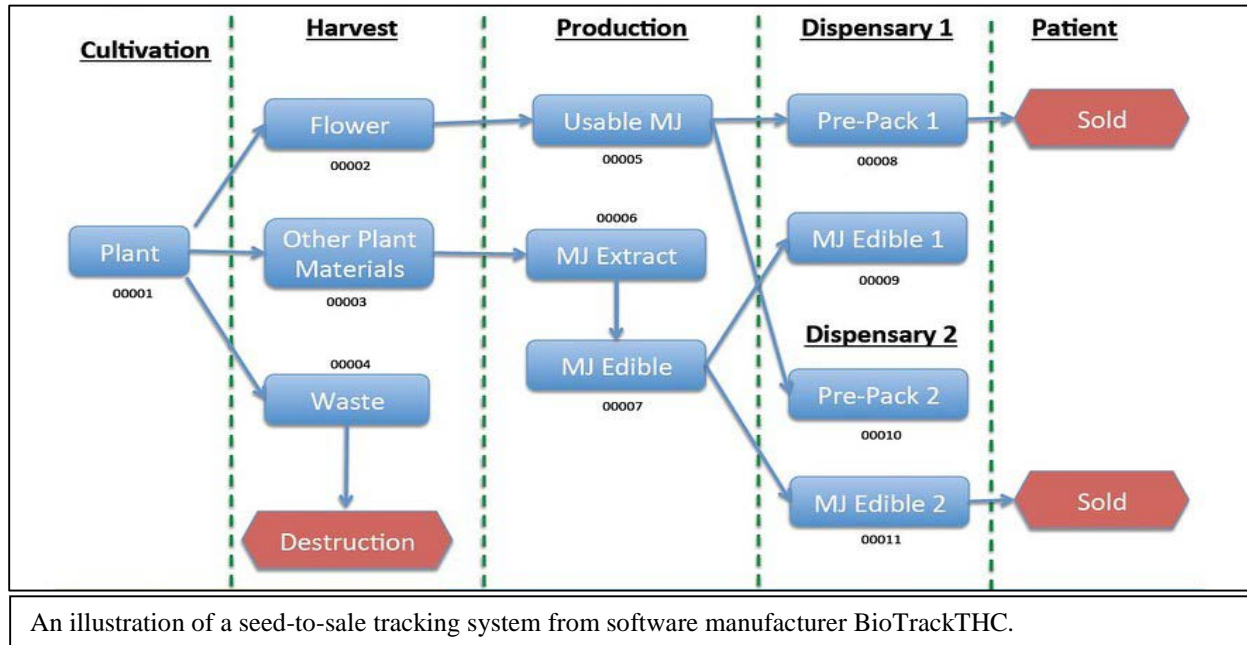
- ❖ Seed-to-sale tracking is ineffective at preventing the diversion of marijuana from legal dispensaries and cultivation facilities.
- ❖ Despite claims otherwise, no marijuana reporting system is capable of providing total accountability of commercially-grown marijuana.

Seed-to-sale Tracking System

Seed-to-sale tracking—a common term in the marijuana industry— is a generic phrase suggesting that dispensaries and manufacturers are capable of total accountability by assigning a unique radio frequency identification (RFID) tag to a plant that will track its path until it ultimately reaches the hands of the consumer. Seed-to-sale tracking is intended to ensure that no marijuana or marijuana-infused products are diverted to illicit markets from cultivation or retail facilities. While this system implies complete control of each stage of the marijuana plant’s lifecycle, repeated instances of diversion in other states that permit medical or recreational marijuana have proven otherwise.

^c The MW HIDTA asserts this as 74 percent of MW HIDTA DHE traffic stops involving marijuana originated from medical or recreational marijuana states.

Figure 2: Seed-to-Sale Tracking System



The Problems with Marijuana Reporting Systems

Marijuana reporting systems have benefits in their use and are certainly better than no inventory control measures; however, they do not provide total accountability of commercially-grown marijuana. Seed-to-sale tracking systems are not the only reporting methods used by the marijuana industry, although they represent the majority of inventory systems used by marijuana businesses. The pitfalls of seed-to-sale tracking may be attributed to several factors, as outlined below.

Cloning

The diversion of marijuana from licensed marijuana cultivation and dispensary facilities is a driving factor for the necessity of tracking systems in the marijuana industry. Unfortunately, the diversion of marijuana plants and plant products can occur in several stages of the cultivation process. Cloning is a popular method in which marijuana cultivators can make exact copies of a specific cannabis plant by cutting away small sections of the branching stems and replanting them. It is possible to make many clones from the same “mother” plant, which, if grown under the same conditions, will likely yield similar potencies and quantities as the mother plant. Cloned marijuana plants often mature at a faster rate than those from a seed. Marijuana clones contribute to the drug’s

diversion as they can be taken from a RFID-tagged plant and grown unregistered either on or off the licensed cultivation facility's grounds.

Harvesting & Processing

In the harvesting and processing phases, the fully matured plant is cut just above the roots and is weighed to establish the initial "wet weight." Workers then separate the usable portions of the plant from the unusable, which are labeled as waste products and later disposed of, and weigh both. The weight should be close to the original wet weight. Diversion can occur at this point by removing marijuana flowers and reassigning the weight difference to the waste pile. After weighing, the useable marijuana is set out to dry on a rack. The RFID tag that the plant was assigned as a seedling is attached to this rack. Diversion is possible in this process because the flowers dehydrate in varying amounts, providing an opportunity for an employee to remove small quantities of flowers each batch. Small losses from multiple drying trays over an extended period of time would be difficult to detect. After the flowers have dried, their weight is taken once more and recorded. The difference in the wet and dry weights is attributed to dehydration.

Figure 3: Marijuana Harvesting



Left: "Wet" marijuana. Right: "Dry" marijuana.
Source: <https://tinyurl.com/s5jydw5>

Internal Theft & Self-reporting Data Quality

A marijuana business's practice of self-reporting wholesale and retail sales of marijuana is controversial. Reporting in this sense includes information from the harvesting, processing, and point of sale phases of marijuana cultivation. The harvesting and processing phases in particular represent the greatest opportunities for theft to occur. Deliberate misrepresentation of data by cultivators, dispensaries, or their employees creates opportunities for diversion.

Chapter 3: Diversion & Illegal Marijuana Grows

Introduction

While proponents of marijuana legalization claim that marijuana commercialization will eradicate the underground market, reality has proven otherwise. Not only has legalization failed to abolish the black market, illicit marketplaces have become stronger and more profitable for DTOs in many states. Furthermore, the illegal cultivation of marijuana by criminal enterprises has skyrocketed across the U.S.

Key Findings

- ❖ Illicit marijuana markets are primarily supplied by illegal growing operations and the diversion of marijuana from legal markets.
- ❖ Overproduction, inadequate regulation, and prospective financial gain are the primary causes of the diversion of marijuana to black markets.
- ❖ Marijuana represented 89 percent of the total drug weight seized by Midwest HIDTA enforcement initiatives in 2020.
- ❖ Of the 1,268 Domestic Highway Enforcement seizures involving marijuana, 64 percent (n=809) originated from states with recreational marijuana programs and 74 percent (n=935) originated from states with either a medical or recreational marijuana program.
- ❖ Eighty-seven percent of the marijuana and marijuana products mailed into Midwest HIDTA between July 2020 and July 2021 originated from California, Colorado, Oregon, and Washington.

Illegal Marijuana Grows

Although medical and recreational marijuana sales contribute significant amounts of marijuana to illicit markets, illegal growing operations make up the majority of the black market's supply. While Mexico remains the primary foreign supplier of marijuana to U.S. markets, marijuana seizures along the southwest border have decreased more than 80 percent since 2013, indicating a shift from foreign to domestic production.⁵

Modern marijuana is able to withstand a wide variety of climates and can be cultivated in every state. With that being said, certain climates—such as those found in California, Oregon, and some parts of Washington—offer the longest outdoor growing

seasons. This, coupled with expansive public lands and an already established “legal” market are primarily why the majority of illicit outdoor marijuana grows occur in western states.^D Countless DTOs cultivate illicit marijuana outdoors, often in clandestine grow sites situated deep within public lands (e.g., national forests, wilderness areas). The DEA’s Domestic Cannabis Eradication/Suppression Program—a nationwide program that exclusively targets DTOs involved in marijuana cultivation—seized more than 4.5 million plants in 2020.⁶ This number has steadily increased since 2016.

The widespread use of indoor hydroponic systems allows growers to cultivate marijuana in virtually any climate and season. DTOs have increasingly adopted the use of hydroponics in recent years to expand their operations to other regions of the country. Where personal marijuana cultivation is legal (i.e., “home grows”) at the state level, DTOs have the opportunity to generate enormous profits with relatively little risk. DEA reporting suggests that experienced DTOs are capable of producing up to 1,800 pounds of indoor marijuana per year for every 100 plants possessed.⁵ It is now common practice for a DTO to purchase one or more homes in a residential neighborhood to be used solely for illicit marijuana cultivation. The use of private residences for indoor cultivation offers privacy and security compared to grows located in a warehouse or industrial space.

Causes of Diversion

Overproduction

Marijuana diversion represents a major challenge to both law enforcement and public health agencies. Marijuana products are frequently produced in legal states, trafficked across state lines, and distributed via black markets. States with legalized marijuana are major suppliers to the rest of the United States.^E The overproduction of marijuana occurs when the supply exceeds the demand, and the resulting stockpile drives down prices in the legal retail market. The only legal option for growers or dispensaries with a surplus of marijuana is to auction it at a heavily discounted price or suffer total loss. Overproduction leads some businesses or individuals to sell marijuana on the black market, often untaxed and at high prices, where it is ultimately trafficked out of state.

^D See “Diversion Statistics” on page 17 for data supporting this.

^E This statement is supported by data collected from the MW HIDTA DHE program, the Rocky Mountain HIDTA, Oregon-Idaho HIDTA, national seizure reporting systems, postal seizures, and other law enforcement resources.

Many legal states struggle with overproduction. Estimates predict Oregon marijuana users consume approximately 185,188 to 372,581 pounds annually.⁴¹ As of 2018, only 31 percent of the state's recreational marijuana inventory had been distributed, leaving 69 percent unconsumed. Between July 2014 and June 2015, 32 percent of the marijuana produced in Washington remained unsold, according to data from the state Liquor and Cannabis Board. The Director of the California Growers Association stated in July 2017 that the state produced eight times the amount of marijuana that was consumed.^{7,8}

Inadequate Regulation

A January 2019 report issued by Oregon Secretary of State Dennis Richardson asserts that Oregon's marijuana program has failed to meet mandatory state inspections. Gaps in the state marijuana program's regulatory framework have contributed to the diversion of marijuana to black markets.⁴¹ The Oregon Liquor Control Commission, which is responsible for the regulation of the marijuana industry, has not been able to properly enforce facility inspections and reporting because no cap was placed on the number of cultivation licenses. Only three percent of retailers and 32 percent of growers have had a compliance inspection.⁴¹ Due to the lack of regulation in Oregon's marijuana industry, approximately 14,550 pounds of marijuana have been seized en route to 37 states between July 2015 and January 2018.⁴¹

Prospective Financial Gain

There are strong financial incentives for those cultivating and supplying marijuana for the black market. A relatively-experienced grower with the right equipment is capable of producing around one pound of marijuana per plant in a 90-day growing cycle.⁹ Under the right conditions, six marijuana plants—an amount that approximately two-thirds of states with marijuana programs allow patients to cultivate at home—can produce approximately 24 pounds of marijuana a year. The average price nationally for indoor marijuana on the black market varies between \$800 and \$1,000 per pound.⁹ This means that the average grower could earn between \$19,200 and \$24,000 per year by selling the marijuana from their legal plants on the black market. This phenomenon is not unique to individual growers; in fact, large quantities of black market marijuana have been linked to legal marijuana dispensaries.

Diversions Statistics

Midwest HIDTA Initiatives

Midwest HIDTA initiatives confiscated more than 25,983 pounds of marijuana, 2,156 pounds of marijuana concentrates, and 31,764 pounds of marijuana consumables in 2020.¹⁰ Marijuana represented 89 percent of the total drug weight seized by Midwest HIDTA enforcement initiatives in 2020.¹⁰ The most popular methods used to divert medical and recreational marijuana are through the use of privately owned vehicles and mailing services.¹¹ Marijuana is routinely seized during traffic stops, at bus and train terminals, and in mail centers within the Midwest HIDTA. Seizures involving hydroponic, medical, and other high-grade marijuana transported from California, Colorado, Oregon, Washington, and other states have become commonplace.

Domestic Highway Enforcement Program

The Midwest HIDTA Domestic Highway Enforcement (DHE) program seized 19,939 pounds of marijuana and marijuana products that were destined to, or transiting through, the Midwest HIDTA in 2020.¹² Of the 1,268 DHE events involving marijuana where an origin was determined, 64 percent (n=809) originated from states with recreational marijuana programs and 74 percent (n=935) originated from states with either a medical or recreational marijuana program.¹²

Mailing Services

Public and commercial mailing services are highly utilized by both individuals and DTOs to traffic marijuana around the U.S. Figure 4 displays packages containing marijuana (or marijuana products) destined for Midwest HIDTA-region states between July 2020 and July 2021.¹³ Using multivariate clustering, Figure 5 displays the origins of the marijuana-containing packages that were destined for the Midwest HIDTA for the aforementioned time period.¹³ As demonstrated by the red circles, the bulk of Midwest HIDTA-bound packages containing marijuana originated from California, Colorado, Oregon, and Washington. These four states, each with a medical and recreational marijuana program, represented 87 percent of the 3,201 pounds of mailed marijuana and marijuana products destined for the Midwest HIDTA.¹³

Figure 4: FY2020 Q4 – FY2021 Q3 Marijuana Packages Destined for MW HIDTA

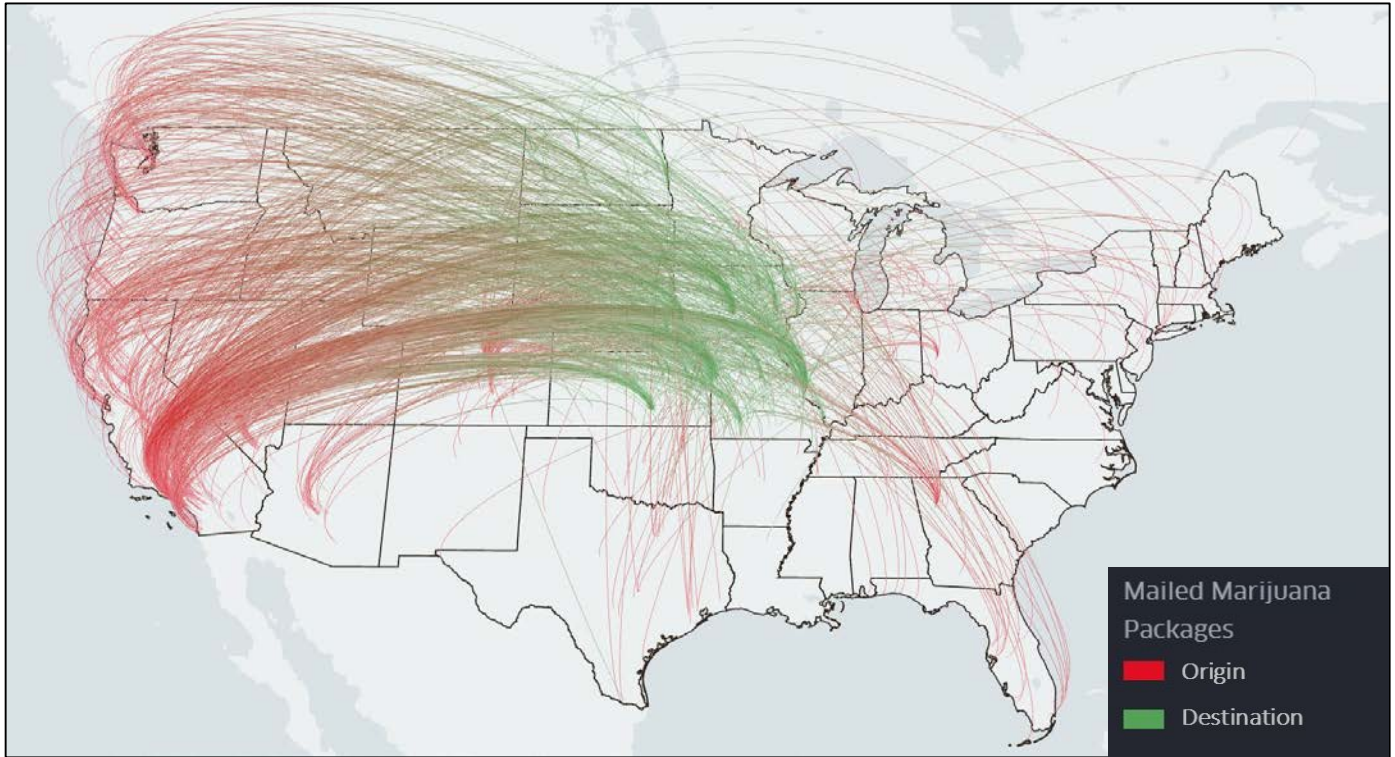


Figure 5: FY2020 Q4 – FY2021 Q3 Marijuana Package Origin

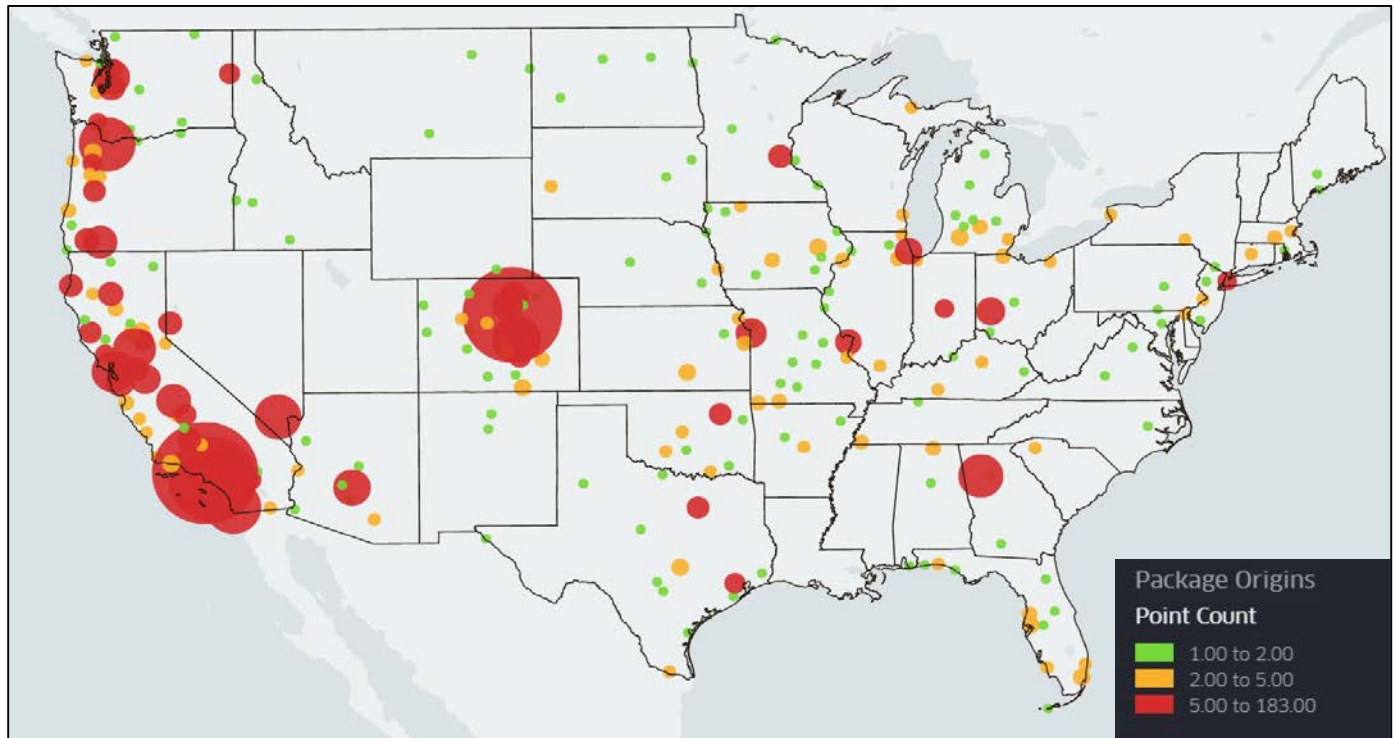


Figure 6 displays the major source and destination areas of the marijuana parcels that were seized by Midwest HIDTA law enforcement partners.¹³ For a better geographic representation of the source and destination areas, many of the areas were grouped by metropolitan statistical area. The Los Angeles, California and Denver, Colorado Metropolitan Areas accounted for the overwhelming majority of marijuana packages destined to the Midwest HIDTA region. The primary destination cities within the Midwest HIDTA region were Wichita, Kansas, and the Kansas City, KS-MO and St. Louis, MO Metropolitan Areas.¹³

Figure 6: Source & Destination Areas of Marijuana Parcels Seized Within MW HIDTA

Significant Source Areas of Marijuana Parcels Seized Within Midwest HIDTA July 2020 - July 2021	
Area Name	# of Seizures
Los Angeles Metro, CA	232
Denver Metro, CO	156
Portland Metro, OR	44
San Diego Metro, CA	37
Colorado Springs, CO	34
Las Vegas Metro, NV	32
Atlanta Metro, GA	32
Riverside Metro, CA	30
Gresham, OR	27
San Francisco Metro, CA	23
Seattle Metro, WA	22
Phoenix Metro, AZ	20
Sacramento Metro, CA	19
Kansas City, MO-KS	15
Chicago Metro, IL	10

Significant Destination Areas of Marijuana Parcels Seized Within Midwest HIDTA July 2020 - July 2021	
Area Name	# of Seizures
Wichita, KS	103
Kansas City Metro, KS-MO	109
St. Louis Metro, MO	98
Des Moines, IA	70
Omaha, NE	49
Springfield, MO	35
Sioux Falls, SD	29
Columbia, MO	24
Cedar Rapids, IA	23
Iowa City, IA	20
Sioux City, IA	20
Topeka, KS	20
Davenport, IA	17
Fargo, ND	17
Rapid City, SD	16

Diversion Case Examples

In a current California lawsuit, investigators allege that millions of pounds of legally-produced marijuana has been diverted to black markets.¹⁴ According to the lawsuit, rogue marijuana distributors bought vast quantities of legal marijuana at wholesale prices and then sold it both out of state and within California through illegal channels.¹⁴ Instances of diversion are widespread around the state, with illegal sellers outnumbering legal businesses almost 3 to 1.¹⁵

Despite recreational legalization, Nevada still struggles to contain its black market for marijuana. Large numbers of unlicensed retailers have been competing against legal marijuana businesses, depriving state and local governments of potential tax revenue.¹⁶ The Las Vegas Metro Police Department stated that illegal cultivators are growing much more marijuana individually now than before legalization.¹⁶

In Oklahoma, a state with a medical but no recreational marijuana program, loose restrictions and inexpensive grower licenses are contributing to large-scale diversion. According to the Oklahoma Bureau of Narcotics and Dangerous Drugs (OBNDD), licensed and unlicensed growers alike produce large quantities of marijuana for distribution to black markets around the U.S.¹⁷ The OBNDD also claims that the state has unintentionally become a national center of illegal growing operations following passage of its medical marijuana law.¹⁸

Chapter 4: Marijuana-related Crime

Introduction

Marijuana legalization is not indicative of lower crime. Although there may be decreases in misdemeanor possession arrests, many states observe increases in violent, property, and/or public-order crimes following marijuana legalization. While increases in crime may not be causatively linked to marijuana legalization, the correlation between the two is unassailable.

Key Findings

- ❖ Iowa, Missouri, and North Dakota all experienced increases in crimes against persons offenses following passage of medical marijuana legalization.
- ❖ Between 2017 and 2019, the number of incidents where marijuana was recovered from a crime increased by 13 percent nationwide.
- ❖ Following the legalization of medical marijuana in Missouri in 2018, the number of homicides, aggravated assaults, and weapons violations involving marijuana increased in St. Louis between 2018 and 2020.
- ❖ The Drug Enforcement Administration (DEA) found that illicit marijuana markets are increasing in states that have legalized the possession, use, and cultivation of marijuana.¹⁹

National Incident-Based Reporting System

Attempting to quantify the impact of a specific drug on an area's crime rate presents many challenges; the most obvious being that every law enforcement agency, regardless of size, collects data differently. This section will utilize data from the Federal Bureau of Investigation's National Incident-Based Reporting System (NIBRS) in order to examine the rates of various crimes both pre- and post-marijuana legalization.

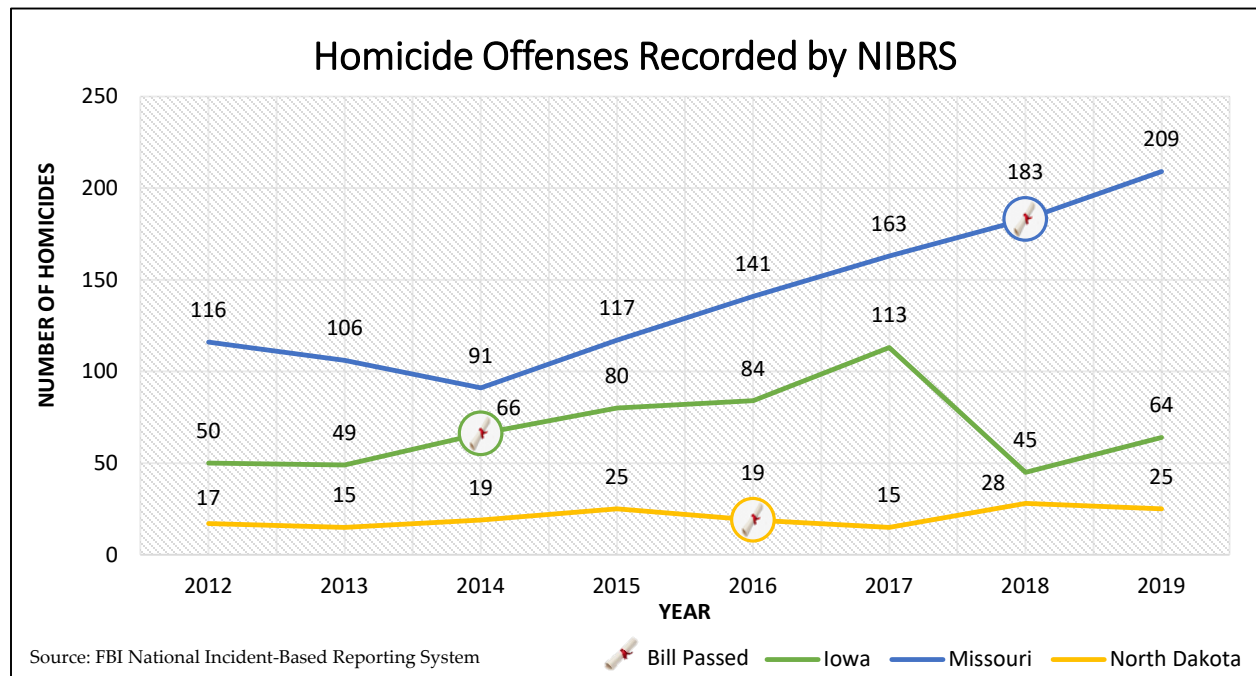
According to the data, crimes against persons offenses (e.g., murder, assault) increased for each of the Midwest HIDTA-region states with an operational marijuana program in the years following legalization.^F Crimes against property offenses (e.g.,

^F As each state legalized medical marijuana at different times, this phrase refers to the year in which legislation passed for each state through present day or the year for which the most recent data is available.

robbery, burglary) decreased for Iowa and North Dakota following legalization, while Missouri experienced a 25 percent rise. Crimes against society offenses (e.g. gambling, prostitution) increased for each of the Midwest HIDTA-region states, with drug offenses representing the greatest portion of category offenses. Following medical marijuana legalization, drug/narcotic offenses increased 17 percent in Iowa, 52 percent in Missouri, and eight percent in North Dakota. Several crimes against person offenses are included in the figures below.

NIBRS began collecting data on criminal incidents where drugs were involved in 2017. Nationwide, marijuana was the most commonly seized drug type in the dataset.⁶ Between 2017 and 2019, the number of incidents where marijuana was recovered from a crime increased by 13 percent nationwide. The total increased each year, from 311,808 incidents involving marijuana in 2017 to 351,550 in 2019.

Figure 7: Total Homicides Recorded by NIBRS



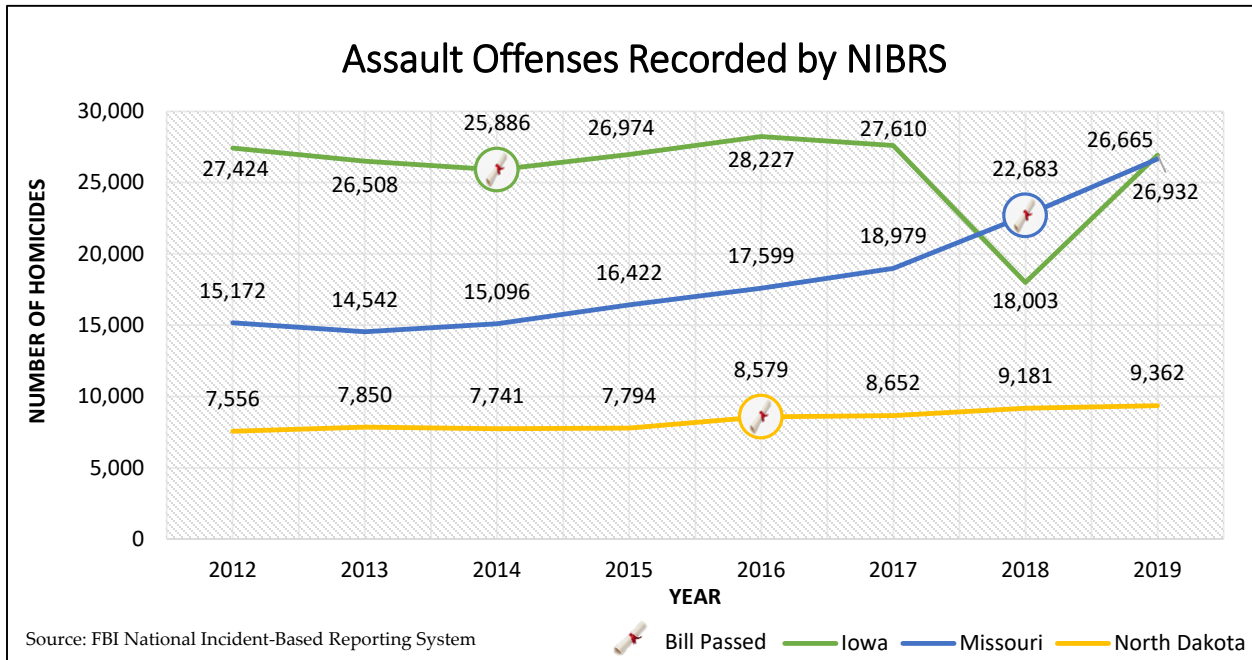
According to data from the NIBRS:

- the number of homicides in Iowa decreased by three percent since legalizing medical CBD;

⁶ The dataset is limited to national-level data.

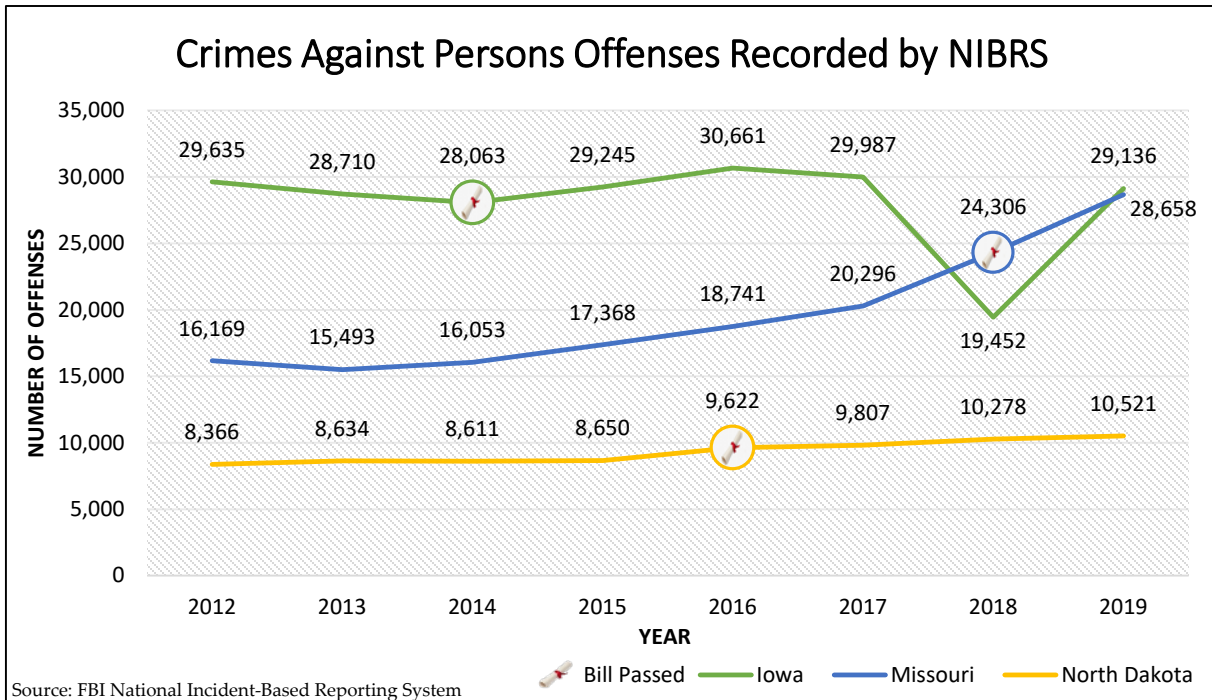
- the number of homicides in Missouri increased by 14 percent since legalizing medical marijuana; and
- the number of homicides in North Dakota increased by 32 since legalizing medical marijuana.

Figure 8: Total Assaults Recorded by NIBRS



According to data from the NIBRS:

- the number of assaults in Iowa increased by four percent since legalizing medical CBD;
- the number of assaults in Missouri increased by 18 percent since legalizing medical marijuana; and
- the number of assaults in North Dakota increased by nine percent since legalizing medical marijuana.

Figure 9: Total Offenses Recorded by NIBRS

According to data from the NIBRS:

- the total number of criminal offenses in Iowa increased by four percent since legalizing medical CBD;
- the number of assaults in Missouri increased by 18 percent since legalizing medical marijuana; and
- the number of assaults in North Dakota increased by nine percent since legalizing medical marijuana.

City-Level Marijuana Data

Despite legalization prompting many law enforcement agencies to deprioritize marijuana crimes, a host of marijuana-related crime continues to occur, albeit uncaptured in many law enforcement agencies' statistics. Furthermore, many prosecutors are reluctant to prosecute many marijuana-related crimes without a clear connection to firearms offenses or violence. These two factors are partially responsible for the lack of data accurately depicting the contribution of marijuana to crime. This section will utilize data from the police departments of several major cities in the Midwest HIDTA region states with a functioning marijuana program in an attempt to measure the local impacts of medical marijuana on crime.

Kansas City

The following data table from the Kansas City Police Department (KCPD) illustrates the number of reports that mention marijuana where it was recovered from a crime or taken as evidence. Between 2016 and 2018, this number increased by seven percent. In 2019, however, the number of reports began to decrease and continued throughout 2020. This is likely the result of an announcement made by the Jackson County Prosecutor's Office stating that it would cease prosecuting cases of 100 grams or less of marijuana.²⁰ The ongoing decline of reports mentioning marijuana may also be attributable to the passing of a July 2020 ordinance that stripped marijuana possession from the city code.²¹

Figure 10: KCPD Recovered Property Involving Marijuana

Kansas City - Recovered Property Involving Marijuana					
Year	2016	2017	2018	2019	2020
Number of Reports	3,536	3,347	3,773	2,031	1,483
Source: Kansas City (MO) Police Department					

St. Louis

The following table displays statistics from the St. Louis Metropolitan Police Department (SLMPD) for all crimes where marijuana was seized and tested positive by their crime laboratory. Since legalization in 2018, the total number of crimes involving marijuana decreased by 13 percent. However, several major types of crime increased within this period. The number of marijuana-related homicides increased by 45 percent, aggravated assaults increased by 15 percent, and weapons violations increased by six percent. It is important to note that since 2013, the City of St. Louis has reformed its penalties for marijuana offenses.

Figure 11: SLMPD Marijuana-related Crime

St. Louis Marijuana-related Crime					
Crime	2016	2017	2018	2019	2020
Aggravated Assault	78	70	61	44	70
All Drug Possession (Involving MJ)	629	555	532	485	311
All Drug Sales (Involving MJ)	5	5	13	3	1
Homicide	35	31	49	42	71
Robbery	16	14	15	10	9
Weapons Violation	219	246	252	224	267
<u>All Crimes Involving MJ</u>	1218	1111	1174	1122	1025
Source: St. Louis Metropolitan Police Department					

Des Moines

The table below displays marijuana-related crime data for Des Moines, Iowa between 2018 and 2020 year-to-date (YTD).^H While marijuana-related data for possession and distribution are depicted in the table, data pertaining to violent crimes (e.g., assaults, homicides) were unavailable. Each of the marijuana-related crimes below decreased between 2018 and 2020 YTD. The reason for this decrease is unknown, although changes in marijuana enforcement and criminal penalties may be responsible.

Figure 12: Des Moines Marijuana-related Crime

Des Moines Marijuana-related Crime			
Crime	2018	2019	2020 YTD
Possession of Marijuana	350	262	115
Possession of Controlled Substance, Marijuana 1st Offense	83	56	34
Possession of Controlled Substance, Marijuana 2nd Offense	1	2	0
Possession of Controlled Substance, Marijuana 3 rd + Offense	7	16	3
Possession with Intent to Deliver Marijuana	73	51	25
Intent to Deliver Marijuana	20	15	10
Conspiracy to Deliver Marijuana	2	8	1
Manufacturing Marijuana	0	3	1
Arrests with Marijuana as the Only Charge	130	86	35
Sources: Des Moines Police Department, IA Fusion Center			

^H Data earlier than 2018 was not available for the writing of this report.

Rising Marijuana Crime

In recent years, law enforcement leaders across the U.S. have voiced their concerns regarding marijuana's contribution to violent crime. These leaders, ranging from deputy chiefs to police commissioners, all recognize that the sale and trafficking of marijuana is not the benign activity that popular culture purports it to be. In late 2019, Kansas City Police Chief Rick Smith wrote, "Most people don't realize the connection marijuana has to violent crime in Kansas City. So far this year, 10 of our homicides have been directly motivated by marijuana."²² "There is nothing to prove the rise in violent crime was caused by legalized recreational marijuana in the states that have experienced it, but the correlation is undeniable"²² (Smith, 2019, para. 1).

In Memphis, Tennessee, Assistant Police Chief Donald Crowe stated, "When we get to the scenes of these shootouts, there's guns and bodies everywhere, and what we find scattered on the ground is marijuana. Just this past week, we had a shootout and there were 20 pounds of marijuana"²³ (Wexler, 2021, para. 12).

Deputy Police Chief Kris Pitcher of the Los Angeles Police Department had this to say about marijuana, "Cannabis is a tremendous issue here, both legal and illegal. It is a driver of violence in LA. The illegal grows and dispensaries that we have, in addition to the legal ones, create the opportunities for robberies. We have a lot of murders and shootings by gang members and competitors"²³ (Wexler, 2021, para. 13).

In Baltimore, the city's Deputy Police Commissioner Sheree Briscoe stated, "We are seeing violence related to marijuana. A lot of our issues with violence are discords and 'beefs' between groups over territory, disrespect related to drug sales, cheating one another, using bad currency, all of the behaviors connected to the drug trade"²³ (Wexler, 2021, para. 13).

In Washington D.C., Police Chief Robert Contee informed the press that marijuana is a driving factor in the city's rise in violent crime. Chief Contee also stated, "I can tell you that marijuana undoubtedly is connected to violent crimes that we are seeing in our communities"²⁴ (Pomeroy, 2021, para. 12). The chief went on to say that marijuana creates a "...very bad situation, because those individuals get robbed, those individuals get shot at, those individuals get involved in disputes all across our city"²⁴ (Pomeroy, 2021, para. 14).

U.S. Marijuana Markets

The DEA's 2019 and 2020 National Drug Threat Assessments found that illicit marijuana markets are increasing in states that have legalized the possession, use, and cultivation of marijuana.²⁵ While marijuana remains illegal under federal law, there are three types of marijuana markets in the U.S.: illicit markets, state-approved medical marijuana markets, and state-approved recreational marijuana markets. Each of these markets is subject to a wide variety of crimes, including, but not limited to: assault, robbery, homicide, burglary, theft, and drug trafficking. Profits resulting from the diversion and sale of marijuana to black markets may be used to fund other criminal activities.

Illicit Markets

Domestically-produced illicit marijuana is produced by individuals and organizations of varying size. Illicit markets consist of individual growers—who cultivate only a handful of plants at a time—to international DTOs with large-scale operations intended for distribution throughout the U.S.

Medical Marijuana Markets

Marijuana that is cultivated and sold by state-sanctioned individuals or groups in medical dispensaries is easily divertible to illicit markets. On a smaller scale, individuals or groups exploit the marijuana regulations of their state to produce or obtain marijuana. Rather than consume their allowed allotment, they sell their supply on the black market. On a larger scale, some state-licensed growers may divert quantities of marijuana to illicit markets. Black market sales often occur in states where marijuana is illegal, which provides a lucrative source of income.

Recreational Marijuana Markets

As with medical marijuana markets, recreational markets are supplied by state-licensed producers and retail stores. It is common for individuals to purchase marijuana or marijuana products at a dispensary in a legalized state and transport these products to illicit markets. Unlike many medical marijuana markets, recreational markets generally do not limit how much marijuana an individual may purchase in a given time period. Instead, the only limitation is the amount of marijuana one may buy in a single visit. State-licensed retailers and growers may divert unreported quantities of marijuana to illicit markets in search of higher profits.

Chapter 5: Impaired Driving & Traffic Fatalities

Introduction

Marijuana is the most frequently reported illicit drug in impaired driving accidents in the U.S., both fatal and non-fatal.²⁶ Research has shown that both current and long-term exposure to marijuana impair driving ability.^{26,27} Drivers testing positive for THC are three to seven times more likely to be at fault for a motor vehicle accident than those who do not consume drugs or alcohol before driving.²⁸

Key Findings

- ❖ Numerous studies have demonstrated that marijuana use impairs an individual's ability to safely operate a motor vehicle.
- ❖ Following medical marijuana legalization, the percentage of total traffic fatalities involving a driver testing positive for cannabinoids increased in each of the three Midwest HIDTA states with a marijuana program.
- ❖ Many other states with a legalized marijuana program experienced an increase in traffic fatalities following legalization, including California, Colorado, Oregon, and Washington.

Marijuana Impairment

There are many misconceptions surrounding the effects of marijuana on driving. Numerous scientific studies indicate that marijuana impairs motor skills, cognitive functions, and a driver's ability to multitask.^{29 30 31} In fact, marijuana is the illicit drug most commonly found in the blood of drivers involved in motor vehicle crashes.²⁶ Additionally, the concentration of THC in the blood is directly related to the level of impairment of one's driving ability.²⁷

In 2020, a double-blind randomized clinical trial examining the effects of vaporized marijuana on driving performance found that THC impairs driving skills.³² The trial focused on the study participants' ability to maintain lane position on a roadway after receiving marijuana that was either THC dominant (22 percent THC), THC/CBD equivalent, CBD dominant (nine percent CBD), or a placebo. The study also collected feedback from the drivers on their driving quality, perceived impairment, and confidence to safely operate a vehicle. Results from the study found that the drivers who consumed

THC had increased difficulty in maintaining lane position for up to five hours after use compared to the CBD or placebo groups.³² The feedback collected from the drivers that used THC also found that drivers reported a lower confidence in their driving ability, a higher sense of impairment, and a lower perception of their driving quality.³²

The National Highway Traffic Safety Administration (NHTSA) conducted three driving studies in 1993 to determine the effects of marijuana smoking on driving performance.¹ The first study, which was conducted on a closed highway, administered different doses of THC to subjects on separate occasions and measured their driving performance by several dependent variables. The results demonstrated that all three doses of THC impaired driving performance as measured by an increase in the standard deviation of lateral position (i.e. the weaving of the car).²⁹ The second study conducted driving tests in the presence of other traffic to better resemble reality. Once again, the results indicated that all three doses increased the deviation of lateral position, although the impairment increased as the doses increased.²⁹ The third study was conducted in high-density urban traffic. Due to obvious safety reasons, only the lowest THC dose (100 ug/kg) was administered. The findings demonstrated that impairment was comparable to the same dose of THC in the previous study and that hand steadiness was impaired following consumption.²⁹

According to two large European studies, drivers with THC in their blood were approximately twice as likely to be responsible for a fatal motor vehicle crash than drivers without drugs or alcohol in their system.^{33,34} Drivers that consume both alcohol and THC appear to represent an even greater risk for fatal motor vehicle crash than drivers with either of the substances alone.³⁰ Although countless researchers have determined that active THC in the blood impairs driving ability, the true extent of marijuana's involvement in fatal motor vehicle crashes is often unclear because of its propensity to remain within the body for long periods of time.³⁵

¹ This is the most recent major study from the NHTSA on marijuana-impaired driving.

Marijuana-Related Traffic Fatalities in the Midwest HIDTA

Following medical marijuana legalization, the percentage of total traffic fatalities involving a driver testing positive for cannabinoids increased in each of the three Midwest HIDTA states with a marijuana program, as depicted in Figures 13–15 below.^{36,37,38} The Midwest HIDTA recognizes that there are numerous data limitations based on current testing methods and processes that make interpreting traffic fatality data difficult. However, this is the most comprehensive data available that allows for multi-year comparisons of drug-related fatalities. Data for this section was gathered from the National Highway Traffic Safety Administration’s Fatality Analysis Reporting System (FARS), the Missouri State Highway Patrol, the Iowa Department of Transportation, and the North Dakota Department of Transportation.

The percentage of total fatalities where a driver tested positive for cannabinoids has increased since Iowa passed mCBD legislation, from 7.1 percent in 2018 to 11.9 percent in 2020.³⁶ With the removal of THC limitations on mCBD products in 2020, this percentage may increase going forward.

Figure 13: Iowa Traffic Deaths Related to Cannabinoids

Iowa Traffic Deaths Related to Marijuana When a DRIVER Tested Positive for Marijuana			
Crash Year	Total Statewide Fatalities	Fatalities with Drivers Testing Positive for Cannabinoids*	Percent of Total Fatalities
2014	322	23	7.1%
2015	320	33	10.3%
2016	402	46	11.4%
2017	330	37	11.2%
2018	319	53	16.6%
2019	336	30	8.9%
2020	337	40	11.9%

*Cannabinoids: Delta 9, Hashish Oil, Hashish, Marijuana, Marinol, and THC.

The percentage of total fatalities where a driver tested positive for cannabinoids has slightly increased since Missouri passed medical marijuana legislation, from 17.0 percent in 2018 to 17.3 percent in 2020.³⁷ While there were slightly fewer fatalities

involving a driver testing positive for cannabinoids in 2020, this number has been increasing since at least 2014.

Figure 14: Missouri Traffic Deaths Related to Cannabinoids

Missouri Traffic Deaths Related to Marijuana When a DRIVER Tested Positive for Marijuana			
Crash Year	Total Statewide Fatalities	Fatalities with Drivers Testing Positive for Cannabinoids*	Percent of Total Fatalities
2014	766	96	12.5%
2015	870	112	12.9%
2016	947	148	15.6%
2017	932	154	16.5%
2018	921	157	17.0%
2019	880	144	16.4%
2020	849	147	17.3%
*Cannabinoids: Delta 9, Hashish Oil, Hashish, Marijuana, Marinol, and THC.			

The percentage of total fatalities where a driver tested positive for cannabinoids has nearly doubled since North Dakota passed medical marijuana legislation, from 5.3 percent in 2016 to 10.0 percent in 2020.³⁸

Figure 15: North Dakota Traffic Deaths Related to Cannabinoids

North Dakota Traffic Deaths Related to Marijuana When a DRIVER Tested Positive for Marijuana			
Crash Year	Total Statewide Fatalities	Fatalities with Drivers Testing Positive for Cannabinoids*	Percent of Total Fatalities
2014	135	3	2.2%
2015	131	6	4.6%
2016	113	6	5.3%
2017	116	5	4.3%
2018	105	4	3.8%
2019	100	6	6.0%
2020	100	10	10.0%
*Currently the ND Crime Lab only screens urine samples for the presence of THC-COOH, the inactive metabolite of delta9-THC.			

Marijuana-Related Traffic Fatalities in Other Legalized States

Many other states with medical and/or recreational marijuana experienced an increase in traffic fatalities following legalization. In California, the number of drivers who tested positive for marijuana increased by 22 percent between 2005 and 2014.^{39,J} During the same time period, the number of fatalities involving a driver who tested positive for marijuana increased by 17 percent.³⁹ According to data from FARS, the number of fatalities involving a driver testing positive for marijuana in California increased by 34 percent between 2005 (n=273) and 2015 (n=366).^{40,J}

Since recreational marijuana was legalized in Colorado (2013), marijuana-related traffic deaths increased 138 percent, while overall Colorado traffic deaths increased by 29 percent between 2013 and 2020.⁴¹ Fatalities involving drivers who tested positive for marijuana rose from 55 in 2013 to 131 in 2020.⁴¹ There were 481 total traffic fatalities across the state in 2013. Eleven percent of those fatalities involved drivers who tested positive for marijuana. In 2020, total traffic fatalities rose to 622, with 20 percent of drivers testing positive for marijuana.⁴¹

Among impaired driving fatalities in Oregon, analysis of toxicology results between 2010 and 2015 show that an average of five percent of drivers involved in driving fatalities tested positive for THC.⁴² During the same period, only 38 percent of traffic fatalities underwent toxicology screening.⁴² Data from the Oregon State Police show that the total number of DRE investigations between 2014 and 2016 that resulted in a marijuana-impaired driving outcome increased by 66 percent.^{42,K}

Following passage of recreational marijuana in Washington State, the prevalence of drivers testing positive for THC significantly increased. The Washington State Traffic Safety Commission found that the number of deceased drivers testing positive for THC who were involved in a fatal crash increased from 7.8 percent in 2013 (pre-commercialization) to 12.8 percent in 2014 (post-commercialization).⁴³ A study from the AAA Foundation found that the proportion of Washington state drivers involved in a fatal crash is double the level from before marijuana commercialization, with an estimated 21 percent of all drivers involved in fatal crashes testing positive for THC.⁴⁴

^J The Midwest HIDTA was unable to obtain more recent FARS data from the California Office of Traffic Safety for the writing of this report.

^K All DRE examinations were validated by toxicological results; there were a total of 991 positive results by 2016.

According to driving under the influence (DUI) submissions to the Washington State Police Toxicology Lab, active THC was detected in 18 percent of driving cases in 2009.⁴³ In 2016, that number increased to more than 33 percent.⁴³

Chapter 6: Accessibility and Use

Introduction

As California, Colorado, Oregon, and Washington saw a proliferation of medical marijuana dispensaries, they also saw a corresponding increase in marijuana use among all ages, as well as a decrease in the perception of risk.^{39,45} This likely has and will continue to lead to increasing use, especially among youth ages 12 to 17.³⁹ While none of the three Midwest HIDTA region states with a legalized medical marijuana program reported adult or youth usage rates above the national average, this may be due to the short period of time in which these state dispensaries were operational. Using the western states as a predictive model, it is likely both youth and adult marijuana use will increase once the marijuana programs of Iowa, Missouri, and North Dakota mature.

Key Findings

- ❖ Seventy-five percent of states with a legalized recreational marijuana program and 57 percent of states with a legalized medical marijuana program moved up in the national ranking of past month marijuana usage by those ages 12 to 17 from 2017 to 2019.
- ❖ Past-month marijuana usage for youth ages 12 to 17 increased following legalization in Iowa and Missouri.
- ❖ Past-month marijuana usage for adults ages 18 and older increased following legalization in Missouri and North Dakota.
- ❖ The Iowa Youth Survey found the percentage of past-month marijuana use increased 7.5 percent between 2016 and 2018.Error! Bookmark not defined.
- ❖ The Missouri Student Survey found the percentage of past-month marijuana use increased 48 percent between 2018 and 2020.

State Estimates of Youth Marijuana Use

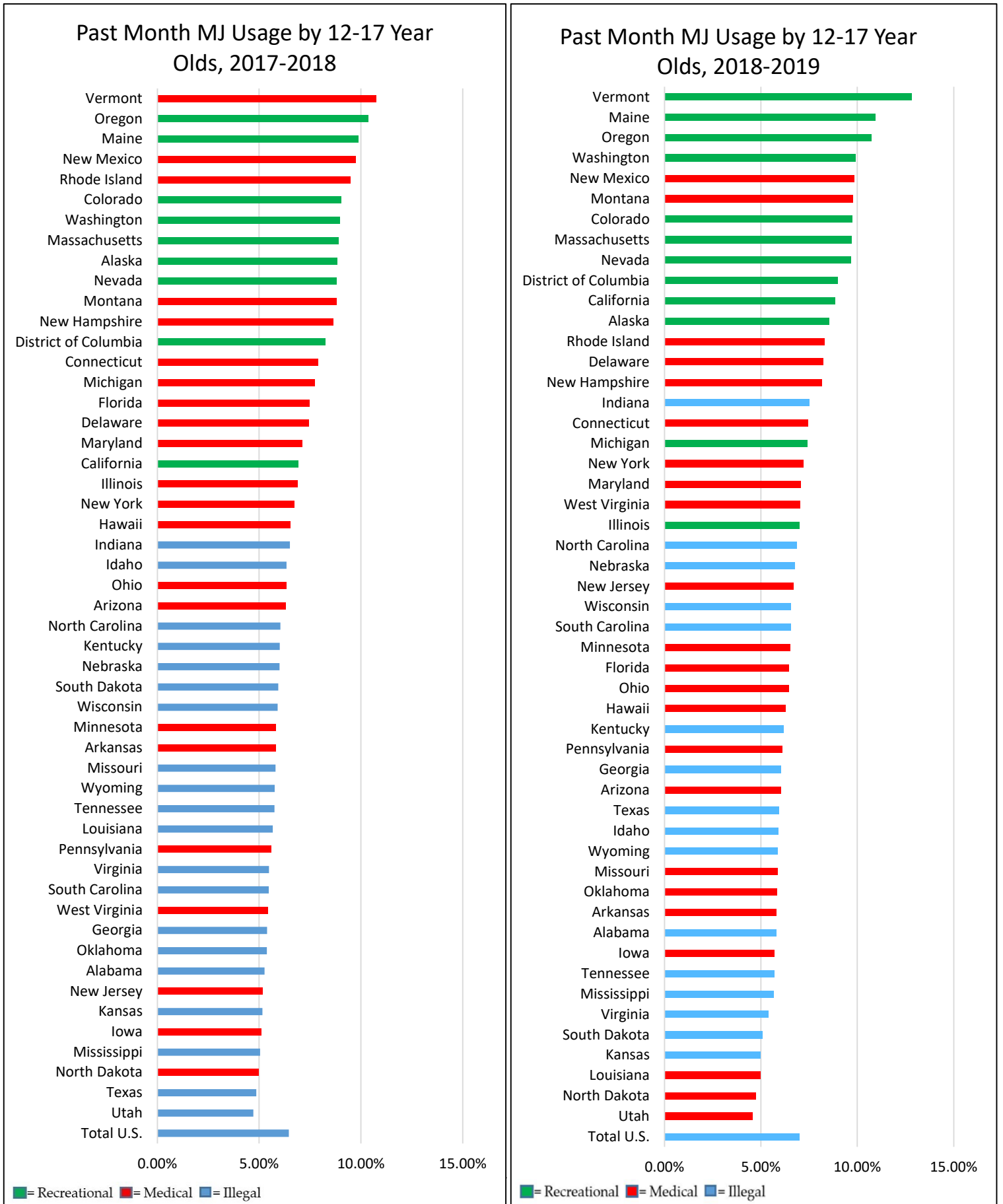
According to data from the Substance Abuse and Mental Health Services Administration's (SAMHSA) National Survey on Drug Use and Health (NSDUH), 75 percent of states with a legalized recreational marijuana program and 57 percent of states with a medical marijuana program (and no recreational marijuana program) moved up

in the national ranking of past month marijuana usage by those ages 12 to 17 from 2017 to 2019.^{46,47}

Regarding past month marijuana use among youth ages 12-17, 92 percent of states with a legalized recreational marijuana program reported usage above the national average.^{46,47} Of the states with a medical marijuana program and no recreational marijuana program, 39 percent reported usage above the national average.^{46,47} Figure 16 on the following page illustrates past month marijuana usage by 12-17 year olds for 2017-2018 and 2018-2019 NSDUH data.

According to the 2018-2019 NSDUH data, none of the three states within the Midwest HIDTA region with an operational medical marijuana program reported youth usage rates above the national average.^{46,47} While a definitive explanation for lower youth marijuana use in the three Midwest HIDTA states is unknown, it may be because dispensaries were not operational for the full period in which the surveys were administered. For example, Iowa's mCBD program began dispensing mCBD products in December 2018, while North Dakota's medical marijuana program began dispensing marijuana in early 2019. Missouri's first medical marijuana dispensaries opened in October 2020. While youth marijuana use for the three Midwest HIDTA region states was below national average, rates did increase in Iowa and Missouri following legalization. According to NSDUH data, past month youth marijuana use increased by 12 percent in Iowa and one percent in Missouri between 2017 and 2019.^{46,47}

Figure 16: Past-month Marijuana Usage by 12-17 Year Olds, 2017-2019



The following data examining youth substance use were gathered from the Iowa and Missouri state departments of health.^L These youth and student surveys are administered biennially to record risk behaviors of students in grades six to 12. The Iowa Youth Survey found the percentage of past-month marijuana use increased 7.5 percent (from 4.0 to 4.3 percent) between 2016 and 2018.⁴⁸ Between 2018 and 2020, the Missouri Student Survey found the percentage of lifetime marijuana use increased 21 percent (from 14 percent to 16.9 percent), while the percentage of past-month marijuana use increased 48 percent (from six percent to 8.9 percent).^{49,50} Of the group that reported smoking marijuana in the past month, the number reporting they used marijuana daily rose 38 percent between 2018 and 2020.⁵⁰

State Estimates of Adult Marijuana Use

According to data from the NSDUH, 83 percent of states with a legalized recreational marijuana program moved up in the national ranking of past month marijuana usage by adults ages 18 and older from 2017 to 2019.^{46,47} In comparison, 91 percent of states with a medical marijuana program and no recreational marijuana program moved up in the national ranking of past month marijuana usage by adults ages 18 and older from 2017 to 2019.^{46,47}

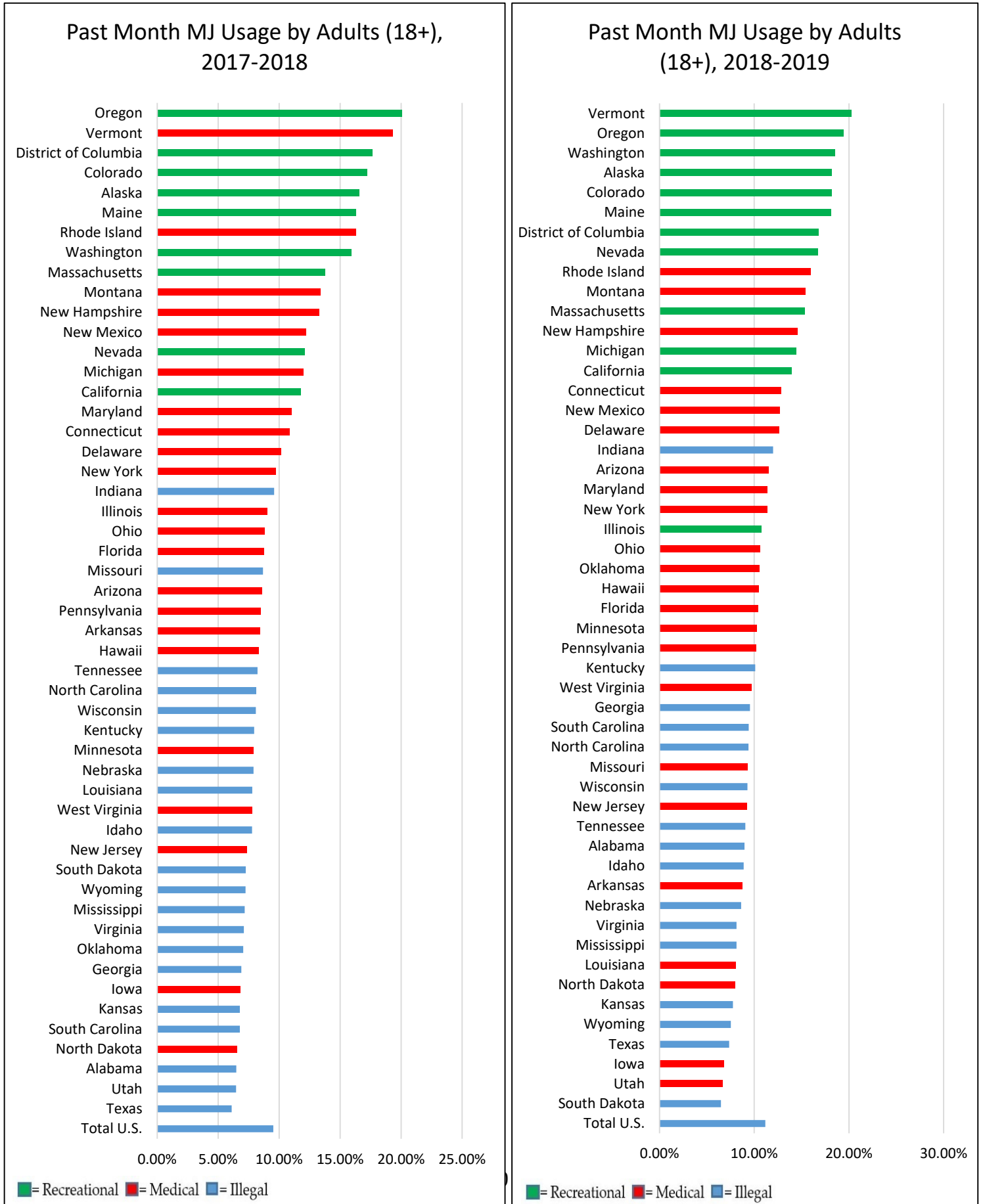
Regarding past month marijuana use among adults ages 18 and older, 92 percent of states with a legalized recreational marijuana program reported usage above the national average.^{46,47} Of the states with a medical marijuana program and no recreational marijuana program, 41 percent reported usage above the national average.^{46,47} Figure 17 on the following page illustrates past month marijuana usage by adults ages 18 and older for 2017-2018 and 2018-2019 NSDUH data.

According to the 2018-2019 NSDUH data, none of the three states within the Midwest HIDTA region with an operational medical marijuana program reported adult usage rates above the national average.^{46,47} While a definitive explanation for lower adult marijuana use in the three Midwest HIDTA states is unknown, it may be because dispensaries were not operational for the full period in which the surveys were administered. While adult marijuana use for the three Midwest HIDTA region states was below national average, rates did increase in Missouri and North Dakota following

^L The North Dakota Youth Behavior Risk Survey results were not included in this comparison as it did not share the same question format as that of Iowa or Missouri. As a result, the data was incomparable.

legalization. According to NSDUH data, past month youth marijuana use increased by seven percent in Missouri and 21 percent in North Dakota between 2017 and 2019.^{46,47}

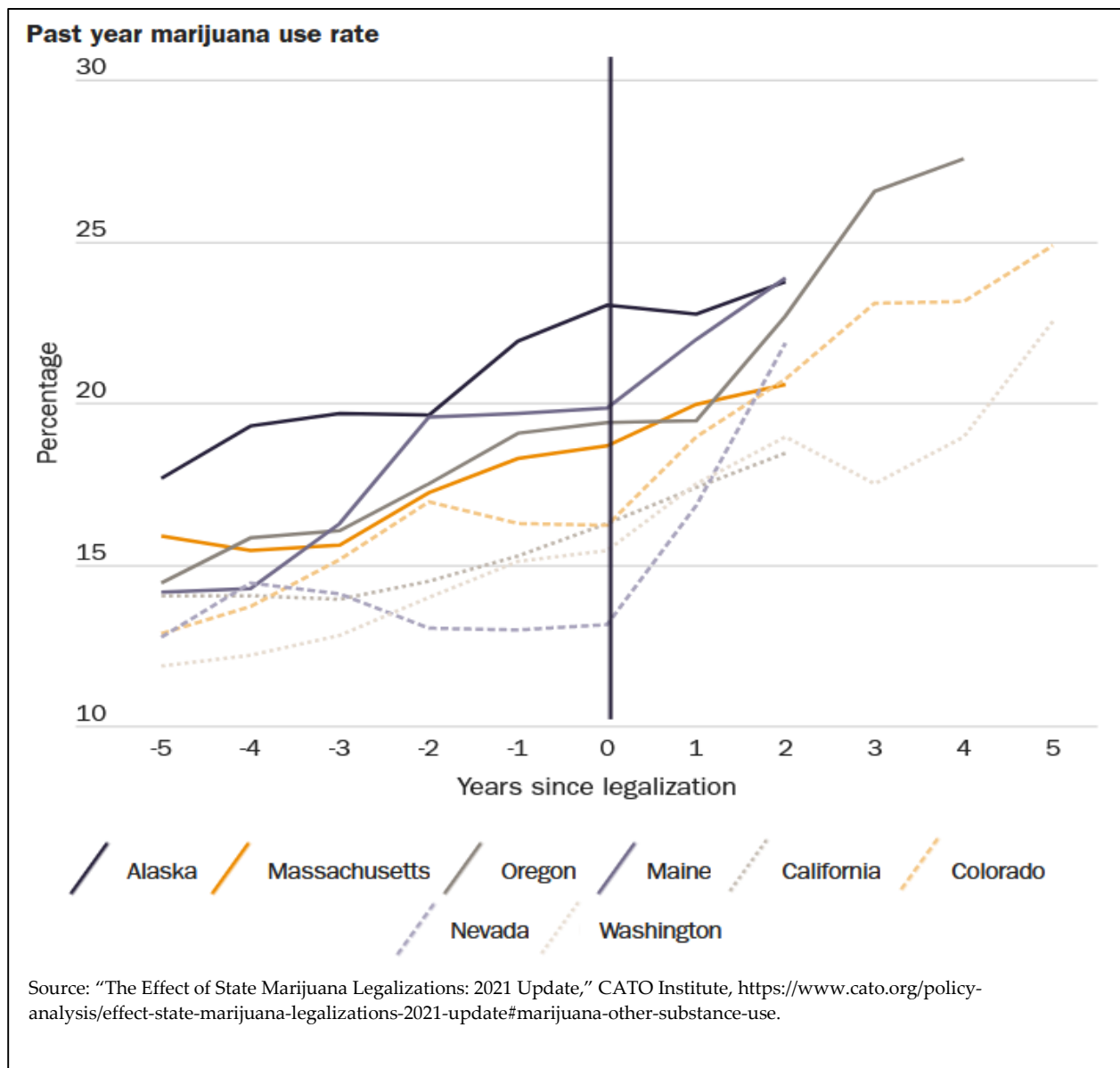
Figure 17: Past-month Marijuana Usage by Adults (18+), 2017-2019



Data on Past-Year Marijuana Use by Those Ages 12+

Marijuana dispensaries are a relatively new occurrence in the Midwest HIDTA region. Because of this, the impact of marijuana legalization on the region’s usage may not be accurately captured by the NSDUH data. To better illustrate the relationship between marijuana legalization and increased use, Figure 18 displays the prevalence of marijuana use in eight states—which have the longest records of legalized data—before and after legalization.⁵¹ The vertical line in graph below represents the year each state legalized marijuana. While use in many states modestly increased in the years leading up to legalization, the data show a significant increase in use post-legalization.

Figure 18: Past-year Marijuana Use Rate Among Those Ages 12+



Chapter 7: Impacts to Health

Introduction

Following passage of medical and/or recreational marijuana, many states experienced an increased incidence of marijuana-related illnesses observed by their emergency departments. For example, Colorado saw an increased number of marijuana-related admissions to its emergency department.^{52,53} This increased even more dramatically following recreational marijuana legalization.

Key Findings

- ❖ Marijuana-related emergency department visits increased in Iowa, Missouri, and North Dakota following the legalization of medical marijuana.
- ❖ Marijuana-related hospitalizations increased in Missouri and North Dakota following the legalization of medical marijuana.
- ❖ Marijuana-related exposure calls to state poison centers increased in Iowa, Missouri, and North Dakota following medical marijuana legalization.
- ❖ Frequent marijuana use is associated with several adverse health effects, including brain development, anxiety, depression, psychosis, schizophrenia and suicide.
- ❖ Despite claims otherwise, marijuana legalization does not lower rates of opioid overdose mortality.
- ❖ Marijuana use in adolescence and young adulthood increases the likelihood of abusing other illicit drugs later in life.

Emergency Department Visits

The prevalence of marijuana use is further demonstrated by the hospitalizations and emergency department visits (ED) in Iowa, Missouri, and North Dakota. While data going back to 2014—the year Iowa adopted an mCBD program—is not available, Iowa marijuana-related emergency department visits have increased 50 percent since 2016 and seven percent since mCBD facilitates opened in 2018.^M The number of marijuana-related hospitalizations has remained relatively steady since 2016.

^M Due to adoption of the ICD-10 coding system in 2016, the data for cannabis-related ED visits and hospitalizations is only available from 2016 and forward. Previous ICD versions are not comparable to ICD-10.

Figure 19: Iowa Cannabis-Related ED Visits and Hospitalizations

Iowa Department of Public Health Division of Behavioral Health						
Cannabis-Related Emergency Department Visits and Hospitalizations, Iowa, 2016-2020						
Type	Indicator	2016	2017	2018	2019	2020
ED Visits	Cannabis Poisonings	106	103	149	151	159
Hospitalizations	Cannabis Poisonings	71	70	67	61	67

Source: Iowa Department of Public Health, Division of Behavioral Health, Bureau of Substance Abuse, 2016-2020 Inpatient and outpatient data. Des Moines: Iowa Dept. of Public Health, [2021].

Following medical marijuana legalization in Missouri, hospitals observed an increase in both initial and repeat emergency department visits and hospitalizations for marijuana complications.⁵⁴ The number of marijuana-related ED visits in Missouri decreased by seven percent between 2016 and 2020, although the data for 2020 is provisional. Since legalizing medical marijuana in 2018, the number of ED visits rose by 72 percent. Marijuana-related hospitalizations have increased 24 percent since 2016 and two percent since 2018.

Figure 20: Missouri Cannabis-Related ED Visits and Hospitalizations

Missouri Department of Health & Senior Services						
Cannabis-Related Emergency Department Visits and Hospitalizations, Missouri 2016-2020						
Type	Indicator	2016	2017	2018	2019	2020 (Provisional)
ED Visits	Cannabis Poisonings	321	173	174	257	300
Hospitalizations	Cannabis Poisonings	203	211	246	301	252

Source: Missouri Patient Abstract System, Missouri Dept. of Health & Senior Services, [2021].

Since passing medical marijuana in 2016, North Dakota witnessed an elevenfold increase in marijuana-related emergency department visits. During that same time, marijuana-related hospitalizations increased from zero in 2016 to five in 2020. Since sales of medical marijuana began in 2019, marijuana-related emergency department visits increased 92 percent, while hospitalizations increased 400 percent.

Figure 21: North Dakota Cannabis-Related ED Visits and Hospitalizations

North Dakota Department of Health						
Cannabis-Related Emergency Department Visits and Hospitalizations, North Dakota 2016-2020						
Type	Indicator	2016	2017	2018	2019	2020
ED Visits	Cannabis Poisonings	2	8	10	12	23
Hospitalizations	Cannabis Poisonings	0	1	1	1	5

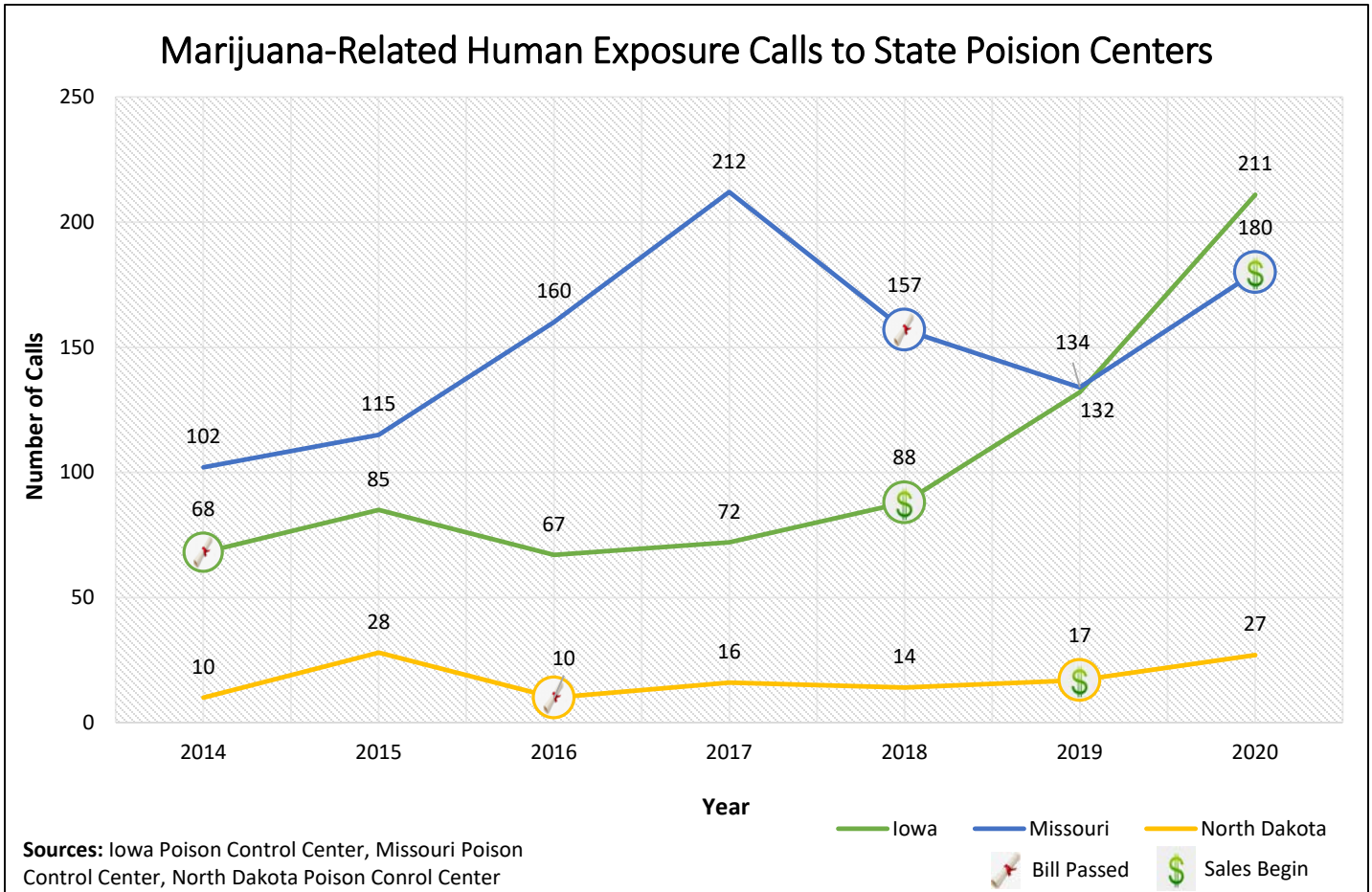
Source: North Dakota Department of Health, Division of Disease Control, Respiratory & Syndromic Surveillance, [2021].

Poison Center Calls

According to data collected from the poison centers of Iowa, Missouri, and North Dakota, marijuana-related exposure calls to state poison centers increased for each state following medical marijuana legalization.^N In Iowa, these calls increased 210 percent between 2014 and 2020.⁵⁵ In Missouri, these calls increased 15 percent between 2018 and 2020.⁵⁶ In North Dakota, these calls increased 170 percent between 2016 and 2020.⁵⁷ Additionally, calls to each state's respective poison center increased after sales of medical marijuana began. In Iowa, these calls increased 140 percent between 2018 and 2020.⁵⁵ In North Dakota, these calls increased by 59 percent between 2019 and 2020.⁵⁷ This percentage cannot yet be calculated for Missouri as dispensaries did not open until 2020.

^N See Figure 22 for the dates when medical marijuana legislation passed and sales commenced.

Figure 22: Marijuana-Related Calls to State Poison Centers, 2014 - 2020



Adverse Health Effects of Marijuana

THC, the primary psychoactive component in marijuana, causes a variety of mental and physiological health problems. The addictive properties of THC exacerbate its potential harms and may result in marijuana users developing substance use disorders, mental illness, and experiencing impaired cognitive development and function.

Addiction

Despite heated arguments concerning the addictiveness of marijuana, research clearly states that long-term marijuana use can lead to addiction.⁵⁸ In fact, approximately

nine percent of individuals who experiment with marijuana become addicted.^{59,O} This number increases to approximately 17 percent for those who begin using marijuana as teenagers and increases to between 25 and 50 percent for those who use marijuana daily.⁶⁰ Frequent marijuana use by adolescents predicts an increased risk of marijuana addiction, which predicts a greater risk of the use of other illicit drugs.⁶¹

While the debate over whether marijuana use leads to the abuse of other drugs is not new, there is a substantial body of evidence supporting the idea that adolescent marijuana use leads to the abuse of other illicit drugs. In 2017, researchers from the University of Bristol interviewed more than 5,000 teenagers between the ages of 13 and 18 to determine their level of marijuana use over a period of five years.⁶² Once the teenagers reached age 21, they were asked whether they had taken illicit drugs other than marijuana in the months prior to their final interview. After taking other influential factors into account, the study determined that adolescents who regularly used marijuana were 26 times more likely to use other illicit drugs.⁶²

Preclinical and epidemiologic data propose that adolescent marijuana use may influence multiple addictive behaviors in adulthood.⁵⁸ When researchers exposed rats to cannabinoids in adolescence, they found a decreased reactivity of the rodents' dopamine neurons that control the brain's reward regions.^{63,P} Reduced dopamine reactivity in these regions of the brain may explain the increased susceptibility to substance abuse and addiction to other drugs later in life, which many epidemiological studies have reported.⁶⁴

High resolution magnetic resonance imaging scans on the brains of young marijuana users showed abnormalities in the sections of the brain considered to be the reward center (i.e. nucleus accumbens and amygdala).⁶⁵ These abnormalities in the brain's reward center are consistent with findings from other studies which indicate addiction and compulsive drug-seeking behavior.^{66,67}

^O The use of the term "addiction" in this report is defined by the criteria for dependence in the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV).

^P This study used rats rather than human volunteers due to ethical research guidelines. Mice and rats are standard subjects in similar fields of research.

Brain Development, School Performance, and Lifetime Achievement

The human brain continues to develop until an individual reaches their mid-20s.⁶⁸ During the developmental phase, the human brain is significantly more vulnerable to the adverse effects of drugs than one that has reached maturity. Adults who regularly smoked marijuana during adolescence—a crucial brain development phase—have impaired neural connectivity in several brain regions compared to adults who did not.⁵⁸ Results from a 38-year study published in 2012 found that participants with ongoing marijuana dependence experienced a greater decline in intelligence quotient (IQ) points.⁶⁹ In comparison, participants who never used marijuana experienced a slight increase in IQ.⁶⁹

Marijuana use impairs important cognitive functions during intoxication and for days after use.⁷⁰ Students who consume marijuana may operate at a cognitive level below their natural capability for significant periods of time, depending on their frequency of use. Failure to learn in school interferes with a student's ability to achieve educational goals, which may explain the connection between regular marijuana use and low grades.⁷¹ Heavy marijuana use has been linked to several negative factors later in life, including lower income, unemployment, higher need for socioeconomic assistance, criminal behavior, and lower satisfaction with life.⁷²

Relation to Mental Illness

Many marijuana users justify their use as a treatment for mental illness, yet there is an absence of high quality evidence supporting these claims.⁷³ In actuality, marijuana use is correlated with the development or worsening of several mental health issues, including anxiety, depression, psychosis, schizophrenia, and suicidal ideation.⁷⁴ One study that examined how marijuana use affects mental health conditions found that frequent marijuana use was positively significantly associated with a variety of negative mental health symptoms.⁷⁵ According to the study findings, more frequent marijuana use was significantly associated with more psychosis, depression, and anxiety symptoms for individuals ages 18 to 64.⁷⁵ Additionally, cannabis use disorder (CUD) was associated with increased psychosis symptoms for those ages 18 to 64, increased depression symptoms for those ages 18 to 61, and increased anxiety symptoms for those ages 18 to 61.⁷⁵

Marijuana is commonly marketed as a solution for anxiety, although evidence for this is scant. Many studies that have attempted to examine this relationship have found that more research is needed before such a claim can be made.^{76,77} One study of female adolescents found that daily marijuana use was associated with a fivefold increase in the likelihood of reporting a state of anxiety or depression.⁷⁸ The researchers also found that weekly or greater marijuana use of adolescents predicted a twofold increase in the risk of anxiety or depression later in life.⁷⁸

Multiple studies have revealed that using marijuana in adolescence significantly increases the risk of developing a psychotic disorder.^{79,80} Marijuana's association with psychosis appears to be dose-dependent, with the risk of psychosis increasing with more frequent use.^{79,81} Risk of psychosis is also correlated with potency, with the consumption of more potent marijuana increasing one's risk of experiencing psychosis.^{79,82} Those with underlying mental illnesses or who are genetically predisposed to mental illnesses (e.g. schizophrenia) are particularly at risk of experiencing a psychotic episode while using marijuana.⁸³

A link between schizophrenia—a mental illness characterized by continuous or relapsing episodes of psychosis— and regular marijuana use has existed for decades. In moderate to severe cases, schizophrenia is associated with violent behavior and violent offending.⁸⁴ Just as studies determined the link between cigarette users and lung cancer, similar studies found that heavy marijuana use increases the chance of developing schizophrenia compared to non-users.^{85,86,87} This is especially true among adolescents who use marijuana.⁸⁶ Many of these studies report a dose-response relationship where more frequent and/or higher potency marijuana use increases the chance of developing a schizophrenic disorder.

Numerous studies have documented a connection between marijuana and suicidality. Unsurprisingly, this connection is especially apparent in youth. A large, longitudinal study of more than 2,000 adolescents found that those who used marijuana daily before age 17 had substantially higher odds of attempting suicide.⁸⁸ A meta-analysis of 11 studies comprising more than 23,000 individuals found that the odds of experiencing suicidal ideation and attempting suicide were significantly greater for marijuana users in young adulthood.⁸⁹ In Colorado—a state with one of the most expansive recreational and medical marijuana markets—THC is the most frequent drug found in toxicology results of teens that committed suicide.⁹⁰

Marijuana Laws and Other Drug Overdose Rates

Proponents of marijuana legalization often tout medical marijuana as the key instrument in solving the opioid overdose crisis.⁹¹ This claim relies upon a single study funded by the National Institute on Drug Abuse which was published in 2014.⁹² The study found that states with medical marijuana laws had a 25 percent lower annual opioid overdose mortality rate between 1999 and 2010 than states without medical marijuana laws.⁹² When the analysis was extended through 2017, however, not only did the findings did not hold up to the new period, but the association between state medical marijuana laws and opioid mortality rates reversed.^{93,94} The updated findings indicated that states with medical marijuana laws experienced a 23 percent higher opioid overdose death rate than states without medical marijuana laws.^{92,93} Ultimately, the study originally used to link marijuana legalization to lower rates of opioid overdose mortality proved false.

Chapter 8: Environmental Impacts & Concerns

Introduction

The environmental impact of marijuana cultivation is startlingly high, particularly in terms of energy consumption, pesticide use, water diversion, and air pollution. Virtually every stage of the marijuana lifecycle is an energy-intensive process. Not only does its cultivation require a substantial amount of electricity and water, it also contributes to greenhouse gas emissions and the destruction of natural habitats. Careful consideration of the data concerning the impact of marijuana on the environment shows that one cannot be both a proponent of marijuana commercialization and also environmentally conscious.

Key Points

- ❖ The marijuana industry accounted for approximately one percent of all electricity used in the U.S. in 2016.
- ❖ The cultivation and processing of marijuana emits volatile gases that contribute to ground-level air pollution.
- ❖ Water diversion, wildlife poisoning, and the destruction of habitats are common characteristics of illegal outdoor marijuana growing operations.

Energy Usage

The marijuana industry is one of the most energy-intensive in the U.S., accounting for about one percent of all electricity used in the U.S. in 2016.⁹⁵ Some states, such as Illinois, included energy efficiency requirements in their marijuana legalization bill that mandate the use of energy efficient cultivation equipment (HVAC systems, lighting, etc.) and require the submission of energy reports to ensure compliance. As of May 2021, the marijuana programs of Iowa, Missouri, North Dakota, and South Dakota do not have any regulation in place governing the amount of energy a marijuana cultivation facility may consume. The Northwest Power and Conservation Council (NPCC) claims that regional annual demand from marijuana cultivators in Oregon and Washington alone may reach 300 megawatts by 2035.^{96,97} For a conventional coal plant, 300 megawatts can provide enough electricity to power 120,000 to 270,000 American homes in a year, depending on the region.⁹⁸ The NPCC also states that marijuana cultivators typically use between 2,000

and 3,000 kilowatt hours per pound of product.⁹⁶ This is equivalent to running a standard window air conditioning unit continuously for 90 days.⁹⁹

Indoor Marijuana Cultivation

A considerable portion of legal marijuana is cultivated indoors. Indoor marijuana production requires a significant amount of electricity and other resources to ensure a profitable harvest. A byproduct of marijuana cultivation is the emission of highly reactive volatile organic compounds (VOCs).¹⁰⁰ VOCs react with nitrogen oxides in the atmosphere to form ground-level ozone, an environmental pollutant also known as smog.¹⁰¹ Marijuana-infused product facilities also emit VOCs from solvent extraction processes.¹⁰⁰

According to a study from Colorado State University examining the effects of indoor cannabis production on greenhouse gas emissions, marijuana grown indoors produces between 2,283 and 5,184 kilograms of carbon dioxide (CO₂) per kilogram of dried flower.¹⁰² This variance is dependent upon the region of the U.S. where the marijuana is grown. Put another way, growing one ounce of marijuana generates as much carbon as burning seven to 16 gallons of gasoline.¹⁰³ Greenhouse gas emissions from indoor marijuana cultivation are largely due to power consumption from indoor climate controls, high-intensity discharge grow lights, and supplemental CO₂ for accelerated plant growth.¹⁰² In Colorado, a state with one of the longest-running marijuana programs, state officials are very much aware of the energy usage marijuana production requires. According to Denver's Department of Public Health and Environment, marijuana cultivation uses nearly four percent of the city's supply of electricity.¹⁰⁴

Outdoor Marijuana Cultivation

Outdoor marijuana cultivation, especially on public lands, causes substantial environmental damage. This practice also poses significant environmental concerns for law enforcement and other public agencies that come across illegal marijuana cultivation sites. Illicit marijuana growers frequently contaminate and alter watersheds; divert natural waterways; clear-cut native foliage; poach wildlife; create wildfire hazards; and pollute the surrounding environment with garbage, human waste, and non-biodegradable materials.¹⁰⁵

Marijuana cultivation is both water- and nutrient-intensive.¹⁰⁶ While outdoor marijuana cultivation requires less electricity than indoor cultivation because of a lesser need for lights and environmental controls, this method has its own set of environmental concerns. The clearing of habitats, water diversions, and wildlife poisoning are common at outdoor cultivation sites. Negative effects on the environment often extend far beyond the cultivation site itself.¹⁰⁷

The illegal diversion of water from streams and rivers is commonplace at illegal outdoor marijuana grow sites. These crops are typically irrigated with water taken directly from streams and springs.¹⁰⁷ Illegally constructed water diversions significantly reduce stream flow from the diverted water bodies and threaten the survival of fish, amphibians, and other animals.¹⁰⁷

An average marijuana plant uses approximately six gallons of water per day.^{108,109} According to Dr. Mourad Gabriel— a prominent researcher in the field of the environmental impact of illicit marijuana grows and former co-director of the Integral Ecology Research Center— illegal marijuana grows use 50 percent more water than legal grows.¹⁰⁸ This is primarily because illegal grow sites use less efficient irrigation systems and add to existing environmental stressors like pests.¹⁰⁸ One study by the California Department of Fish and Wildlife estimated that trespass marijuana grows used about 300 million gallons of water per square mile, roughly the same as almond orchards.¹⁰⁸ By Dr. Gabriel's estimates, the 1.1 million illegal marijuana plants removed in California in 2016 would have used approximately 1.3 billion gallons of water—about the same as 10,000 average California households do in a year.¹⁰⁸



Irrigation lines removed from an illegal marijuana grow site.

Source: <https://tinyurl.com/3ed75883>

Marijuana cultivation sites often use substantial quantities of pesticides and rodenticides to prevent wildlife from damaging marijuana plants and irrigation lines.¹⁰⁹ The various pesticides and rodenticides found at illegal marijuana grow sites impact many different types of wildlife in the surrounding area. Carnivores and scavengers are at increased risk of poisoning, as these chemicals are easily incorporated into an ecosystem's food web, which can result in secondary and tertiary exposures and poisonings.¹¹⁰ Many of these chemicals are so toxic to insects, birds, and mammals that the U.S. and European Union banned their use long ago.



A common rodenticide discovered at an illegal outdoor marijuana grow site.

Source: <https://tinyurl.com/3v87dnx7>

Chapter 9: Regulatory Overview

Introduction

This chapter will provide an overview of the regulations discussed in each of the Midwest HIDTA states' medical marijuana programs. These include purchase and possession limits; cultivation limitations; and restrictions on the packaging, labeling, and marketing of marijuana and marijuana products. As South Dakota's medical marijuana program is still pending, it may be excluded from one or more sections.

Key Findings

- ❖ Possession limitations
 - Iowa: 32 fluid ounces (907.1 grams) of mCBD.
 - Missouri: 8 ounces of dried flower for those not authorized to cultivate, 12 ounces dried flower for those authorized to cultivate.
 - North Dakota: 3 ounces of dried flower for standard patients, 7.5 ounces of dried flower for those authorized to cultivate.
 - South Dakota: Once operational, individuals will be able to possess up to three ounces of dried marijuana flower.
- ❖ All states require qualifying patients to carry a medical marijuana identification card.
- ❖ All states require marijuana businesses to implement inventory tracking systems.
- ❖ Each state has its own regulations governing the advertising, packaging, and labeling of marijuana and marijuana products.
- ❖ Average Potency (Δ -9-THC)
 - Iowa
 - Tincture: 2.88%
 - Tablet: 9.2%
 - Vape Cartridge: 240 mg/cartridge
 - Missouri
 - Flower: 19.40%
 - Concentrate: 68.17%
 - North Dakota
 - Flower: 16.42%
 - Concentrate: 72.41%

Possession

Iowa

Individuals who are eligible under Iowa's mCBD program may only possess the following approved marijuana products: creams, lotions, tablets, tinctures, and vaporizer cartridges.¹¹¹ Marijuana flowers, edibles, and concentrate products (excluding vape cartridges) are illegal. Personal cultivation of marijuana is also prohibited.

Qualifying individuals may possess no more than 32 fluid ounces (907.1 grams) of mCBD at any time.¹¹¹ An mCBD dispensary cannot dispense more than 25 grams of THC to a patient or qualified caregiver within a 90-day period.¹¹¹ Registered caregivers may possess up to this same amount per patient they service.

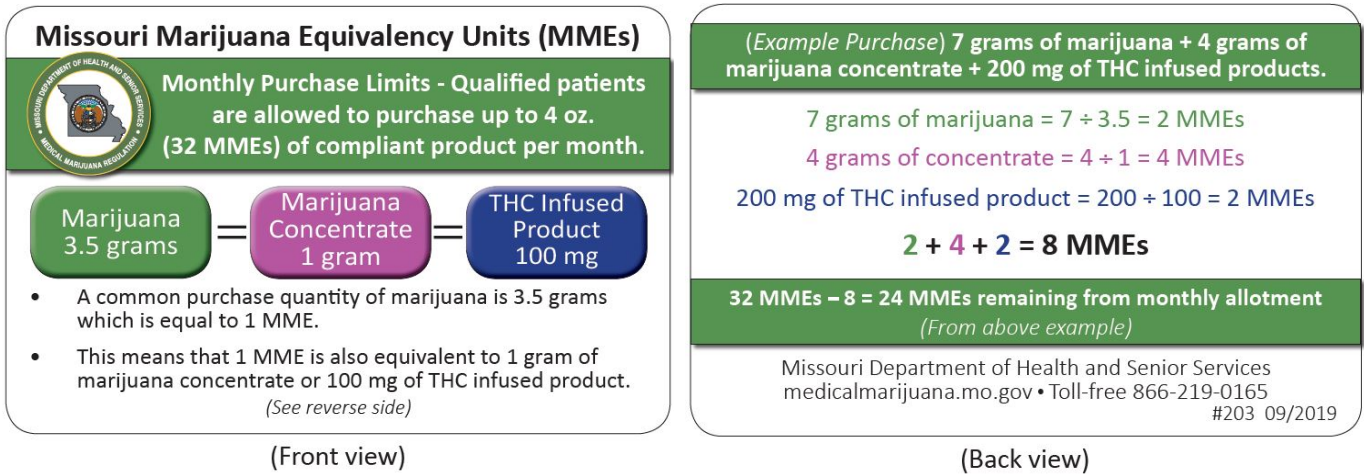
Missouri

Qualified individuals who do not cultivate marijuana may possess up to a 60-day supply, or eight ounces, of dried marijuana or its equivalent.^Q Qualified individuals who cultivate marijuana may possess up to a 90-day supply—or 12 ounces—of dried marijuana or its equivalent as long as the marijuana remains on the property under the patient's control. Individuals who are authorized to cultivate marijuana may grow up to six plants. Qualified individuals may purchase up to four ounces of dried marijuana or its equivalent in a 30-day period.

According to the Missouri DHSS, a common purchase quantity of dried marijuana is 3.5 grams. The Missouri DHSS considers this as one Missouri Marijuana Equivalency Unit (MME). Figure 23 below is provided by the DHSS to illustrate MMEs.

^Q Dried, unprocessed marijuana or its equivalent means the marijuana flower after it has been cured and trimmed. Four ounces of dried, unprocessed marijuana is equivalent to 32 grams of marijuana concentrate or 3,200 milligrams of THC infused product.

Figure 23: Missouri Marijuana Equivalency Units Card



North Dakota

The maximum purchase amounts for a qualifying individual within a 30-day period is 2.5 ounces of dried marijuana flower and a cumulative total of 4,000mg of THC from other marijuana products. A qualifying individual may not possess more than three ounces of dried marijuana flower at any given time.

If a qualifying individual is authorized to possess an enhanced amount of marijuana, they may not purchase more than six ounces of dried marijuana flower within a 30-day period. Individuals authorized to possess enhanced amounts of marijuana may not possess more than 7.5 ounces of dried marijuana flower at any given time. Home cultivation of marijuana plants is illegal.

South Dakota

While South Dakota’s medical marijuana program is not yet operational, qualifying individuals may possess up to three ounces of dried marijuana flower. There are no additional limitations governing the amount of high-potency marijuana/marijuana products that individuals may possess. Individuals authorized by both their practitioner and the Department of Health to cultivate marijuana may possess up to three marijuana plants and the marijuana produced by those plants. Purchasing limits have not yet been set.

Licensing

Iowa

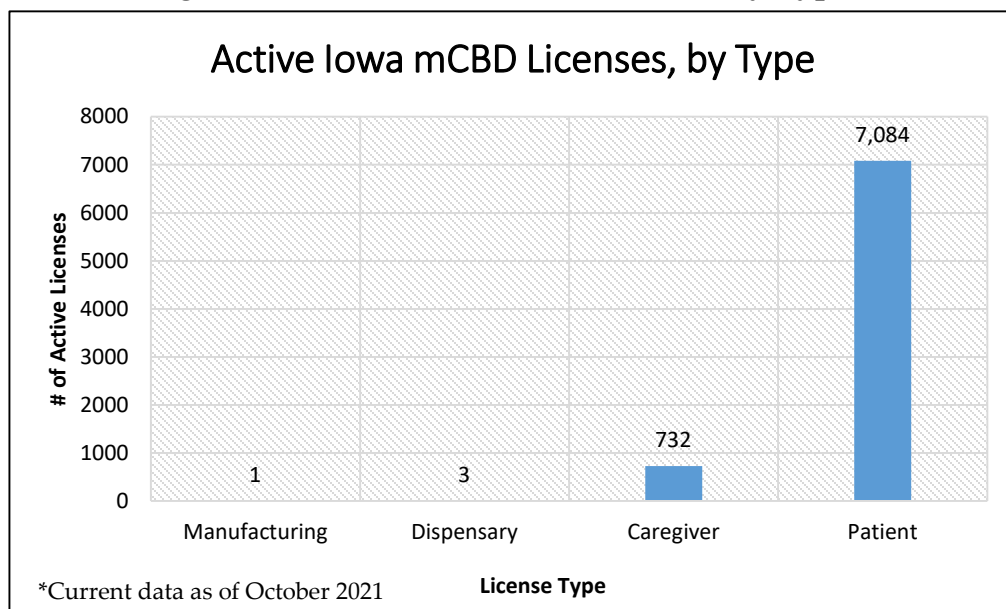
Manufacturer Location Requirements

- All of a manufacturer’s operations must take place in a secured manufacturing facility location at a physical address provided to the department during the licensure and application processes.
- A manufacturer may not operate a manufacturing facility at the same physical location as an mCBD dispensary.
- A manufacturer may not operate a manufacturing facility in any location, whether for manufacturing, possessing, cultivating, harvesting, transporting, packaging, processing, storing, or supplying within 1,000 feet of a public or private school existing before the date of the manufacturer’s licensure.

Dispensary Location Requirements

- All dispensing of mCBD must take place in an enclosed facility at a physical address provided to the department.
- A dispensary may not operate at the same physical location as a manufacturer.
- A dispensary may not operate in any location within 1,000 feet of a public or private school existing before the date of the dispensary’s licensure by the department.

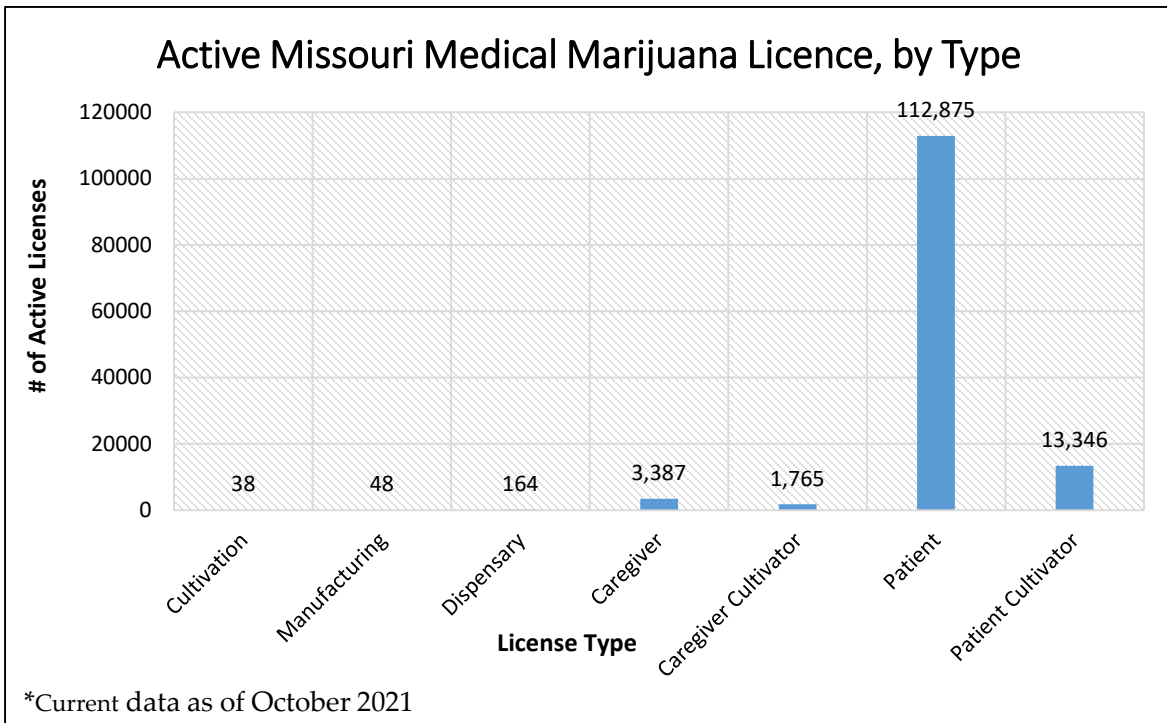
Figure 24: Active Iowa mCBD Licenses, by Type



Missouri

The location requirements for Missouri marijuana businesses do not differentiate between dispensaries, cultivators, or manufacturers. Marijuana business entities must not reside within 1,000 feet of an existing elementary or secondary school, daycare, or church. If a local government allows for closer proximity to these facilities, the business must comply with the local government’s requirements.

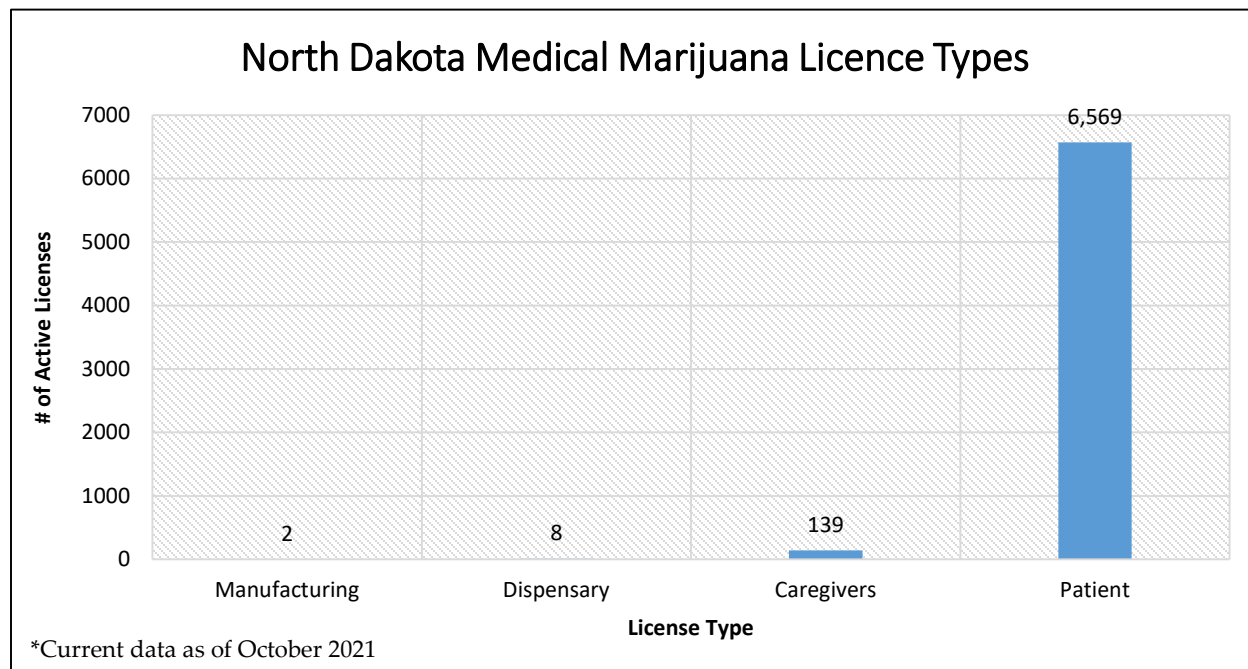
Figure 25: Active Missouri Medical Marijuana Licenses, by Type



North Dakota

Similar to Missouri, the location requirements for North Dakota marijuana businesses do not differentiate between dispensaries or manufacturers. Both manufacturing facilities and dispensaries must be at least 1,000 feet from the property line of a pre-existing public or private school.

Figure 26: Active North Dakota Medical Marijuana Licenses, by Type



Medical Marijuana Recognition Cards

The three states within the Midwest HIDTA region with active medical marijuana programs—Iowa, Missouri, and North Dakota—issue identification cards for individuals authorized to consume marijuana by their respective state departments. Information unique to the authorized individual is printed on the card. This includes the patient’s name, date of birth, registration number, expiration date, and certain program authorizations unique to that individual (e.g. number of plants they may cultivate).

The IDPH issues qualifying individuals a registration card, as seen in Figure 27. A patient’s mCBD registration card expires one year from the time it is issued by the IDPH. Rather than issuing physical marijuana registration cards, the Missouri DHSS requires that registered patients print off an official card to prove they are qualified patients. An example of this form is depicted in Figure 28. The Missouri DHSS requires marijuana patient cards to be renewed on an annual basis. The North Dakota DPH also requires patients to register for a medical marijuana patient identification card, which can either be a physical or electronic card. As with other state marijuana identification cards, North Dakota DPH requires marijuana patient cards to be renewed on an annual basis.

Figure 27: Iowa Patient Registration Card (Front & Back)

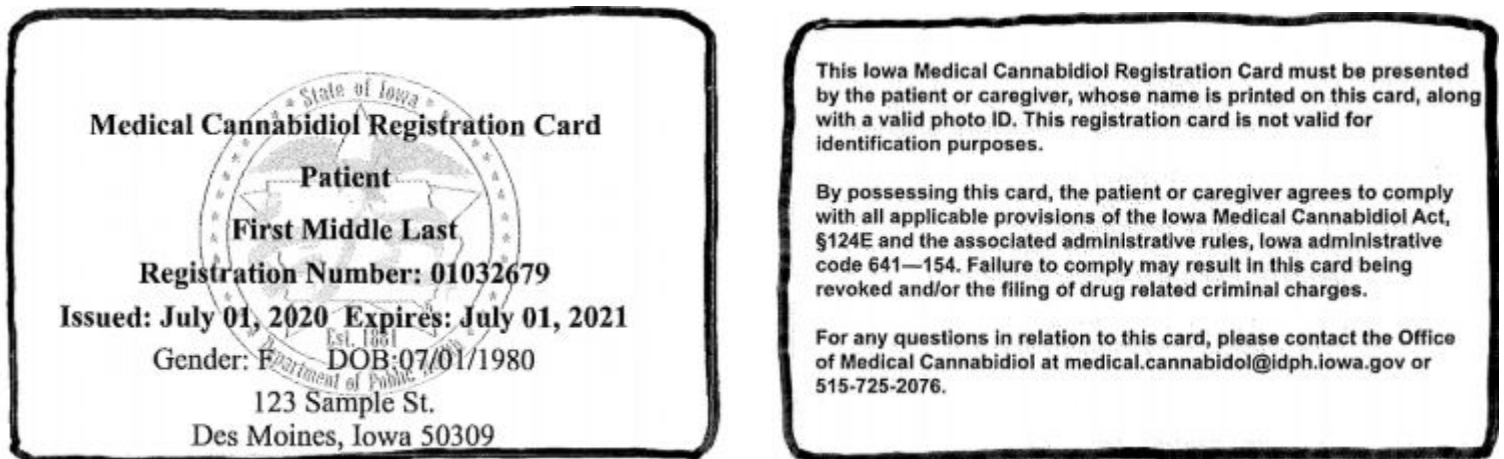


Figure 28: Missouri Patient Registration Card

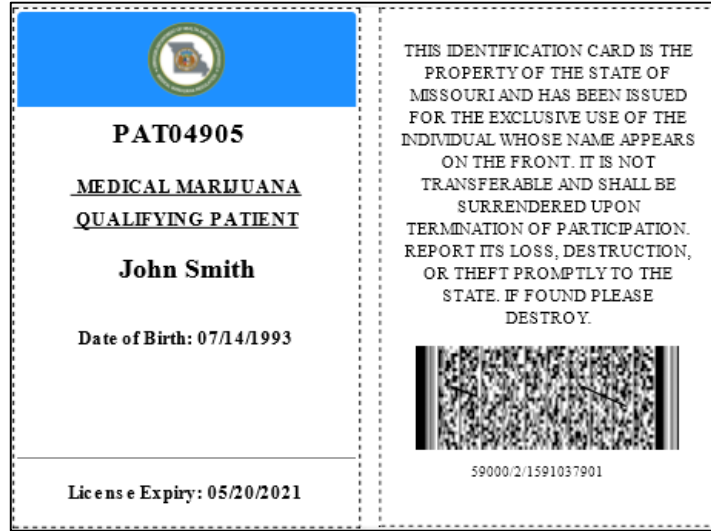


Figure 29: North Dakota Registration Card (Front & Back)



Traceability

Iowa

Iowa's mCBD program states that manufacturers and dispensaries must establish and implement an mCBD inventory and delivery tracking system to track mCBD from production by a licensed manufacturer through dispensing at an mCBD dispensary.¹¹² This system is also referred to as a seed-to-sale tracking system by the IDPH. The manufacturer must also maintain a constant record of the quantity and form of the mCBD, the number of plants being grown at the facility, and the names of the employees maintaining the inventory.¹¹³ The IDPH utilizes the OstriJ inventory tracking system for all mCBD-related information.

Missouri

Under Missouri's medical marijuana program, licensed dispensaries are required to maintain an operational seed-to-sale tracking system that is integrated into the statewide track and trace system.¹¹⁴ The Missouri Office of Administration awarded METRC as the vendor that will oversee the state's tracking system. METRC is used by 14 other states and Washington D.C. as an inventory management system.

North Dakota

North Dakota's medical marijuana program requires dispensaries to keep detailed financial reports of proceeds and expenses and that they must maintain all inventory, sales, and financial records in accordance with generally accepted accounting principles. The NDDH selected BioTrackTHC as the inventory control vendor and requires all dispensaries to maintain records within it.

Potency

Iowa

Prior to the passage of Iowa Senate File 2363 (SF 2363) in June 2020, Iowa's program only authorized mCBD products containing no more than three percent THC for non-smoking use. The passage of SF 2363 removed the restrictions on the amount of THC a product may contain in Iowa and allowed the use of vaporizable products.¹¹⁵ SF 2363 also added a restriction that limits the amount of THC a patient may purchase in a 90-day period to 25 grams.

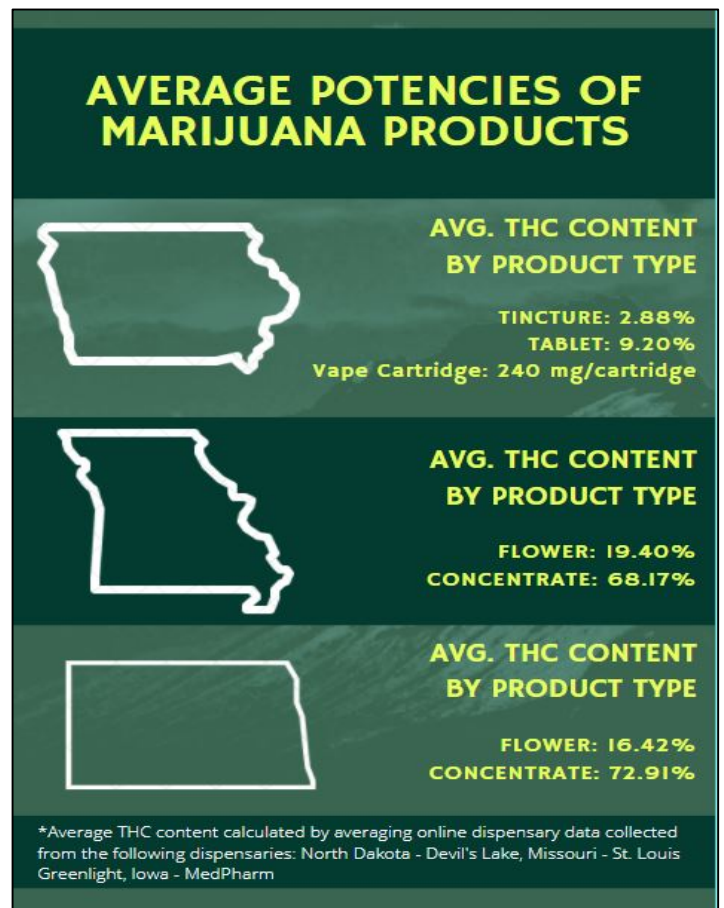
Missouri

There are no restrictions on the amount of THC a product may contain. However, there are monthly purchase and possession limitations.^R A qualifying individual may not purchase more than 3,200 milligrams of THC within a 30-day period.

North Dakota

Minors and their caregivers are not allowed to purchase marijuana or marijuana products that contain more than six percent THC. There are no potency limitations for dried marijuana for all other qualifying individuals, although individuals may not purchase more than 4,000 milligrams of THC from all other marijuana products within a 30-day period.

Figure 30: Average Marijuana Potencies



^R See Figure 23 from "Possession".

Marketing

Marijuana Product Packaging and Labeling

The requirements for the packaging and labeling of marijuana and marijuana products are listed in each of the states' respective marijuana bills.^{111,116,117} Each type of marijuana product is labeled with a set of specific set of requirements and warnings.

Iowa

A manufacturer must package all mCBD intended for distribution according to the following standards:¹¹¹

- mCBD packaging may not bear a reasonable resemblance to commonly available nonmedical commercial products;
- the manufacturer must package mCBD products in a manner that minimizes its appeal to children; and
- the manufacturer may not depict images other than the business' name or logo on the package.

The label must include:

- the name and address of the manufacturer where the product was created;
- the primary active ingredients, including levels of THC and CBD;
- directions for use of the product;
- all ingredients of the product shown with common or usual names;
- instructions for storage;
- the date of expiration;
- the date of manufacture and lot number;
- a notice with the statement: "This product has not been analyzed or approved by the United States Food and Drug Administration. There is limited information on the side effects of using this product, and there may be associated health risks and medication interactions. This product is not recommended for use by pregnant or breastfeeding women. KEEP THIS PRODUCT OUT OF REACH OF CHILDREN.";
- the universal warning symbol provided by the IDPH; and
- a notice with the statement: "This medical cannabidiol is for therapeutic use only. Use of this product by a person other than the patient listed on the label is unlawful and may result in the cancellation of the patient's medical cannabidiol

registration card. Return unused medical cannabidiol to a dispensary for disposal.”

Missouri

Marijuana businesses must not package or label marijuana in a false or misleading manner or in any way designed to cause confusion between a marijuana product and any product that does not contain marijuana.¹¹⁶ Marijuana and marijuana products may not be designed in a way that appeals to a minor and must be sold in containers that clearly label the product as containing marijuana or a marijuana-infused product.¹¹⁶ Packaging must also bear the following message: “Warning: Cognitive and physical impairment may result from the use of Marijuana.”¹¹⁶ According to the Missouri DHSS rules for medical marijuana, marijuana and marijuana products must have a label displaying the following information:¹¹⁶

- the total weight of the marijuana included in the packaging;
- dosage amounts, instructions for use, and estimated length of time the dosage will have an effect;
- the THC and CBD concentration per dosage;
- all active and inactive ingredients, which must not obscure the actual ingredients;
- in the case of dried marijuana, the name of the cultivating facility from which the marijuana in the package originated and, in the case of marijuana concentrate, the name of the infused-product manufacturer; and
- a “best if used by” date.

North Dakota

According to North Dakota’s medical marijuana legislation, the packaging of useable marijuana sold at a dispensary must include the following:¹¹⁷

- the name of the strain, batch, and quantity;
- the statement “This product is for medical use only, not for resale”; and
- details indicating that the marijuana is free of contaminants and the levels of active ingredients in the product within plus or minus five percentage points.

Marijuana Product Advertising

Each of the three Midwest HIDTA region states with operational marijuana programs have restrictions in place regulating the advertising of marijuana and marijuana products. Furthermore, the statements on the products themselves cannot be misleading or deliberately appeal to minors.

Iowa

Marketing and advertising activities permissible under Iowa law allow a marijuana business to display its name and logo on mCBD labels, signs, website, and informational material provided to registered individuals with a qualifying condition.¹¹⁷ The name and logo may not include:¹¹⁷

- images of marijuana or marijuana paraphernalia;
- colloquial references to marijuana;
- the names of marijuana plant strains or varieties;
- unsubstantiated medical claims; or
- medical symbols that resemble established medical associations (e.g. the American Medical Association).

A marijuana business may display signs on the property of the business and maintain a business website that contains the following information:

- the business' name and contact information;
- the mCBD forms and quantities produced in Iowa; and
- other information as approved by the IDPH.

The business' website may not include any false, misleading, or unsubstantiated statements regarding health or physical benefits to the patient. If a marijuana business wishes to conduct marketing or advertising activities outside of those specified above, they must receive written approval from the IDPH before conducting said activities.

Missouri

Missouri has yet to impose many of the restrictions on marijuana advertising as seen in other states. However, the Missouri DHSS has created strict limitations on facility signage. Under these limitations, images depicting marijuana plants, products, or paraphernalia—including smoke—are prohibited on outdoor signage located on marijuana facility premises.¹¹⁶ Indoor signage that is visible to the public from the outside

is also prohibited. There are no Missouri DHSS regulations regarding advertisements at locations other than facility premises.

There are several dispensary-specific rules affecting marijuana advertising. Green cross symbols, commonly displayed at marijuana dispensaries in other legal states, are not allowed.¹¹⁶ Marijuana dispensaries may not use the following terms in their business name:¹¹⁶

- pharmacist;
- pharmacy;
- apothecary or apothecary shop;
- chemist shop;
- drug store;
- druggist;
- drugs;
- consultant pharmacist; or
- any words similar to those above unless the place of business is supervised by a licensed pharmacist.

North Dakota

For the purposes of advertising or marketing, a dispensary may display its business name and logo on its labels, signs, websites, and informational material provided to registered individuals with a qualifying condition.¹¹⁷ The dispensary's name or logo may not include:¹¹⁷

- images of marijuana or marijuana paraphernalia;
- colloquial references to marijuana;
- names of marijuana plant strains; or
- medical symbols that resemble established medical associations.

A dispensary's website may contain:

- the business' name;
- contact information;
- hours of operation;
- marijuana products offered;
- product pricing; and

- other information approved by the ND DPH.

A manufacturing facility may display its name and logo on product logos, websites, and informational material. Similar to dispensary requirements, the name and logo may not include:

- images of marijuana or marijuana paraphernalia;
- colloquial references to marijuana;
- names of marijuana plant strains; or
- medical symbols that resemble established medical associations.

A manufacturing facility's website may contain the business' name, phone number, and other information approved by the ND DPH.

Conclusion

While the full consequences of marijuana legalization will take decades to emerge, many outcomes are already apparent. The data in this report document the many negative impacts of marijuana legalization on public health and safety, both in the Midwest HIDTA region and beyond. These impacts include, but are not limited to:

- higher rates of marijuana-related driving fatalities in states following medical and/or recreational marijuana legalization;
- expanding illicit markets supplied by illegal growing operations and diversion;
- increases in certain crimes following legalization;
- increased rates of both youth and adult marijuana use following legalization;
- increased rates of marijuana-related emergency department visits and hospitalizations following legalization;
- increased rates of marijuana-related calls to state poison centers following legalization; and
- detrimental impacts to the environment and various ecosystems as a result of both licit and illicit marijuana production.

As medical marijuana markets mature across the Midwest HIDTA region, the region will likely see a decrease in the perception of harm from marijuana use among all age groups. The Midwest may experience a further increase in marijuana use—particularly among youth and non-medically qualifying candidates—as a result of the rise in marijuana’s availability and acceptability. This will likely lead to unforeseen consequences, such as increases in marijuana use disorders and the use of other illicit drugs, decreased youth academic performance, and the exacerbation of marijuana-related mental health conditions.

The marijuana programs of the Midwest HIDTA region may be in their infancy, but the impacts of state-sanctioned marijuana usage are already known and well-documented by the early programs in Western states. The economic and social costs of legalization to state and local governments will likely outweigh the revenue generated by the marijuana industry. Midwesterners must take notice of these costs—both to their own region and others—to mitigate the damage done by loosely regulated medical marijuana and prevent the legalization of recreational marijuana.

Appendices

Appendix I: Iowa Code Chapter 124E

Also known as the Medical Cannabidiol Act, Iowa Code Chapter 124E authorizes the use of mCBD to treat a list of qualifying medical conditions.

Administration:

The Iowa Department of Public Health (IDPH) is responsible for the oversight of the mCBD program. The Iowa State Legislature authorized the IDPH to establish requirements for health care practitioner certification, approve applications for patient mCBD registration cards, approve licensure of mCBD manufacturers and dispensaries, inspect manufacturer and dispensary facilities, and collect all application and registration fees.

Qualifying medical conditions:

Physicians may recommend mCBD as a treatment for those diagnosed with one of the following qualifying medical conditions: cancer, severe or chronic pain, nausea or severe vomiting, cachexia, multiple sclerosis, seizures, AIDS or HIV, Crohn's disease, amyotrophic lateral sclerosis, or any terminal illness with a probable life expectancy of under one year. The IDPH has the authority to add additional medical conditions as the program continues.

Possession/Cultivation:

By rule, the IDPH limits sales of mCBD to patients to a 90-day supply at any given time. Iowa's Medical Cannabidiol Act allows patients to possess up to 32 fluid ounces (907.1 grams) of mCBD at any time. An mCBD dispensary cannot dispense more than a combined total of 25 grams of THC to a patient or qualified caregiver in a 90-day period. Registered caregivers may possess up to this same amount per patient they service. Personal cultivation of marijuana is prohibited. Due to the passing of Senate File 2363 (June 2020), there are no longer any restrictions on the amount of THC a product may contain.

Tracking system:

Iowa's mCBD program states that the IDPH must establish and implement a statewide mCBD registry management sale tracking system that is available to mCBD dispensaries

that is always available and able to verify that a person is lawfully in possession of an mCBD registration card.

Regulation:

The IDPH must select and license up to two mCBD manufacturers and five dispensaries to cultivate, manufacture, and supply mCBD and shall license new manufacturers or relicense existing manufacturers each year. The IDPH may select additional proposals for up to two out-of-state mCBD dispensaries from a bordering state to sell and dispense mCBD to Iowa-based patients.

Taxation:

Iowa's mCBD program mandates that all fees collected from the mCBD program shall be retained by the IDPH for operation of the mCBD registration card program and the licensing programs and shall not revert to the state general fund. Each patient mCBD registration card fee will cost \$100 unless the patient qualifies for a reduced fee of \$25. Primary care registration card fees will cost \$25. Each application fee for licensure as a manufacturer will cost \$7,500. Each application for licensure as a dispensary will cost \$5,000. Sales of mCBD products are subject only to Iowa state sales tax. 65

Appendix II: Missouri Amendment 2

Missouri Constitutional Amendment 2 was sponsored by the pro-marijuana advocacy group, “New Approach Missouri,” and passed in 2018. The amendment has been broken down and analyzed in the sections below.

Administration:

The Missouri DHSS is the authority for the medical marijuana program and controls state licenses and certifications for marijuana cultivators, dispensaries, patients, and caregivers. It is also the responsibility of the DHSS to promulgate rules concerning the state’s marijuana trade, develop identification cards, and issue standards for the secure transportation of marijuana.

Qualifying medical conditions:

Physicians may recommend marijuana and marijuana products as a treatment for those diagnosed with one of the qualifying medical conditions. Some of these conditions give discretion to the physician to decide if marijuana is suitable for an unspecified illness.

Possession/Cultivation:

The DHSS limits purchases of marijuana to four ounces per patient in a 30-day period. Patients will also be allowed to cultivate up to six flowering plants on their property for personal use.

Tracking system:

The Missouri Medical Marijuana Regulatory Program utilizes the Marijuana Enforcement Tracking Reporting & Compliance (METRC) system for monitoring the state’s seed-to-sale tracking requirements. Fifteen states use the METRC system as a product-tracking database. Dispensaries are required to maintain records of sales that are available to state departments and law enforcement agencies. This record must also contain an encrypted patient number that details all amounts and types of marijuana sold to the patient by the seller and must be maintained for five years from the date of sale.

Regulation:

The DHSS is obligated to approve at least one medical marijuana cultivation facility license per 100,000 residents and one marijuana-infused product manufacturing facility license per 70,000 residents. The DHSS may not limit the number of marijuana 66

dispensary licenses to less than 24 licenses for marijuana dispensaries in each congressional district.

Taxation:

This amendment will levy a tax of four percent upon the retail sale of medical marijuana at licensed marijuana dispensaries within the state. The tax on retail sales of marijuana will be paid to the Department of Revenue, where the department will keep five percent for collection costs and the remaining funds will be deposited into the Missouri Veteran's Healthcare Fund.

Support/Opposition:

Amendment 2 was endorsed by the National Organization for the Reform of Marijuana Laws (NORML) and the Marijuana Policy Project. Other notable supporters include former Senator Claire McCaskill, the Epilepsy Foundation of Missouri and Kansas, Our Revolution, and the St. Louis NAACP.

There were ten groups that organized in opposition to Amendment 2. The groups are as follows: Greene County Medical Society, Kansas City Academy of Family Physicians, Kansas City Medical Society, Missouri Association of Osteopathic Physicians and Surgeons, Missouri College of Emergency and Physicians, Missouri Pharmacy Association, Missouri Psychiatric Physicians Associations, Missouri Society of Eye Physicians and Surgeons, Missouri State Medical Association (MSMA), and the St. Louis Metropolitan Medical Society.

Appendix III: North Dakota Measure 5

North Dakota Statutory Measure 5 was sponsored by “North Dakotans for Compassionate Care.” The bill passed in 2016 and became law in 2017. The amendment has been broken down and analyzed in the sections below.

Administration:

The North Dakota Department of Health is responsible for the issuance of caregiver registry identification cards, qualifying patient registration, and compassion center regulation.

Qualifying medical conditions:

Physicians may recommend marijuana and marijuana products as a treatment to patients diagnosed with one of many qualifying medical conditions.

Possession/Cultivation:

The North Dakota Department of Health does not allow patients and designated caregivers to purchase more than 2.5 ounces of dried flower and 4,000 milligrams of THC within a 30-day period. Qualifying patients who live more than 40 miles from the nearest compassionate care center may cultivate up to eight marijuana plants and must notify local law enforcement if they do so.

Tracking system:

Measure 5 requires that compassion centers must keep detailed financial reports of proceeds and expenses and that they must maintain all inventory, sales, and financial records in accordance with generally accepted accounting principles. The compassion centers must employ a bar coding inventory control system to track plant information and quantities sold to qualifying patients.

Regulation:

Compassion centers are subject to random inspection by the Department of Health in order to ensure compliance. A compassion center may not possess more than 1,000 marijuana plants, irrespective of their stages of growth. Compassion centers may not possess more than 3,500 ounces of usable marijuana, regardless of formulation.

Appendix IV: South Dakota Measure 26

South Dakota voters passed Constitutional Measure 26 in 2020, thereby legalizing medical marijuana. Once all rules and regulations are finalized by the state legislature, the measure will establish a medical marijuana program in South Dakota for individuals who have a debilitating medical condition.

Current Status:

Rules and recommendations for the medical marijuana program are pending further legal review, but will be finalized October 29, 2021.

Administration:

The amendment authorizes the South Dakota Department of Health (“Department”) to issue licenses for commercial cultivators and manufacturers, testing facilities, wholesalers, and retailers. The Department is also responsible for creating and presenting the final rules and regulation to the state legislature.

Qualifying Medical Conditions:

The Department must present a final list of qualifying conditions to the state legislature by October 21, 2021 and receive approval prior to implementation. While the list is not yet finalized, the measure defines a debilitation medical condition as, “a chronic or debilitating disease or medical condition or its treatment that produces one or more of the following: cachexia or wasting syndrome; severe, debilitating pain; severe nausea; seizures; or severe and persistent muscle spasms, including those characteristic of multiple sclerosis.”¹¹⁸

Possession/Cultivation:

So long as an individual is at or above age 21, they may possess up to three ounces of marijuana. According to the measure, qualifying individuals who register to cultivate marijuana at home may grow three marijuana plants at minimum. A qualifying individual may grow additional plants if prescribed by their medical physician.

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