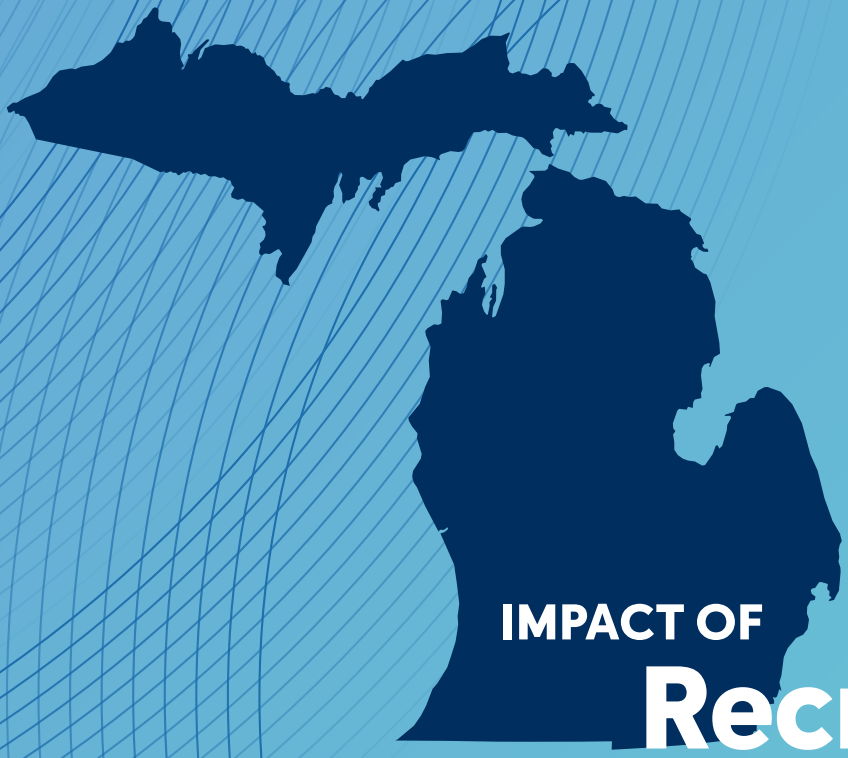

IMPACT OF

Recreational Cannabis Legalization

IN MICHIGAN

SEPTEMBER 2025

INJURY PREVENTION CENTER
UNIVERSITY OF MICHIGAN

Prepared by the **University of Michigan Injury Prevention Center**
A CDC-Funded Injury Control Research Center

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LIST OF ABBREVIATIONS USED IN THIS REPORT

ACA	Affordable Care Act
AOR	Area of Responsibility
CRA	Cannabis Regulatory Agency
CUD	Cannabis Use Disorder
DEA	Drug Enforcement Administration
DTOs	Drug Trafficking Organizations
ED	Emergency Department
FARS	Fatality Analysis Reporting System
FY	Fiscal Year
HIDTA	High Intensity Drug Trafficking Area
ICD	International Classification of Diseases
JDW	Judicial Data Warehouse
LARA	Licensing and Regulatory Affairs
MAPS	Michigan Automated Prescription System
MDHHS	Michigan Department of Health and Human Services
MHA	Michigan Health and Hospital Association
MIDB	Michigan Inpatient Database
MI PRAMS	Michigan Pregnancy Risk Assessment Monitoring System
MiVDRS	Michigan Violent Death Reporting System
MLOs	Money Laundering Organizations
MMFLA	Medical Marihuana Facilities Licensing Act
MMMA	Michigan Medical Marihuana Act
MODB	Michigan Outpatient Database
MRTMA	Michigan Regulation and Taxation of Marihuana Act
MTCF	Michigan Traffic Crash Facts
MVC	Motor Vehicle Crash
NVDRS	National Violent Death Reporting System
NSDUH	National Survey on Drug Use and Health
RSE	Relative Standard Error
TEDS	Treatment Episode Data Set
THC	Tetrahydrocannabinol
US	United States
VMT	Vehicle Miles Traveled

BACKGROUND AND PURPOSE OF THIS REPORT

On November 6, 2018, Michigan citizens voted to legalize recreational (adult-use) cannabis by approving Proposal 1. This proposal approved the Michigan Regulation and Taxation of Marihuana Act (MRTMA), effective December 6, 2018. Among the MRMTA provisions were allowance of:

- **Personal possession and use of cannabis by adults ages 21 or older,**
- **Lawful cultivation and sale of cannabis and industrial hemp by adults ages 21 or older, and**
- **Taxation of revenue from commercial cannabis facilities.**

Passage of the MRMTA made Michigan the 10th state in the country to legalize recreational cannabis, and the first state in the Midwest. This passage occurred 10 years after the Michigan law allowing for medical cannabis use and distribution. After establishing regulatory procedures at the state level, retail recreational cannabis sales in Michigan began in December 2019. Although cannabis remains a Schedule I federally-prohibited substance and there are efforts underway to consider rescheduling cannabis, the 2018 Michigan recreational cannabis law and the 2008 Michigan medical cannabis law allowed for increased access and exposure to cannabis throughout the state. In light of this policy change, the current report was planned to supplement the baseline report[1] by compiling existing data on indicators of health, well-being, and related factors among Michigan citizens and communities since the passage of the MRTMA. This report provides insights into patterns of cannabis-related injury, social, and health indicators in the context of the state's legalization of recreational cannabis per the 2018 MRTMA and opening of the retail market. Of course, when examining data from the years 2020 and onward, it is critical to consider that Michigan residents also experienced COVID-19, an unprecedented global pandemic which had significant, lasting impacts on health, behaviors, and well-being. These two historic events—initiation of retail cannabis sales and a global pandemic—occurring nearly simultaneously make understanding some of the trends reported herein difficult. Therefore, continued examination of these indicators over time will allow stakeholders and public health officials to best understand the health, social, and economic impacts associated with the legalization of recreational cannabis.

EXECUTIVE SUMMARY

On November 6, 2018, Michigan voters approved Proposal 1, which created the Michigan Regulation and Taxation of Marihuana Act (MRTMA), effective December 6, 2018. The law allows for personal possession and use of cannabis by adults ages 21 or older, lawful cultivation and sale of cannabis and industrial hemp by adults ages 21 or older, and taxation of revenue from commercial cannabis facilities. In light of this policy change, the University of Michigan Injury Prevention Center (IPC) compiled then-existing data regarding what was known about cannabis use in the State of Michigan across several domains that potentially affect the health and well-being of Michigan citizens and communities. Comprising data from before the December 2019 opening of the retail cannabis market, an initial baseline report summarizing these data was disseminated in 2020.[1] The current report provides updates on many of these indicators over time, allowing stakeholders and public health officials to understand changes in health and well-being and related factors among Michigan citizens and communities following recreational cannabis legalization. Key findings from the report are noted below; however, readers are encouraged to view both the full baseline and current reports to better understand the breadth and depth of these findings.

KEY FINDINGS

The New Landscape of Recreational Cannabis Legalization

The Michigan Regulation and Taxation of Marihuana Act (MRTMA) led to the creation of a regulatory structure in the state of Michigan pertaining to adult-use cannabis establishments and licensees. Key data show that cannabis businesses currently exist in every county in the state (with a recent total of 818 retailers and consumption spaces), and that retail sales have increased over time, while state revenue shows a decline for the most recent year. Geographic data show some general clustering of cannabis-related businesses along state borders and near popular travel destinations.

- Cannabis businesses began receiving state licenses to operate in 2019, with a surge of license applications and approvals in the first few years of the program, with peaks of over 1,800 applications per year. More recently, fiscal year (FY) 2023 data showed a decline in annual licenses approved to 1,223.
- Within its 83 counties, Michigan has over 1,700 municipalities, which include townships, cities, and villages. Most recently (April 2024), 139 municipalities had opted in to allow recreational cannabis sales and production. The number of municipalities opting in for recreational cannabis is consistently lower than those opting in for medical cannabis sales/production.
- Cannabis establishments focused on recreational sales and consumption have increased over time, with the most recent data showing 818 existed in the state in Quarter (Q) 3 of FY 2024. Over 300 of these establishments provide home delivery of cannabis.
- The number of these sales/consumption businesses per 100,000 residential population (per 100K hereafter) have increased over time in all 10 of Michigan's prosperity regions, though there is substantial variation among them in the per capita rate.
- The Upper Peninsula, Southwest, and Northeast regions cluster at having the highest number of these businesses per capita according to the most recent data. The Detroit Metro region has consistently had the lowest number of these businesses per capita. Other regions on the lower end are: West Michigan, South Central, and East Michigan.
- Several maps showing the density of cannabis establishments focused on sale and consumption of cannabis over time are included. Early on, in 2020, Kalkaska, Benzie, Crawford, Presque Isle, and Lenawee counties showed the highest per capita density of these cannabis establishments. For the most recent year with available data, Iron, Alcona, Branch, and Menominee counties display the greatest density of adult-use establishments per 100K.

- In terms of the dollar value of state-sanctioned recreational cannabis sales, monthly sales figures have generally increased over time, reaching $276.69 million for the month of April 2024.
- Climbing sales figures are reflected in the total weight and volume of cannabis products sold each month, which was 569,619 lb. and 1,476,715 oz. respectively in April 2024. While sales of liquid forms of cannabis were initially very low, they have been steadily increasing since 2022.
- Beginning in December of 2019, the average price per ounce for cannabis flower was $516.21, but this had dropped substantially to $86.61 by April 2024.
- Although recreational cannabis flower started out with a higher average price, the prices of medical and recreational cannabis have been relatively similar since around June of 2021 when both were at $209 per oz.
- In its first full FY (2020), net revenue for the recreational program reached over $8 million and subsequently increased to a high of $37.3 million in FY 2022. There was a decline to $28.1 million in FY 2023.

Trends in Medical Cannabis

Residents of Michigan living with specific qualifying medical conditions currently have the choice to obtain and use cannabis via state-sanctioned medical cannabis programs or the state adult-use recreational program. The medical cannabis program, approved in 2008 in Michigan, pre-dates the legalization of recreational cannabis, but formal regulations for medical cannabis businesses did not exist until nearly 10 years after medical cannabis approval. Changes to medical cannabis indicators are apparent in the wake of recreational cannabis legalization.

- In 2018, approximately 3.0% of the state population held a medical cannabis certification; this fell to about 1.3% in 2023. The number of caregiver certifications and physicians providing these certifications also declined.
- Since recreational cannabis legalization, state revenue from individual medical cannabis certifications has declined, to the point where most recently there was a negative net revenue in FY 2023 of over half a million dollars.
- Newer regulations allowed the state to license medical cannabis facilities (including dispensaries/provisioning centers that allow home delivery, and other businesses such as growers, transporters, etc.). Local jurisdictions may opt in to allowing such facilities (currently 172 opt in). The first 3 years of this regulatory structure saw approximately 1,200 medical cannabis license approvals per year, but this figure declined by nearly half in FY 2023 to 698 licenses.
- Although medical cannabis facility-driven net revenue for the state reached a high of over $20 million in FY 2020, the FY 2023 data show a net revenue of just under $690,000.
- After initial increases in sales of medical cannabis under this new regulatory structure, there have been sharp declines in sales of medical cannabis. The peak of $52 million in sales in July 2020 declined drastically to $1.86 million in April 2024, while the average retail price per ounce (once more affordable than recreational cannabis) has declined to approximately $99 per oz. (notably for both medical and recreational products).
- Many years after the approval of medical cannabis by voters, the state created a regulatory structure for medical cannabis production and sales. It appears now that medical cannabis is resulting in very little revenue for the state, after accounting for program costs. This became the case in the wake of recreational cannabis legalization, particularly given that patients and caregivers can obtain cannabis through the recreational market at a similar cost.

Long-Term Trends in Cannabis Use

The prevalence of cannabis use in Michigan, especially among young adults (ages 18-25), is increasing and remains higher than in the Midwest region and the entire US. Given the risks of initiating and escalating cannabis use in young adulthood, there is a need for prevention and harm reduction efforts tailored to this population.

- Around one in four (25.6%) Michigan residents report past-year cannabis use, and almost one in 5 (18.5%) report past-month use. These numbers have more than doubled over the past 20 years. The prevalence of past-month cannabis use alone increased by over 150% (from 7.2% in 2002-2003 to 18.5% in 2021-2022) during this time and is greater than what is found in the Midwest and the nation.

- Notable increases in the prevalence of cannabis use in Michigan were seen following legalization of medical cannabis use in 2008 and again after 2018, when recreational use was legalized in the state, but these data should be cautiously interpreted given changes to survey methodology.
- Young adults (ages 18-25) are the age group with the highest prevalence of cannabis use.

Public Perceptions of Cannabis Risks

The last 20 years of available data show that perceptions of the level of risk associated with cannabis use have decreased. The perceived risk of great harm from smoking cannabis is lowest among young adults (ages 18-25), more of whom use cannabis than any other age group. Greater public health messaging that accurately conveys appropriate risks, harms, and potential benefits of cannabis use may be warranted.

- The most recent data (2021-2022) show that 14.7% of the Michigan population perceives that smoking cannabis once a month will result in a "great risk" of physical or other personal harm. This represents a striking 59.1% decline since 2002-2003.
- During the past 20 years, decreases in perceived risk associated with smoking cannabis were observed across all ages of the population of Michigan. Young adults (ages 18-25) consistently had the lowest levels of perceived risk associated with cannabis use.

Cannabis Use and Pregnancy

Most expectant mothers do not use cannabis in the months before, during, or after pregnancy. For 2021-2022, 74.4% of Michigan's expectant mothers did not use cannabis before, during, or after pregnancy; this rate is lower than the 86.7% reported in 2016-2017 before recreational cannabis legalization. Although cannabis use among mothers before, during, and after pregnancy more than tripled in 2021-2022 vs. 2016-2017, many mothers who used cannabis before pregnancy stop while pregnant. Findings may reflect sociodemographic or other risk factors for cannabis or other substance use in general and/or disparities in access to healthcare or prevention services. Screening for cannabis use risk among women who are pregnant or planning to become pregnant may be needed, followed by interventions or referrals for women using cannabis to provide support.

- For 2021-2022, approximately 1 in 11 mothers (9.0%) reported using cannabis while pregnant.
- Use during pregnancy was most common for women who were under age 20 (21.2%), or who did not complete high school (18.6%), or who had an annual income of less than $16,000 (28.5%).
- Women who were not married were 7 times more likely to use cannabis during pregnancy compared to married women (19.6% vs. 2.7%), and non-Hispanic Black mothers were slightly more likely to use cannabis while pregnant compared to mothers from all other race/ethnicity categories (12.8% vs. 8.1%).
- Among mothers who quit using cannabis during pregnancy, the majority (64.5% in 2021-2022) did not return to cannabis use in the months following birth, which is lower than the 77.4% reported in 2016-2017.
- Following birth, 1 in 8 mothers reported any cannabis use (12.7%), an increase from 1 in 20 (4.8%) in 2016-2017.

Cannabis Use in the Michigan Workforce

Per one source, Michigan employees have a higher proportion of positive urine drug tests for cannabis than the national workforce average, and the percentage of positive urine drug tests is increasing. Additional data are needed on workplace policies for hiring when employees screen positive for cannabis. Employee assistance programs and referrals for employees who test positive and may have a cannabis use disorder are needed.

- Among potential new employees who were tested, 5.2% screened positive for cannabis in 2022, an increase of 62.5% since 2018 when recreational cannabis legalization was approved in the state.
- The percentage of Michigan employees testing positive and the rate of increase over the 15 years examined (2007-2018) is greater in Michigan than nationally.

Cannabis and the Opioid Epidemic

During the period since recreational cannabis legalization (coinciding with the COVID-19 pandemic), cannabis use increased; opioid overdose deaths increased during the pandemic and then declined from 2021 to 2023. Opioid prescribing continued to decrease, and, in 2021, declined to its lowest level observed since statewide monitoring was implemented. Additional data are needed to determine the potential impact of legal recreational cannabis because legalization occurred in tandem with the COVID-19 public health emergency. Further, the available data do not tell us about individuals who were at risk for overdose and who may have switched from opioids to cannabis or other options for pain management.

- In Michigan, the number of opioid prescriptions dispensed increased from 9.7 million in 2013 to more than 10 million per year from 2014 to 2016. In 2017, this figure returned to below the 2013 level (9.4 million) and declined to 6.7 million in 2021.
- Despite a decrease in prescriptions through 2021, opioid overdose deaths reached a peak in 2021. From 2013 to 2021, opioid overdose deaths across all ages in Michigan increased by 174.0% (9.4 to 25.8 per 100K). For 2022 and 2023, opioid overdose deaths began to decline.
- During most of the same years in which opioid overdose deaths increased (2002-2021), the percentage of Michigan citizens ages 12 or older who used cannabis increased by 96.0%.

State Poison Center Calls Involving Cannabis-Related Exposures

Calls to the Michigan Poison & Drug Information Center related to acute cannabis exposure have been increasing. Notably, calls involving children under 12 years rose sharply after recreational cannabis legalization. Improved public health messaging (e.g., safe storage) and policy shifts (e.g., strict packaging regulations) are warranted to help combat potential unintended ingestion of cannabis products, particularly given the unprecedented availability of high potency products.

- While reports of cannabis exposure account for fewer than 2.0% of annual calls to the Michigan Poison & Drug Information Center, the number of these calls has been rising since approximately 2014 and has increased 92.0% since recreational cannabis was legalized.
- Historically, men have made up a greater proportion of cannabis-related exposures reported to the poison center; however, in recent years (both pre- and post-legalization of recreational cannabis) calls have been more evenly divided between men and women.
- Since recreational cannabis legalization, a sharp increase has been observed in the proportion of cannabis-related calls involving children under 12 years.

Healthcare Utilization

Emergency Department (ED) visits for cannabis-related conditions show different patterns depending on diagnosis. For cannabis poisoning and adverse effects of cannabis, ED visits among children under age 15 have grown post-legalization of recreational cannabis, warranting enhanced prevention efforts and safe storage. Given the unprecedented ED utilization due to COVID-19 during the post-legalization era (data only available through 2021), it will be important to monitor ED visits related to cannabis over time, especially given access to higher potency products.

- Post-legalization ED visits for adverse effects of cannabis use continued an upward trend through 2019 but declined through 2021. Between 2019 and 2021, while people ages 15-24 accounted for the largest percentage of these ED visits (30.5%), followed by people ages 25-34 (25.4%), there was a sharp increase post-legalization in visits accounted for by children under age 15 (from 1.8% pre-legalization to 5.0% post-legalization).
- ED visits for cannabis poisoning climbed after legalization of recreational cannabis to 7.3 per 100K, then leveled off across 2019 to 2021. While people ages 15-24 account for the largest proportion of these visits (27.2% post-legalization), children under age 15 have accounted for an increasing share of these visits (from 10.4% pre-legalization to 16.4% post-legalization).

- For ED visits with diagnoses of cannabis-related disorders there was a slight decline in the year following legalization, but this had increased beyond pre-legalization levels by 2021. The largest proportion of these ED visits was accounted for by adults ages 25-34 years. The percentage of each age group making up these ED visits was similar before and after recreational cannabis legalization.
- The gender breakdown for ED visits shows that, in most cases, males were slightly more likely to have any of these diagnoses than females.

Generally, the number of inpatient hospitalizations involving cannabis-related conditions is small. The years with post-legalization data largely coincide with the COVID-19 pandemic, which greatly impacted hospitalizations in general. Given this historical context, drawing conclusions about the impact of recreational cannabis legalization on inpatient hospitalizations is premature, and more data in post-legalization of recreational cannabis and post-COVID-19 years are needed. Hospitalization rates may be most important to monitor among more vulnerable age groups such as children and older adults.

- The rate of hospitalization for adverse effects of cannabis use declined post-legalization through 2021, coinciding with the COVID-19 pandemic. The highest percentage of these hospitalizations was accounted for by younger adults ages 25-34. The age distribution of these hospitalizations has shifted somewhat since legalization of recreational cannabis with slight declines for 35-44-year-olds and slight increases for 65-74-year-olds.
- Hospitalizations for cannabis poisoning were increasing in the years directly preceding legalization and sharply increased to a high in 2019, prior to a decline coinciding with the acute phases of the COVID-19 pandemic. The proportion of these hospitalizations has increased most for children under age 15 (up from 6.0% pre-legalization to 10.0% post-legalization) and older adults ages 65-74 (up from 4.6% to 6.5%); 15-24-year-olds saw a decrease from 19.8% to 15.6%.
- The rate of inpatient hospitalizations for cannabis-related disorders declined from 2017 to 2018, while rates increased slightly from 2019 to 2021. Key changes from pre-legalization of recreational cannabis (2016-2018) to post-legalization (2019-2021) periods were seen by age: the share for 15-24-year-olds declined from 16.9% to 13.6%, while the share for 65-74-year-olds increased from 6.1% to 8.5%.
- The gender breakdown for hospitalizations shows that, in most cases, males were slightly more likely to have any of these diagnoses than females.

Substance use disorder treatment admissions for cannabis as the primary drug associated with admission have decreased in state programs. This may reflect reductions in treatment availability during the rise and continuation of the opioid epidemic, where treatment slots may be utilized by people seeking opioid-related treatment. More data on cannabis use disorder prevalence in the state and corresponding treatment engagement is needed.

- While the total number of substance use treatment admissions fluctuated over an 18-year window between 2004 and 2021 (5.3% increase overall, from 60,190 to 63,356), cannabis-related admissions have consistently declined (pre- and post-legalization) by 69.6% during the same period.
- Adults ages 25 or older are accounting for an increasing share of cannabis-related treatment admissions, offsetting decreases among young ages, primarily the 18-24 age group.
- Counties that demonstrated the largest increases in treatment admissions from 2018 to 2023 were: Van Buren, Menominee, Ionia, Schoolcraft, and Livingston.

Cannabis-Related Mortality

Cannabis poisoning as a primary cause of death is extremely rare, but may be a contributing factor to mortality in patients with underlying cardiovascular disease or other severe medical problems. Improved efforts are needed for tracking cannabis involvement in deaths via more uniform toxicology testing.

- Cannabis poisoning was recorded as the primary cause of death for 6 deaths for the total period of 2004-2022.

- Cannabis poisoning was recorded as related to the cause of death for a total of 78 deaths during the same period. Note that cannabis poisoning as related to the cause of death was increasing prior to the 2018 cannabis policy change allowing recreational use, and that during this period toxicology testing has also increased.

Suicides and Homicides

Suicide and homicide victims often undergo toxicology testing, with many resulting in a positive test for cannabis, and this is increasingly the case after recreational cannabis legalization. Prevention and treatment programs could potentially benefit from addressing cannabis use to help mitigate risk of these types of deaths, particularly for adolescents.

- Among individuals in Michigan who died by suicide and who were also tested for cannabis, the proportion testing positive for cannabis appears to have risen since the onset of legalization of recreational cannabis, particularly through the 2018-2021 period.
- Among suicide decedents, the proportion of positive tests among adolescents ages 12-17 who were tested has increased over time, from 17% in 2016 to 38% in 2022, a more than two-fold increase. Adults ages 26 or older also saw an increase from 2016 (18%) through 2021 (35%), although the rate declined to 22% in 2022.
- Generally, more men than women suicide decedents test positive for cannabis, except in 2017 and 2022, when the proportions of positive cannabis tests were the same for both groups. Men and young adult suicide victims were the groups with the highest percentage of positive cannabis tests.
- Regarding Michigan homicide victims with cannabis toxicology results, the proportion testing positive for cannabis decreased prior to recreational cannabis legalization, but starting in 2018 has increased steadily to a peak of 64% in 2022.
- Over time, more men than women homicide decedents tested positive for cannabis, although the increase over time among women has been substantial (30% in 2016 up to 48% in 2022).
- Although positivity rates in adolescent homicide decedents have fluctuated, and adults ages 26 or older have shown a steady increase, young adults ages 18-25 have the highest positivity rates over time, with steady increases evidenced over the years since recreational cannabis legalization.

Cannabis Presence in Drivers of Fatal Motor Vehicle Crashes

Prior to legalization of recreational cannabis, the percentage of cannabis-involved fatal motor vehicle crashes (MVCs) in Michigan was increasing, and a sharper increase was noted in the first full year of legal adult recreational use, underscoring the need for public health approaches to prevent drivers operating vehicles under the influence of cannabis. Increased and more consistent testing in fatal and non-fatal motor vehicle crashes and other traffic incidents is needed to better characterize the involvement of cannabis in driving-related outcomes.

- Overall, the rate of fatal MVCs (per 100 million vehicle miles traveled) in Michigan increased 22.0% over 13 years from 0.9 in 2009 to 1.2 in 2022.
- Cannabis is not always tested for and/or reported in MVC drug test results in Michigan. Among those fatal crashes where a drug test was administered and where results were available, cannabis positivity rates were increasing in the years leading up to legalization (e.g., 12.3% in 2009 to 27.2% in 2017). There was a sharper increase from 2019 to 2020 (26.9% to 38.9%), followed by a decline in the subsequent years.

Criminal Justice and Legal System Data

Findings from available criminal justice-related data show that in the wake of recreational cannabis legalization, there are fewer legal convictions related to cannabis and fewer seizures of cannabis by federal teams in Michigan. Cannabis also now makes up a smaller proportion of drug trafficking activity in the state. Findings are reflective of the new legal status of cannabis in the state, though there are existing regulations and laws in place that govern the business and consumption of cannabis that can still result in legal charges and convictions. Given the ongoing trafficking of cannabis products, there remains a concern regarding the illegal market and potential safety of products that are available illegally.

- The legalization of recreational cannabis has been accompanied by a large reduction of cannabis-related legal charges and convictions in the state of Michigan.
- Although overall cannabis-related convictions have declined, the proportion of cannabis convictions that also involved a concurrent felony conviction has increased in recent years.
- The Michigan High Intensity Drug Trafficking Area (HIDTA) teams do not represent the entire state's law enforcement efforts. Their post-legalization data provided show sharp declines in cannabis seizures and the proportion of drug trafficking organizations that are trafficking cannabis in the state.

Future Directions

Although the data summarized in this report reflect a variety of areas potentially impacted by cannabis use, there are other areas where data sources were unavailable or were outside the scope of the current report. In addition to addressing such limitations, to the extent data become available in the future, several additional areas for tracking cannabis-related trends over time are suggested. Key suggestions include examination of cannabis-related data for: non-fatal motor vehicle crashes, vaping-related illnesses, injuries, and residential and industrial fires due to cannabis use and production. Additionally, it is recommended that data be identified on cannabis-related indicators affecting vulnerable populations, such as older adults (e.g., falls) and Michigan youth (e.g., Child Protective Services reports, school suspensions, and school expulsions). Additional information about these and other areas may provide a more comprehensive view of the impact of recreational cannabis legalization in Michigan.

MEDICAL AND RECREATIONAL TRENDS

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THE NEW LANDSCAPE OF RECREATIONAL ADULT-USE CANNABIS LEGALIZATION

INTRODUCTION

The Michigan Regulation and Taxation of Marihuana Act (MRTMA) led to the creation of a regulatory structure in the state of Michigan pertaining to recreational (adult-use) cannabis establishments and licensees. Below we report on costs and revenue for program administration, counts and locations of licensures, and sales figures to provide context for the remaining sections of this report. All data reported here were obtained from Michigan's Cannabis Regulatory Agency, and interested readers are directed to view Michigan.gov/CRA for more detailed information.

FINDINGS

Trends in Availability of Legalized Recreational Adult-Use Cannabis

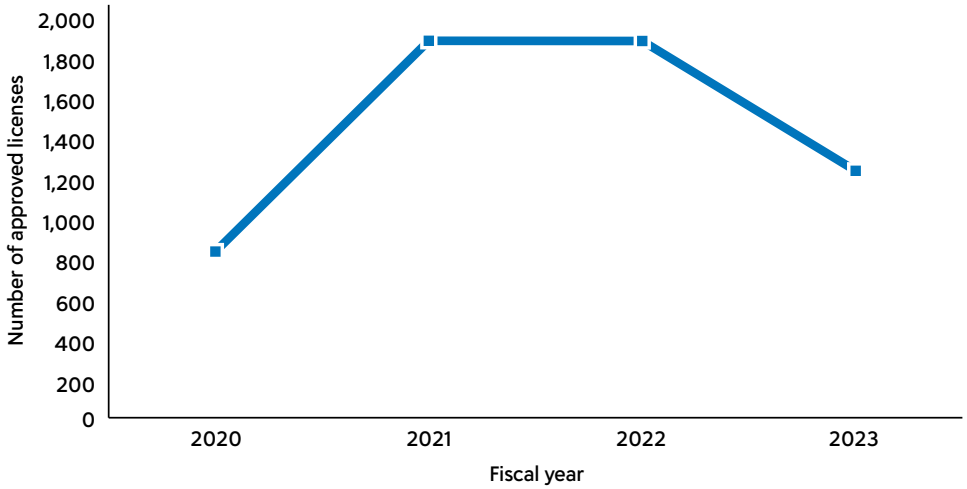
Licensing for Adult-Use Establishments

Currently, 14 types of establishments are regulated via the CRA, reflecting growers, retailers (i.e., dispensaries/ provisioning centers), processors, secure transporters, microbusinesses, event organizers, research, consumption establishments (which allow on-site consumption of cannabis, but not sales), and safety compliance facilities. Those who want to be involved in the industry must undergo a two-step application and approval process. Licenses are approved for one year and can be renewed annually. Greater detail about the types of facilities, processing time for applications, and other data are shown in the Cannabis Regulatory Agency's annual reports.

- The number of licenses approved annually from 2020 to 2023 is shown in Figure 1a.
- FY 2020 saw the approval of 823 licenses for recreational cannabis establishments. This number climbed the next two years to 1,867 and 1,866, respectively, then dropped to 1,223 in FY 2023.
- Denied license applications are rare; there were 14 in FY 2020, and 1 per year in FY 2021 through 2023.

FIGURE 1a

Recreational Cannabis Licensure Approvals by Fiscal Year



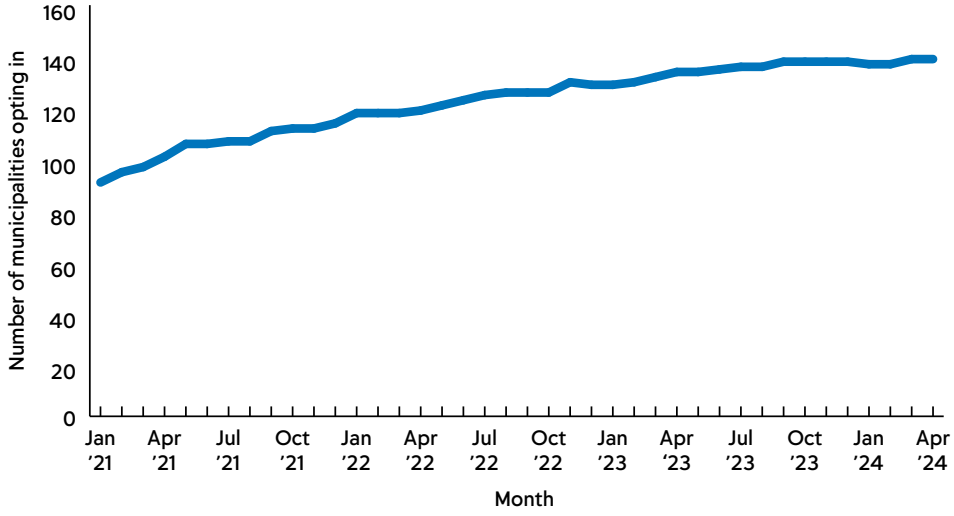
Michigan Municipalities Allowing Adult-Use Establishments Related to Production, Distribution, Consumption, and Sales of Cannabis

Within its 83 counties, Michigan has over 1,700 municipalities, which include townships, cities, and villages. Municipalities may opt in or out of allowing recreational cannabis-related businesses and facilities within their jurisdictions.

- State reports reflecting the number of municipalities opting into the recreational market under the MRTMA are shown in Figure 1b.
- January 2021 saw 91 municipalities as opting in, and this rose to a high of 139 in March and April 2024, reflecting roughly 8.0% of municipalities in Michigan.
- The trajectory of the number of municipalities opting into cannabis sales/production via the MRTMA has been parallel over time for recreational and medical cannabis (See page 31). The number of municipalities opting in for recreational sales/production is consistently lower than those opting in for medical cannabis sales/production.

FIGURE 1b

Number of Municipalities Opting in to the MRTMA by Month



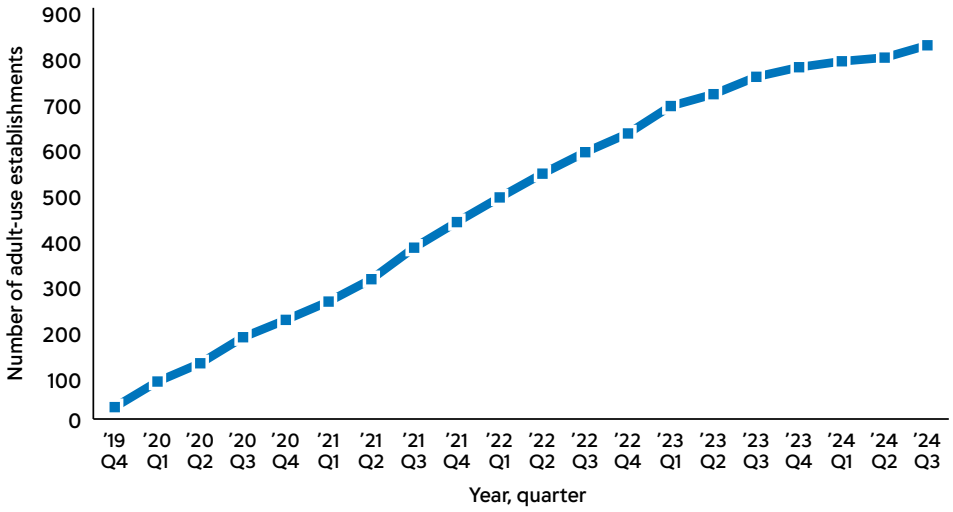
Adult-Use Establishments Allowing Direct-to-Consumer Sales and/or Consumption

Below we examine the emergence of adult-use retailers, adult-use Class A microbusinesses, adult-use microbusinesses, and adult-use consumption establishments together over time. We sourced recreational adult-use cannabis establishment data from publicly available licensing reports published by the Michigan Cannabis Regulatory Agency (CRA) for the period from Q3 of 2019 through Q3 of 2024. The CRA data describes the date when licensees were actively permitted to conduct cannabis-related business and the address of the establishment. For the data reported below, we defined a recreational adult-use cannabis establishment as an address holding a license for either an adult-use retailer, adult-use Class A microbusiness, adult-use microbusiness, or an adult-use consumption establishment.

- The number of adult-use cannabis establishments allowing sales/consumption in Michigan over time, by quarter, is shown in Figure 1c.
- Given that these establishments did not exist legally until 2019, there has been a general increase in adult-use establishments since that time. The most recent data show a total of 818 such sales/consumption establishments in the state as of Q3 of 2024.

FIGURE 1c

Number of Adult-Use Cannabis Sales/ Consumption Establishments in Michigan by Quarter

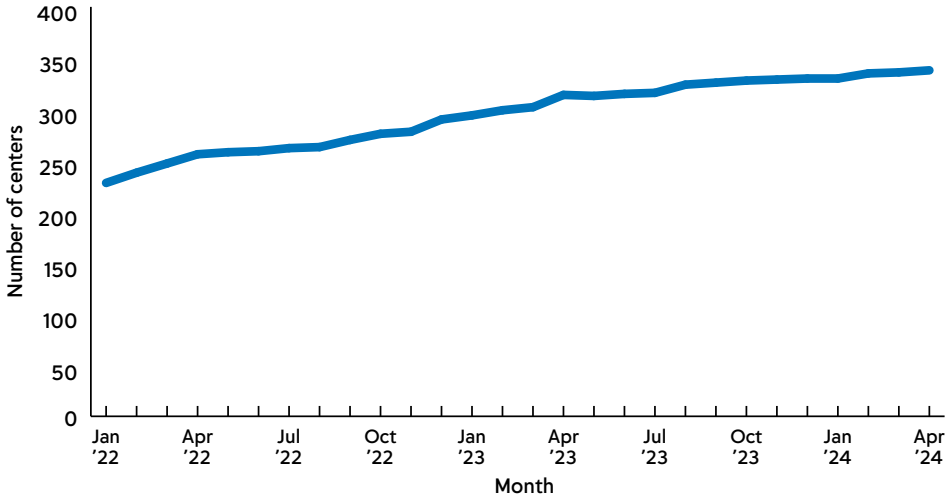


There are many types of these facilities allowed in the state, and one perhaps unique feature of the cannabis market in Michigan is the allowance of home delivery to customers/patients from licensed retailers.

- The number of home delivery provisioning centers (i.e., dispensaries) over time in Michigan is shown in Figure 1d.
- According to the most recent data, there are over 300 provisioning centers in the state which are approved to provide home delivery of recreational cannabis. This has increased from 228 in January of 2022 to 338 in April of 2024.

FIGURE 1d

Number of Home Delivery Provisioning Centers by Month



Regional Trends in Recreational Adult-Use Cannabis Availability

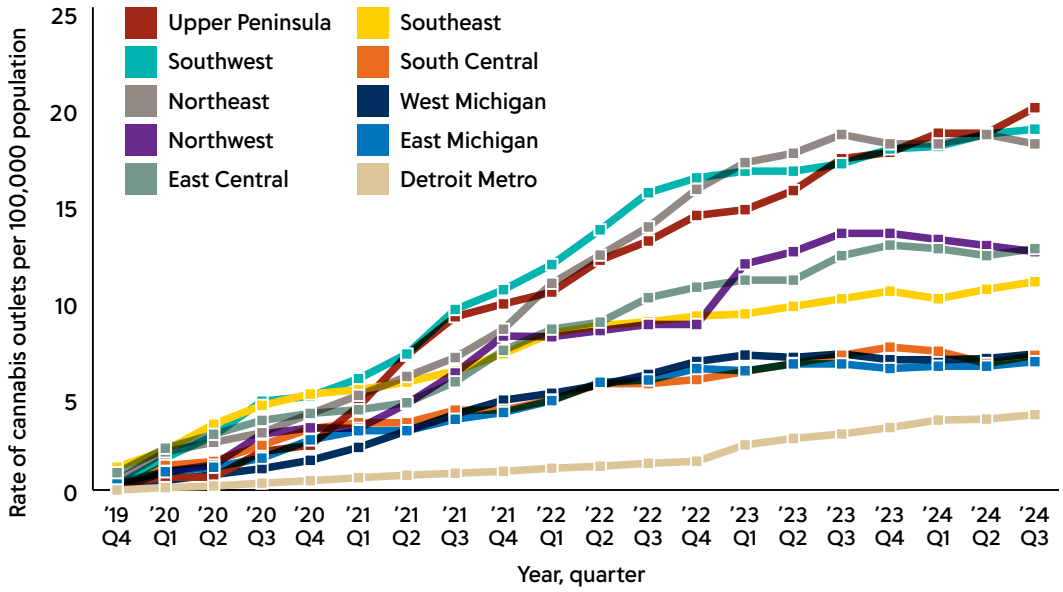
Growth in Adult-Use Establishments Allowing Sales and/or Consumption across 10 Regions

We geocoded the addresses of licensed recreational adult-use establishments allowing sales and/or consumption of cannabis (herein: adult-use retailers, adult-use Class A microbusinesses, adult-use microbusinesses, and adult-use consumption establishments) to calculate the quarter-yearly rates of active adult-use cannabis sales/consumption outlets per 100,000 residential population (per 100K hereafter) within each Michigan Prosperity Region[2] from Q3 of 2020 through Q3 of 2024. We calculated rates per 100K using estimates from American Community Survey[3] data (See Figure 1e).

- Although all regions have increased over time in the number of adult-use sales/consumption businesses per 100K, some patterns are evident. The Upper Peninsula, Southwest, and Northeast regions cluster at having the highest per capita rates, with 19.8, 18.7, and 17.9 dispensaries per 100K respectively in the most recent data.
- The Detroit Metro region has consistently had the lowest number of these businesses per capita, peaking at 3.9 per 100k in the most recent quarter for which data are available. Other regions on the lower end of per capita rates are: West Michigan, South Central, and East Michigan (7.1, 7.0, and 6.6 per 100K respectively in Q3 of FY 2024).
- The East Central, Northwest, and Southeast regions fall in the middle, at 12.5, 12.3, and 10.8 per 100K respectively in Q3 of FY 2024.

FIGURE 1e

Rate of Adult-Use Cannabis Outlets Per Capita by Michigan Prosperity Region by Quarter



Adult-Use Establishments Allowing Sales and/or Consumption by County

- In Q3 of FY 2020, the first FY that saw adult-use establishments open, there were 43 (51.8%) counties in Michigan that had zero adult-use establishments.
- By Q3 of 2021, 17 of these counties added adult-use establishments, followed by 9 more in Q3 of 2022, 6 more in Q3 of 2023, and 3 more in Q3 of 2024.
- As of Q3 of 2024 only 8 counties in the state (9.6%) did not have an adult-use establishment: Charlevoix, Huron, Keweenaw, Luce, Livingston, Marquette, Missaukee, and Sanilac.

For a more granular view of how these establishments emerged regionally over time, we display a series of 6 maps, demonstrating the changes in population density in adult-use retailers, adult-use Class A microbusinesses, adult-use microbusinesses, and adult-use consumption establishments at the county level. We geocoded the addresses of active cannabis outlets and calculated county-level prevalence rates per 100K for Q3 of 2020 through Q3 of 2024. The numbers shown within each county reflect the number of these specific cannabis business types per 100K in that county as of Q3 for each FY (See Figures 1f-1j).

- In 2020 as cannabis licenses became active, Kalkaska, Benzie, Crawford, Presque Isle, and Lenawee counties showed the highest per capita density of establishments allowing sales and/or consumption.
- For the most recent year for which data are available, Iron, Alcona, Branch, and Menominee counties display the greatest density of adult-use establishments per 100K.
- Notably, when calculating the population density of these establishments, some counties have very low density that rounded to 0 or 1 outlets per 100K. For example, the counties with only 1 licensed establishment at this time point were: Clare, Clinton, Leelanau, Mackinac, Mason, Montmorency, Oceana, Ontonagon, Osceola, Oscoda, and Presque Isle.

FIGURE 1f

Rate of Adult-Use Cannabis Outlets in 2020

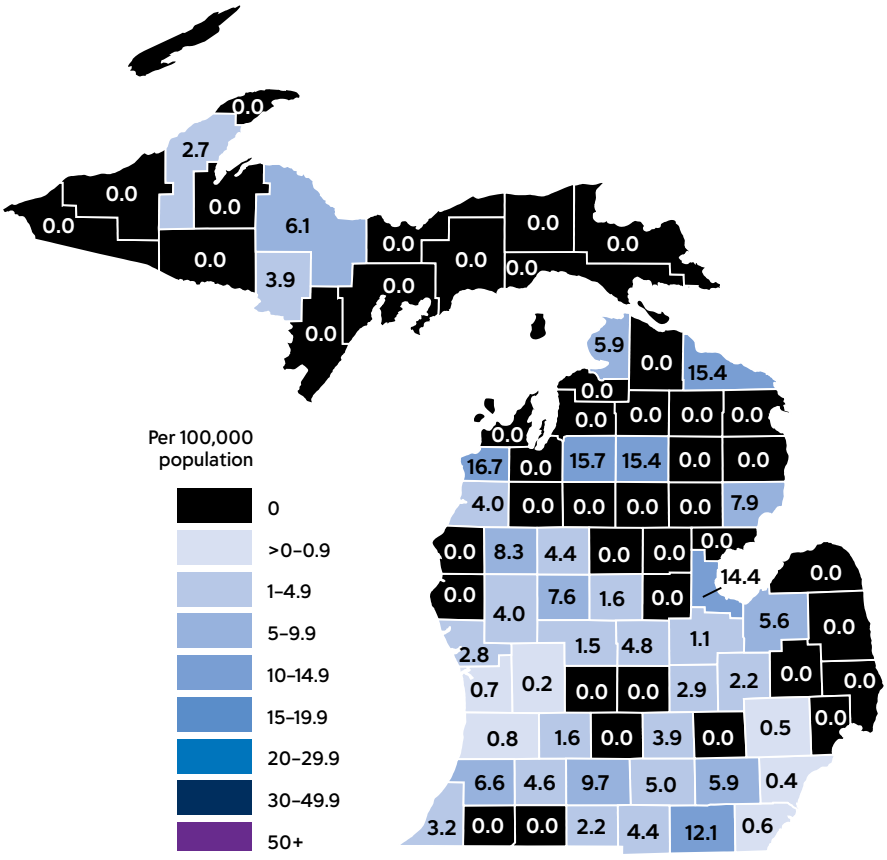


FIGURE 1g

Rate of Adult-Use Cannabis Outlets in 2021

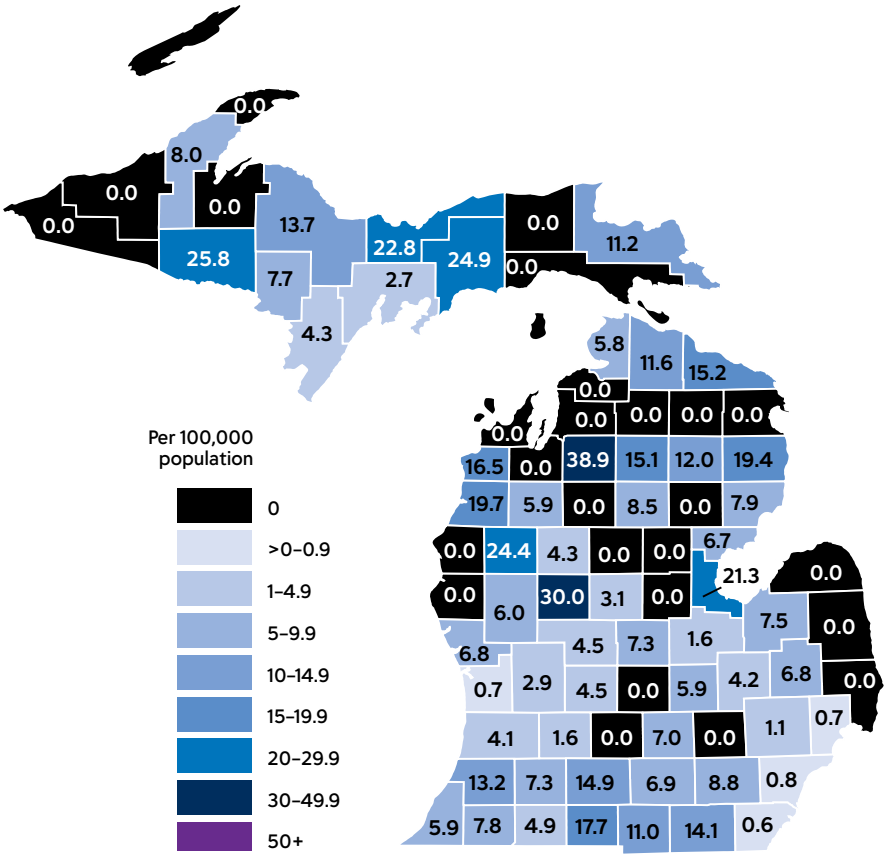


FIGURE 1h

Rate of Adult-Use Cannabis Outlets in 2022

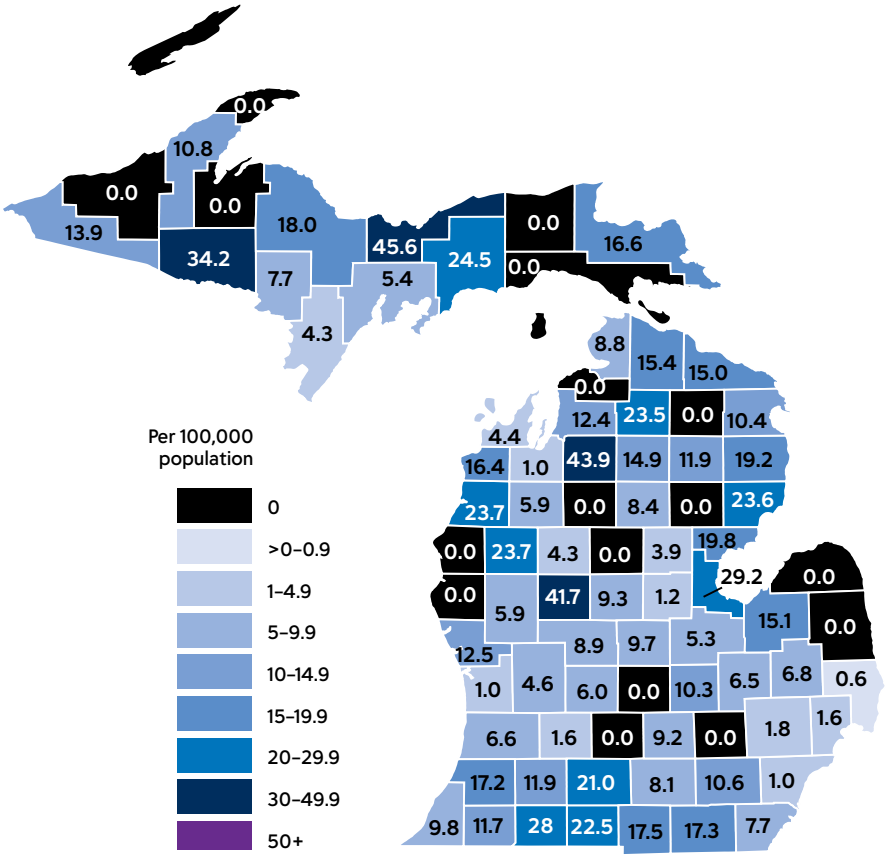


FIGURE 1i

Rate of Adult-Use Cannabis Outlets in 2023

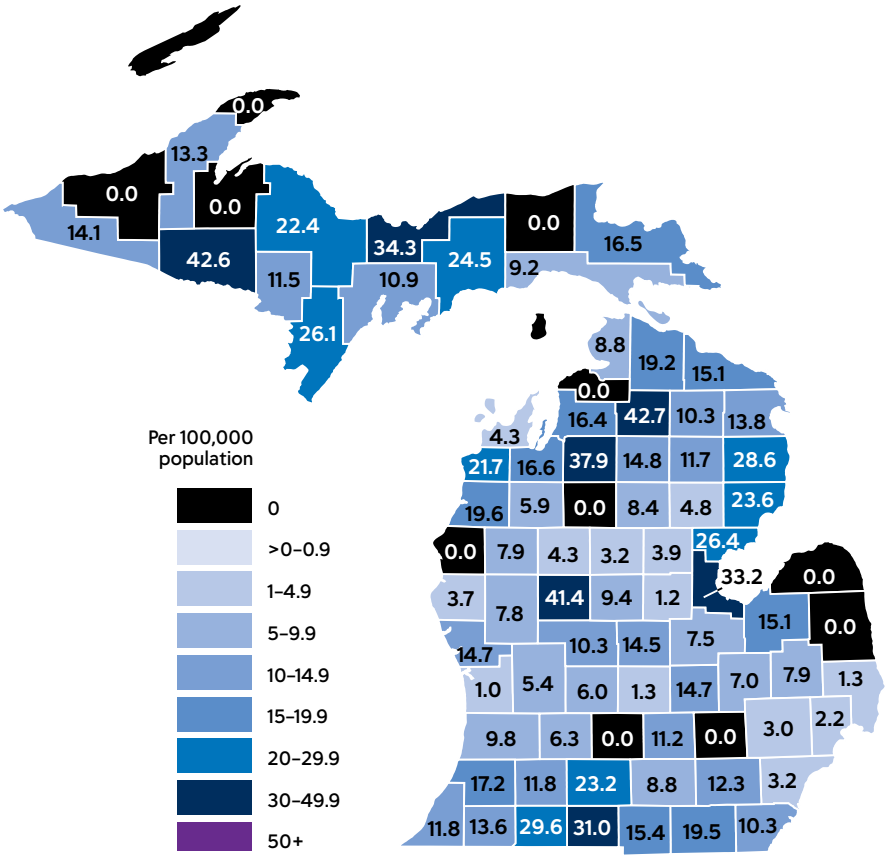
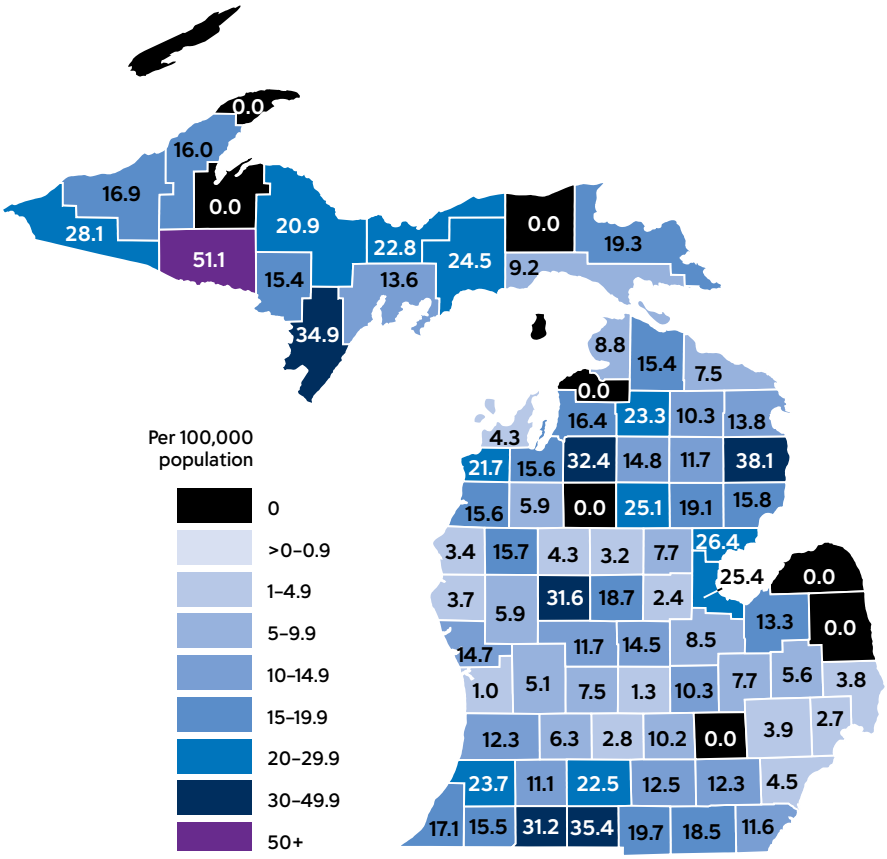


FIGURE 1j

Rate of Adult-Use Cannabis Outlets in 2024



Trends in Recreational Cannabis Sales and Associated State Revenue

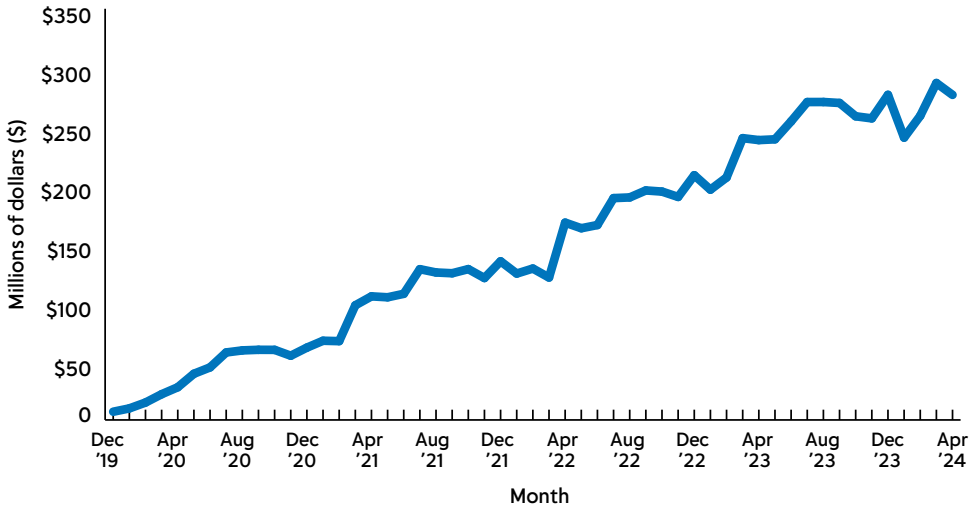
Below, using data provided by the CRA, we show different metrics for amounts of recreational cannabis sold in Michigan.

Total Recreational Adult-Use Cannabis Sales by Month

- In terms of the dollar value of state-sanctioned recreational cannabis sales, data are shown from December 2019 through April 2024 (See Figure 1k). Monthly sales figures have generally increased over time, reaching $276.69 million for the month April 2024.

FIGURE 1k

Total Sales of Recreational Cannabis by Month

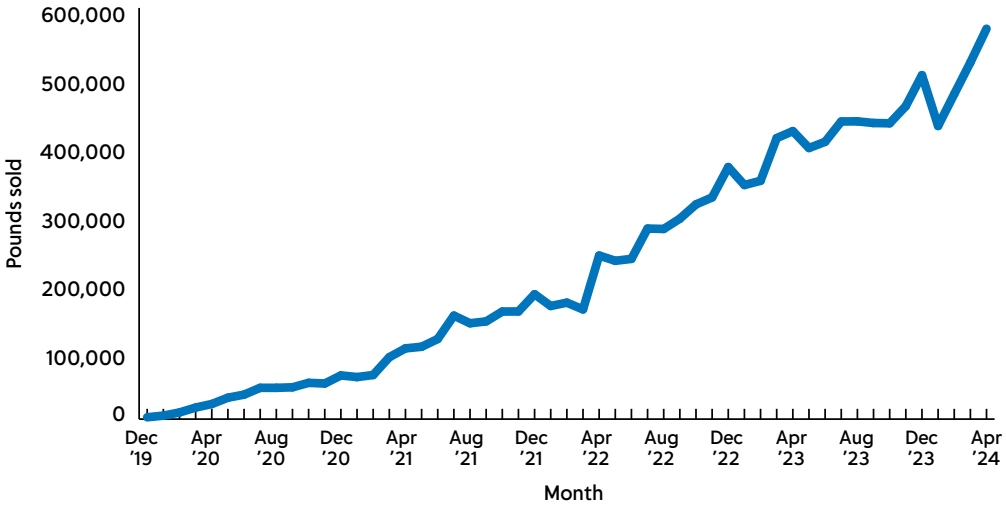


Amounts of Cannabis Sold

- Climbing sales figures are reflected in the total weight of cannabis products sold each month, which was 569,619 pounds in April 2024 (See Figure 1l).

FIGURE 1l

Pounds of Recreational Cannabis Sold by Month

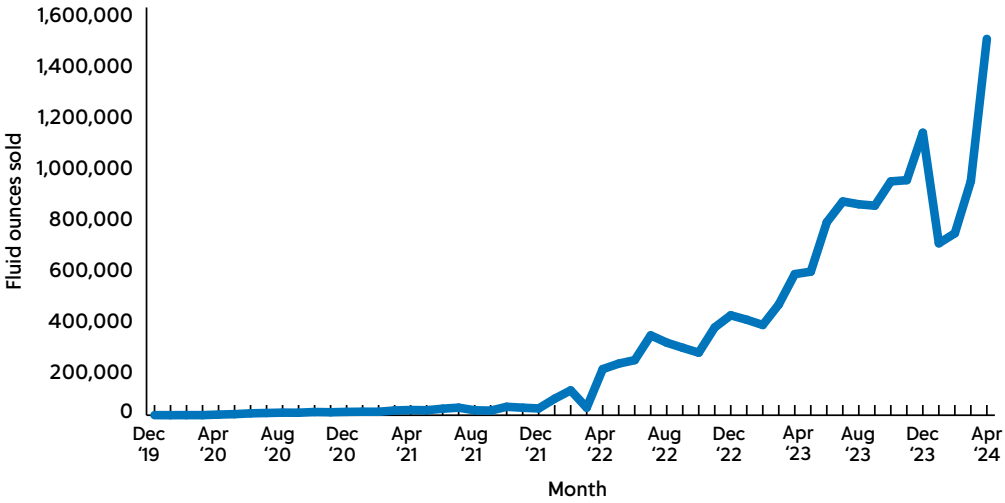


Cannabis products can be sold in many different forms; thus, the volume of liquid products is tabulated separately below (See Figure 1m).

- Across earlier time points (December 2019 to December 2021) there were virtually no fluid ounces of cannabis sold; steady increases were seen thereafter.
- For the month of April 2024, the most recent data tabulated, 1,476,715 oz. of cannabis were sold in the state.

FIGURE 1m

Fluid Ounces of Liquid Recreational Cannabis Sold by Month



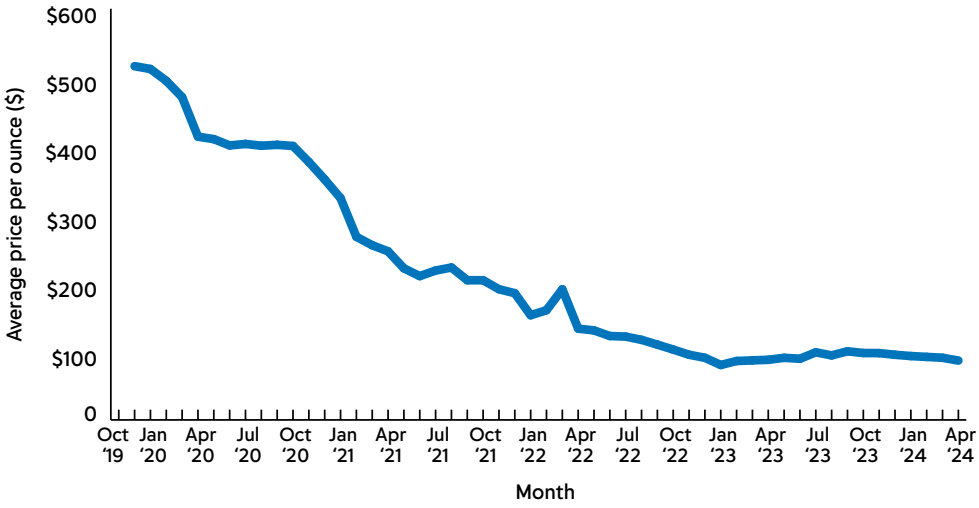
Pricing Trends in Retail Cannabis

Although not reported across all types of cannabis products, average retail pricing of cannabis flower can aid in understanding changes in revenue figures.

- Figure 1n shows the average price per ounce of cannabis flower via recreational sales. Beginning in December 2019, the average price per ounce for cannabis flower was $516.21; this dropped substantially to $86.61 by April 2024 (less than the $99.74 seen that same month for medical cannabis).
- Notably, although recreational cannabis flower started out with a higher average price, the prices of medical and recreational cannabis have been relatively similar since around June 2021, when both were at $209 per oz. (See page 33).

FIGURE 1n

Monthly Average Retail Cannabis Flower Price per Ounce of Recreational Cannabis



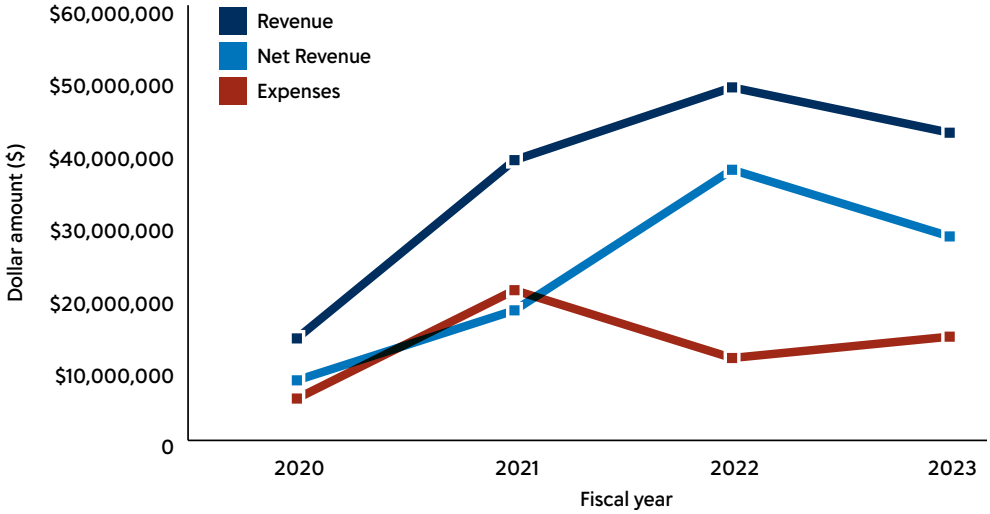
Costs Associated with the Recreational Cannabis Program Administration

Annual state reports provide information on the costs and revenue related to administering the state's recreational adult-use cannabis program. These figures *do not* include sales at dispensaries/provisioning centers.

- In its first full FY (2020), net revenue reached over $8 million and subsequently increased to $17.9 million and $37.3 million in FY 2021 and 2022, respectively. There has been a decline to $28.1 million in FY 2023 (See Figure 1o).

FIGURE 1o

Recreational Cannabis Program Revenue, Expenses, and Net Revenue by Fiscal Year



CONCLUSIONS

- The above data tell the story of how the adult-use, recreational cannabis program has emerged in the state of Michigan. Given the relatively short history of the program, mostly upward trends were observed in terms of licenses granted, products sold, and revenue.
- Notably, some metrics have decreased (revenue, applications for businesses) in recent years, which may begin to reflect a leveling out of the initial surge of growth in this industry. More recent declines may also reflect the increases in legal cannabis availability in border locations such as Ohio, which initiated licensed sales in August 2024 (though border locations along Wisconsin and Indiana show relative increases in density of retailers, which may offset this to a degree).
- Average price was one of the only metrics to show a consistent decline over time. This may reflect traditional dynamics of supply and demand, as more supply becomes available through a greater number of retailers, and relative demand has dropped, requiring a lowering in prices to attract and sustain customers. In more recent years, the average pricing for medical and recreational products has become quite similar.
- The net revenue for the state of more than $28 million in the most recent year was a decline from prior years but should be monitored as prevalence of cannabis consumption is increasing.
- Studies are needed to understand the relationship between pricing, availability, and consumer and state outcomes, particularly as consumption is increasing in key subgroups and areas.

MEDICAL CANNABIS TRENDS

INTRODUCTION

In November 2008, Michigan voters approved the Michigan Medical Marihuana Act (MMMA), which went into effect in December 2008. This law has allowed designated patients with a qualifying medical condition or their caregivers to possess a limited amount of cannabis and to grow a limited number of plants. At first, the law did not expressly allow for the operation of medical cannabis dispensaries and other related facilities. In April 2009, the state began accepting applications for patient/caregiver registry identification cards, which could be obtained with a certification of a medical condition (called a qualifying condition) from a physician. Minors under 18 can obtain medical cannabis with certification from two physicians submitted by a parent consenting to allow the minor to use medical cannabis and the parent agreeing to serve as the caregiver. In 2016, the Michigan Governor signed into law the Medical Marihuana Facilities Act (effective December 2016), which created regulations for the operations of medical dispensaries as well as businesses that grow, transport, test, and process medical cannabis. In addition, in 2018, the initial list of qualifying medical conditions was updated to include 11 new conditions. Below we report on counts of patients, caregivers, and physicians issuing medical cannabis certifications, qualifying conditions, costs, revenue, and volume of medical cannabis sold. All data reported here were obtained from the Michigan Department of Licensing and Regulatory Affairs (LARA) and the Cannabis Regulatory Agency (CRA).

FINDINGS

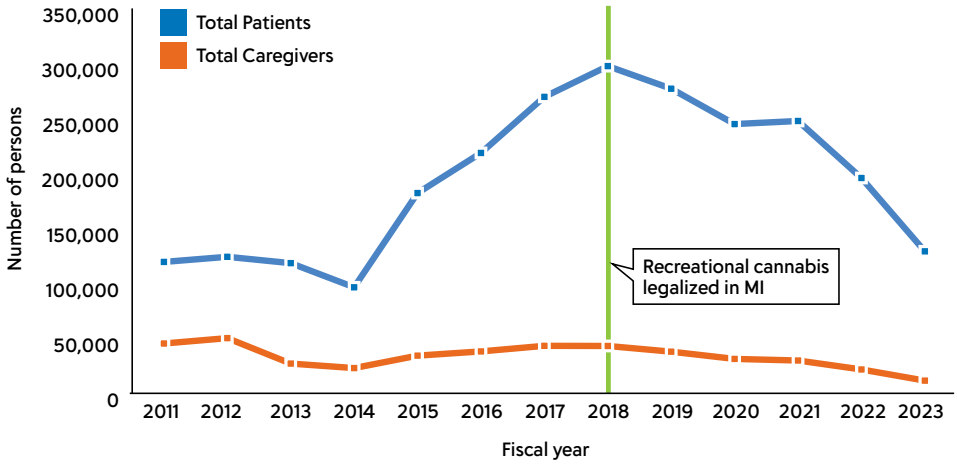
Patients, Caregivers, and Physicians

- Data from LARA demonstrate that the number of patients with a medical cannabis certification increased about 2.5 times, from 119,470 in 2011 to 297,515 in 2018.
- Since 2018, when recreational cannabis was legalized, the number of medical cannabis certifications has decreased each year, to 129,099 in 2023. (See Figure 2a).
- The number of patients in 2018 represented about 3.0% of the population within the state of Michigan. In comparison, in 2023 the number of patients represented only about 1.3% of the state's population.[4]
- In 2011 and 2012, there were 63 and 44, respectively, minors who held medical cannabis certifications, but these data have not been reported in relevant annual reports since 2012.
- The number of caregivers (e.g., adults ages 21 or older who are registered to grow and provide cannabis for identified registered and qualified patients) has fluctuated over the years. The most recent data (2023) show that there was a total of 11,554 registered caregivers, down from 43,056 in 2018 (See Figure 2a).

FIGURE 2a

Total Number of Patients and Caregivers Holding Medical Cannabis Certifications by Fiscal Year*

*Data from 2009 are excluded because the program began in this year, and data that were available reflected an incomplete fiscal year. Data from 2010 are not available per our communication with LARA.

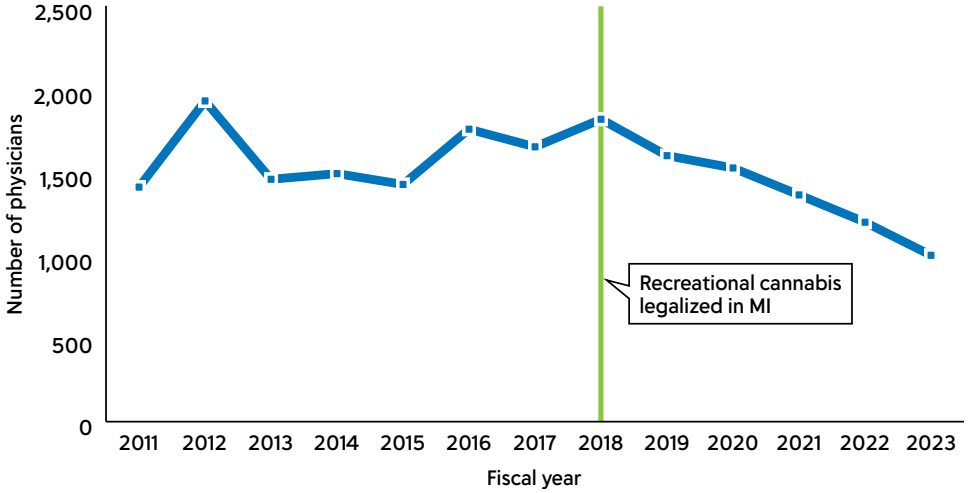


- The number of physicians issuing certifications was somewhat inconsistent from 2011 up to 2018 when there were 1,818 physicians. This number has decreased since 2018 to 1,000 physicians in 2023 (See Figure 2b).

FIGURE 2b

Total Number of Physicians Issuing Medical Cannabis Certifications by Fiscal Year*

*Data from 2009 are excluded because the program began in this year, and data that were available reflected an incomplete fiscal year. Data from 2010 are not available per our communication with LARA.



- In FY 2023, Wayne, Oakland, and Macomb counties were noted to have the highest number of certifications for patients and caregivers in the state.

Qualifying Conditions

Initially medical cannabis was approved for qualifying medical conditions and their treatment including cancer, glaucoma, HIV/AIDS, Hepatitis C, amyotrophic lateral sclerosis (ALS), Crohn's disease, agitation of Alzheimer's disease, nail patella, and any other disease or treatment that resulted in at least 1 of the following: cachexia or wasting syndrome, severe and chronic pain, severe nausea, seizures, or severe and persistent muscle spasms. On July 7, 2018, several new conditions were approved by LARA and the Medical Marihuana Review Panel and are now being tracked by the state. Some of these conditions (e.g., rheumatoid arthritis, spinal cord injury) may overlap with previously approved conditions. There are currently almost 30 qualifying medical conditions and patients may have more than one qualifying condition. Given this more recent specificity of conditions, we focus on presenting data from 2018 onward.

- The most commonly reported conditions over time involve chronic pain. Note that "chronic pain" is listed as a qualifying condition, but patients may also qualify if they have a chronic illness or condition with symptoms or side effects from treatment that result in "severe and chronic pain." Additionally, other conditions known to be associated with chronic pain are also listed as qualifying conditions (e.g., arthritis) (See Figure 2c).

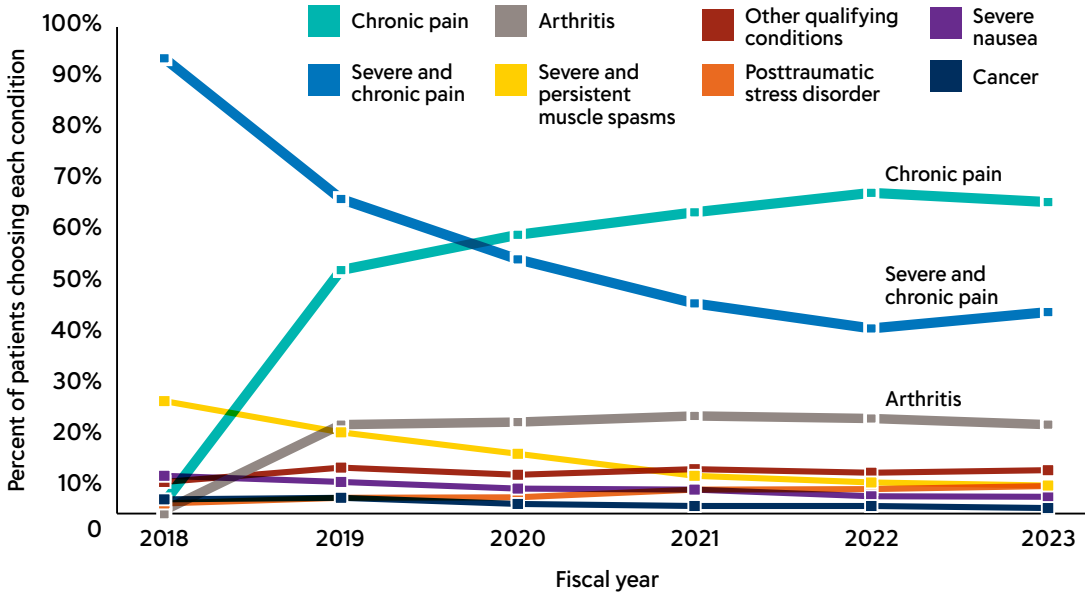
- Summarizing the most recent data from 2023, 63.0% of qualifying patients had chronic pain as a qualifying condition and 41.5% had severe and chronic pain as a qualifying condition.
- Among other qualifying conditions in 2023, arthritis was the third most frequent (19.5%), followed by severe and persistent muscle spasms (7.6%), posttraumatic stress disorder (PTSD; 7.5%), severe nausea (5.4%), and cancer (3.2%).
- All other qualifying conditions were present in fewer than 3.0% of patients and are not shown for brevity.
- Other than the trends shown in the chronic pain/severe and chronic pain qualifying conditions, which may be due to overlap in these conditions, most other conditions have been stable since 2018, with two exceptions. First, there was a notable increase from 2018 to 2019 in arthritis (from 2.0% to 19.5%, remaining relatively stable at 19.0-21.0% each year after). Second, severe and persistent muscle spasms as a qualifying condition have declined over time (from 24.1% in 2018 to 7.6% in 2023). Both trends may be related to symptomatic overlap with pain conditions.

FIGURE 2c

Qualifying Medical Conditions Most Cited by Patients by Fiscal Year

[1] "Other qualifying conditions" includes all conditions cited in less than 5% of cases in all years.

[2] In 2018, Michigan law expanded the number of qualifying conditions.



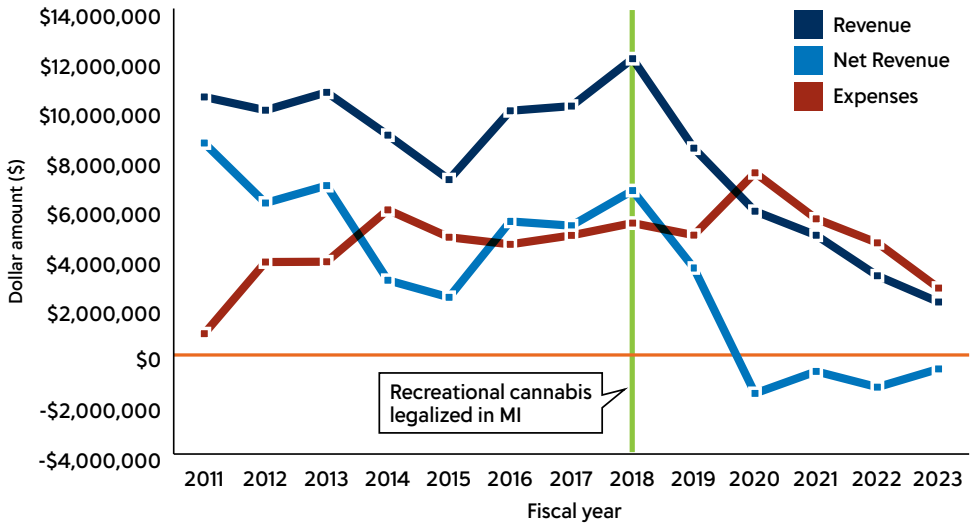
Costs Associated with Medical Cannabis Program Administration

Annual state reports provide information on the costs and revenue related to administering the state's medical cannabis program (e.g., processing initial and renewal applications for medical cannabis registry certifications). These figures do not include sales at dispensaries.[5] Prior to enacting the recreational cannabis law in 2018, net revenue for the medical cannabis program was lowest in 2014 and 2015 and highest in 2011, with a typical annual net revenue of $2-8 million (See Figure 2d).

- Since 2018, when net revenue was over $6.6 million, both revenue and expenses have sharply declined, and net revenue has been negative since 2020, sitting at -$563,567 in 2023. There are multiple factors that may be impacting this sharp decline:
    - First, as noted above, there have been fewer patients each year obtaining a medical cannabis certification, thus fewer people are paying registration fees for the program that would be included as revenue.
    - Second, on October 30, 2019, new administrative rules for the Michigan Medical Marihuana Act were introduced by the Marijuana Regulatory Agency (now called the Cannabis Regulatory Agency).[6] At this time, the patient application fee was reduced from $60 to $40. Additional fees were removed altogether, including a $25 caregiver criminal background check processing fee and $10 service fees for items such as changing names, updating caregivers, and replacement certification cards.

FIGURE 2d

Medical Cannabis Program: Revenue, Expenses, and Net Revenue by Fiscal Year



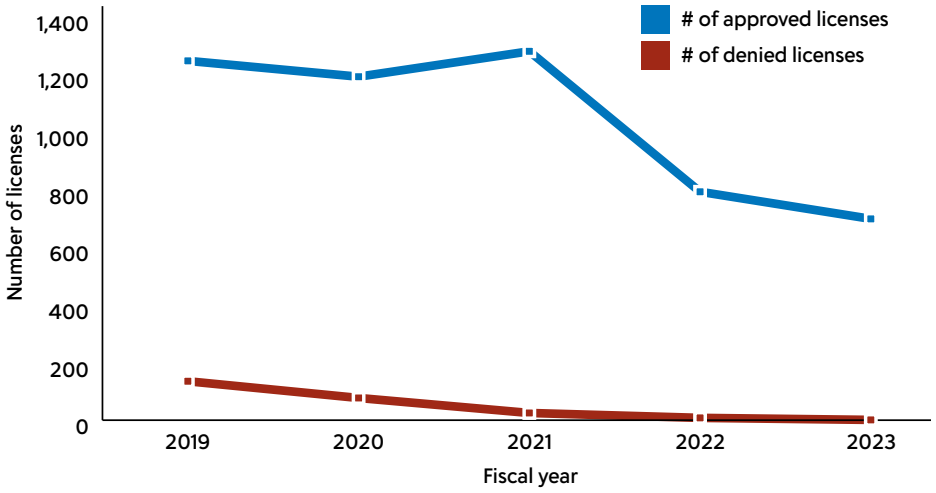
Regulations for Medical Cannabis Facilities

The Medical Marihuana Facilities Licensing Act (MMFLA) is a state licensing program enacted on December 20, 2016. The program began accepting applications in December 2017, thus data are presented for FY 2019 and onward, given 2019 was the first complete year for which data were available. Previously, the legality surrounding medical cannabis allowed for the provision of cannabis within a patient-caregiver relationship in compliance with the 2008 law, but there was no regulatory process for production, transport, facilities, or dispensaries. Thus, the state program, which formalized the regulatory process for these components of the Michigan medical cannabis program, began several years after the approval of medical cannabis use and possession. Currently, seven types of facilities are regulated through the MMFLA: growers (Class A, B, and C), provisioning centers (i.e., dispensaries, retail sales), processors, secure transporters, and safety compliance facilities. Those who want to be involved in the medical cannabis industry must undergo an MMFLA application and approval process, including gaining approval from their local municipality. A facility license is approved for one year and can be renewed annually. Greater detail about the types of facilities, processing time for applications, and other data are shown in the Cannabis Regulatory Agency's annual reports.[7]

- During FY 2019, 2020, and 2021, the number of approved medical cannabis facility licenses was relatively stable at: 1,246, 1,191, and 1,279 respectively. This has greatly declined in recent years, with FY 2023 showing only 698 approved licenses (See Figure 2e).
- Denied license applications are also shown annually and have declined to single digits in the recent years.

FIGURE 2e

Medical Cannabis Facility Licensure Approvals and Denials by Fiscal Year

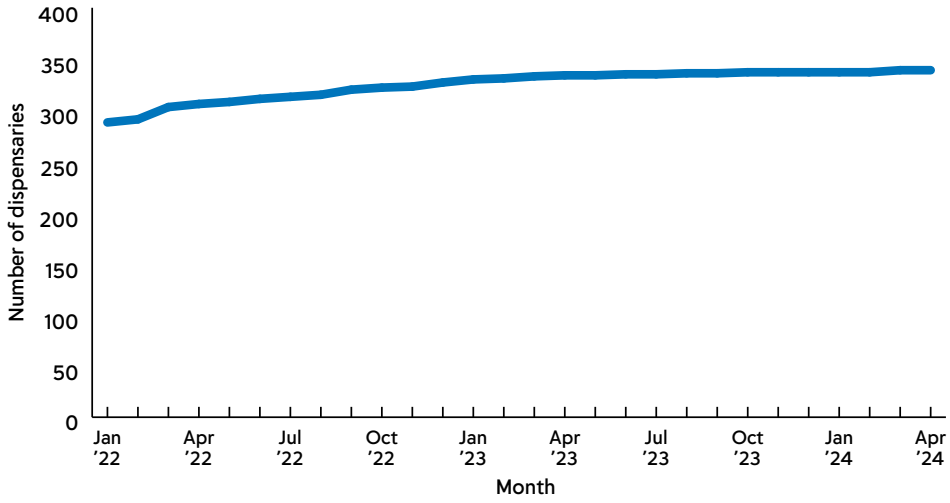


Although there are several types of facilities allowable under the MMFLA as described above, one perhaps unique feature of the cannabis policy landscape is the allowance of home delivery to customers/patients from licensed provisioning centers (also called dispensaries).

- Currently over 300 facilities exist in the state which are approved to provide home delivery of cannabis. This has increased from 288 in January 2022 to 339 in March and April 2024 (see Figure 2f).

FIGURE 2f

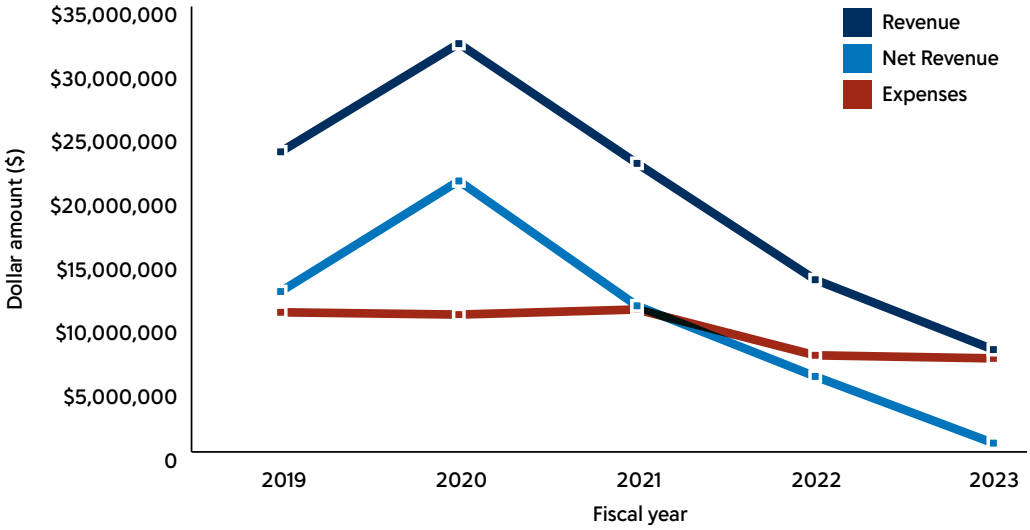
Number of Dispensaries Supplying Medical Cannabis via Home Delivery by Month



- Along with revenue and expenses related to the medical cannabis patient registry program as described above, there are fees and income generated through the facility licensing process. See Figure 2g for revenue and expenses.
- Notably, net revenue peaked in FY 2020 at $21.3 million prior to steadily and sharply declining until the most recent FY for which data were available, where net revenue was calculated at $689,356.

FIGURE 2g

Medical Cannabis Facilities Licensing Program Revenue, Expenses, and Net Revenue by Fiscal Year

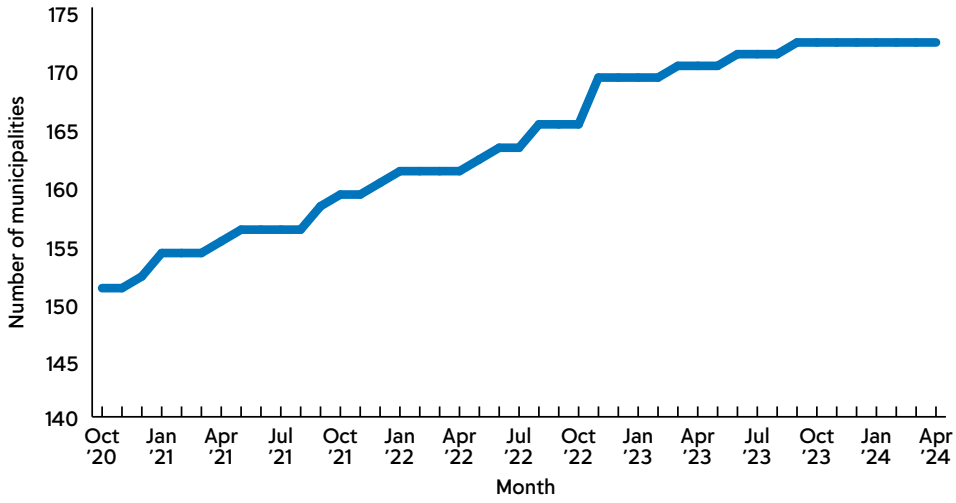


Within its 83 counties, Michigan has over 1,700 municipalities which include townships, cities, and villages. Municipalities may opt in or out of allowing medical cannabis-related businesses and facilities within their jurisdictions.

- State reports reflecting the number of municipalities opting in to medical cannabis production/distribution are shown in Figure 2h.
- October 2020 saw 151 municipalities as opting in, and this has risen to a peak of 172 in September 2023 and remains at 172 through the most recent data included (April 2024), reflecting roughly 10.0% of municipalities in Michigan.

FIGURE 2h

Number of Municipalities Opting in to Allow Medical Cannabis Businesses by Month



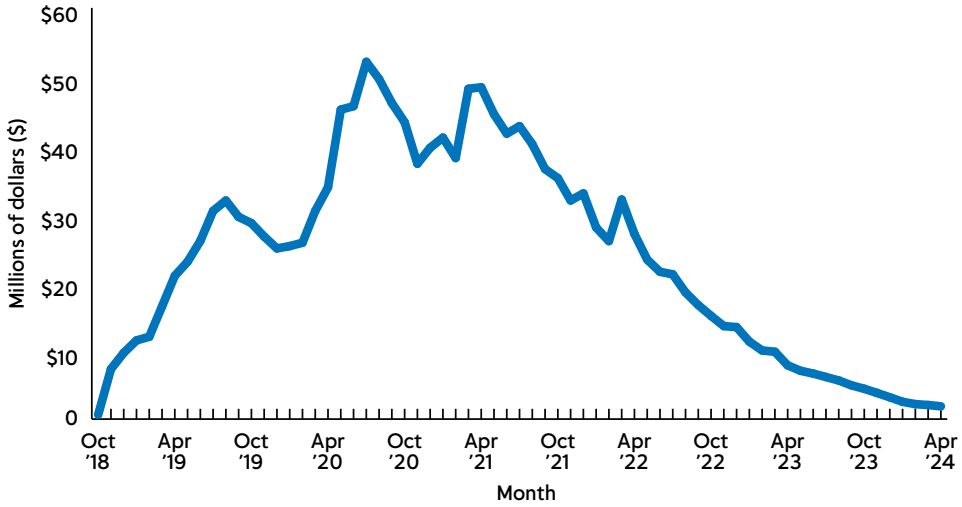
Sales of Medical Cannabis

Below, using data provided by the CRA[7], we show different metrics for amounts of medical cannabis sold under the MMFLA. It is important to note that prior to 2018, although medical cannabis was approved for use in the state, there was no regulatory structure for medical cannabis sales. During the period from 2008 to 2018, although gray market dispensaries operated, these were not officially licensed by the state, as noted to us by the CRA. Thus, as the 2016-approved MMFLA licensing process came fully onboard in 2018, state-licensed medical cannabis sales began and subsequently increased from 0.

- In terms of the dollar value of state-sanctioned medical cannabis sales, this reached a peak in July 2020 at over $52 million, although this figure dropped through the year prior to rising to its second highest in April 2021 ($48 million). Following this, the sales of medical cannabis has drastically declined to under $2 million in the most recent month reported ($1.86 million), April 2024 (See Figure 2i).

FIGURE 2i

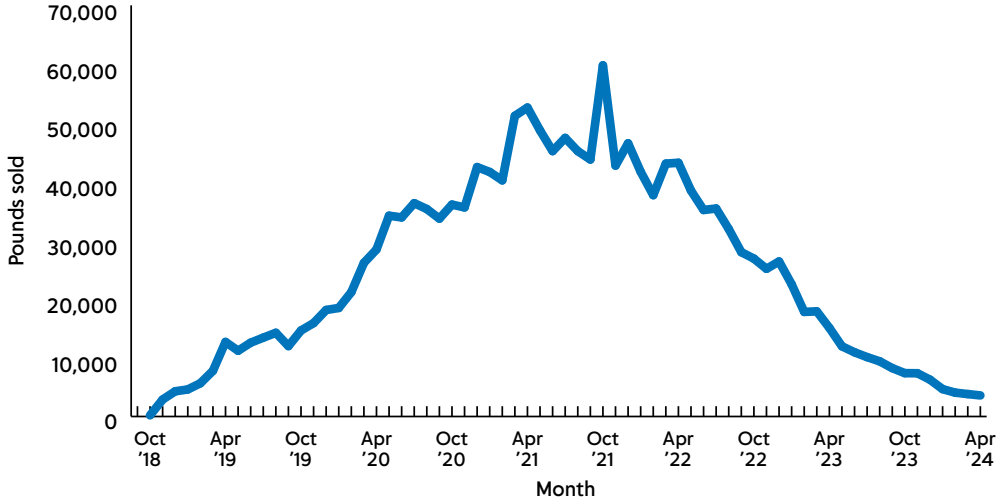
Total Sales of Medical Cannabis by Month



- The weight of state-sanctioned medical cannabis sold reached a peak in October 2021, at over 59,000 pounds sold. This has declined sharply to about 3,586 pounds in the most recent month for which data was obtained, February 2024 (See Figure 2j).

FIGURE 2j

Pounds of Medical Cannabis Sold by Month

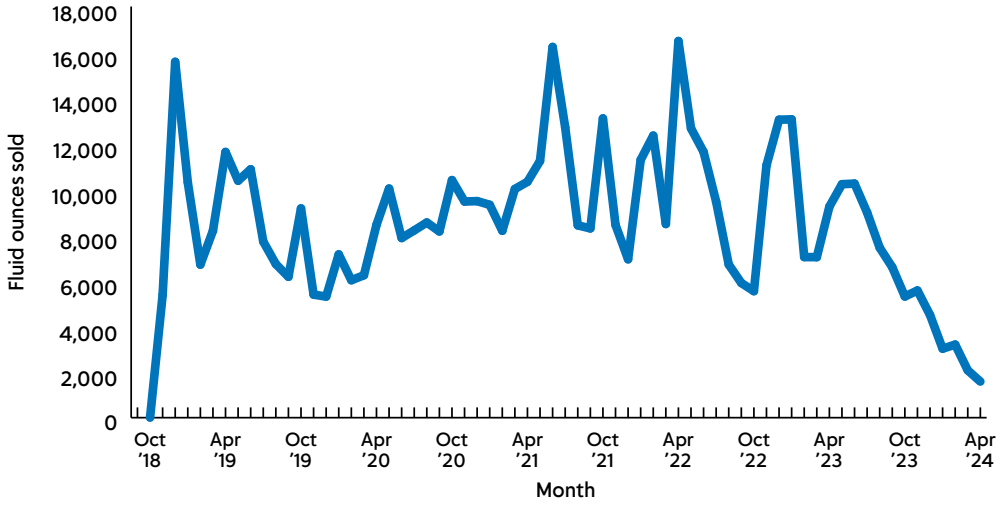


Cannabis products can be sold in many different forms, thus the volume of liquid products is tabulated separately below (See Figure 2k).

- Fluid ounces of liquid cannabis sold has fluctuated quite a bit over time, with an early initial peak in December 2018 at 15,577 fluid oz. sold. Following this, peaks were again seen in June 2021 (16,229 oz.) and April 2022 (16,488 oz.).
- More recently, since about June 2023, there has been a decline in fluid ounces sold, with the most recent month for which we report data (April 2024) dropping to 1,581 oz.

FIGURE 2k

Fluid Ounces of Liquid Medical Cannabis Sold by Month

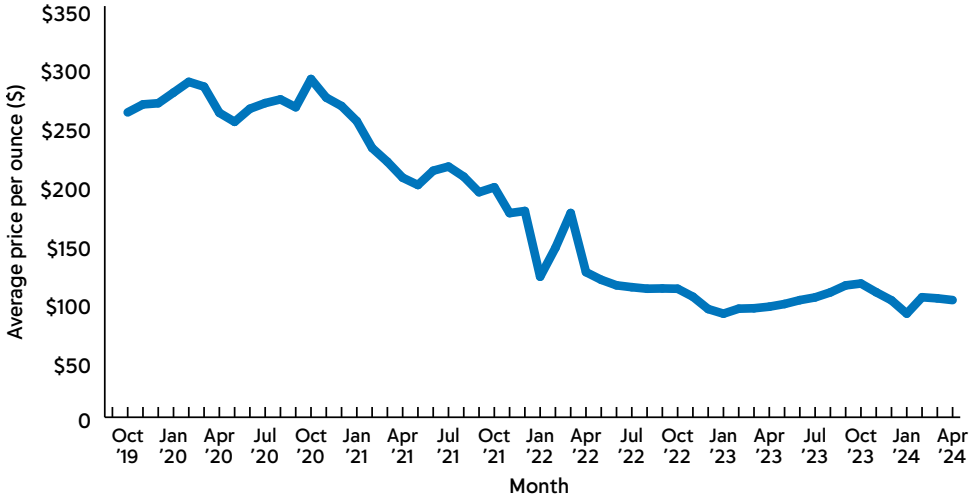


Although not reported across all types of cannabis products, average retail pricing of cannabis flower can aid in understanding changes in revenue figures.

- Figure 2l shows the average price per ounce of cannabis flower for medical sales. Beginning in October 2019, the average price per ounce for medical cannabis flower was $259.51; this dropped substantially to $99.74 by April 2024.
- Notably, although recreational cannabis flower started out with a higher average price, the prices of medical and recreational cannabis have been relatively similar since around June 2021 when both were at $209 per oz. (See page 24).

FIGURE 2l

Monthly Average Retail Cannabis Flower Price per Ounce of Medical Cannabis by Month



CONCLUSIONS

- When examining metrics of medical cannabis in Michigan, the impact of recreational cannabis legalization appears to be reflected in the decreasing number of patients and caregivers obtaining medical cannabis certifications, as well as the number of physicians providing these certifications. Although medical cannabis is taxed at a lower rate than recreational cannabis (6.0% sales tax for medical vs. 6.0% sales and 10.0% excise tax for recreational), and thus may be more affordable to some, the relative ease of obtaining cannabis through recreational dispensaries without needing to obtain physician certification and pay-related fees may be impacting patient/caregiver volume. As such, the decline in physicians providing medical cannabis certifications may reflect decreasing demand for their services.

- Although there are decreases in the numbers of patients/caregivers obtaining medical cannabis through the certification process and changes to approved qualifying conditions, pain-related conditions remain the most commonly held qualifying conditions among program members.
- Regarding state revenue and expenses related to administering the medical cannabis program for patients and caregivers (e.g., application fees), there has been a sharp decline in net revenue since legalization of recreational cannabis, to the point where net revenue for medical cannabis was -$563,567 for FY 2023.
- The MMFLA created regulations in December 2016 for the facilities involved in producing, testing, transporting, and selling medical cannabis, which were implemented over the next few years. Prior to this, facilities were operating in gray market conditions.
- Since FY 2019 (the first full fiscal year with legalized recreational cannabis), data have been made available on the number of licenses for medical facilities. FY 2023 has by far the lowest rates of approved licenses for medical facilities compared to the prior years, and application denials have declined to single digits.
- Notably, there are over 300 approved home delivery provisioning centers for medical cannabis in the state.
- MMFLA-related licensing generates revenue and expenses. After peaking in FY 2020 at a net revenue of over $23 million, net revenue has declined precipitously to around its lowest level in FY 2023 at just over $689,000.
- The most recent data show that 172 of Michigan's over 1,700 municipalities have opted in to the MMFLA.
- Sales figures for medical cannabis have been tracked through the MMFLA since 2018, when these sales officially began as facilities became licensed via the state. Total dollar sales of medical cannabis peaked in July 2020 at over $52 million, but declined to under $2 million in April 2024, showing a substantial drop in medical cannabis sales. This decline is also clearly reflected in the recent declines in pounds of medical cannabis flower and fluid ounces sold.
- The average retail price of medical cannabis dropped during the period of regulation and is now quite consistent with recreational pricing (See page 24). The most recent data show the average price per oz. at $99.74, a decrease of $159 per oz. in the period for which data are available.
- Considering the whole of these data, key conclusions are:
    - Medical cannabis use under state-sanctioned programs is decreasing. This may be attributed to the relative ease and cost of obtaining recreational cannabis, which does not rely on obtaining a state certification for patients/caregivers. In 2019 the state implemented reductions in the cost of obtaining patient/caregiver licensing. The medical cannabis program is currently generating a negative net revenue (e.g., the net revenue was -$563,567 for FY 2023) for patient/caregiver and physician fees.
    - Similarly, the number of medical cannabis facilities is decreasing, as is the revenue generated from licensing these facilities for the state (e.g., processing fees). Although at one point the MMFLA resulted in over $20 million net revenue for the state, this has drastically declined to under $1 million.
    - From a facility perspective, the revenue and sales of medical cannabis are declining in the wake of recreational cannabis legalization, while the average retail price for cannabis flower is now roughly equal whether purchased through state-sanctioned medical or recreational programs (See page 24).
- Finally, the creation of the MMFLA in 2016 led to a new system for tracking metrics related to cannabis licenses, facilities, sales, etc., that was onboarded over subsequent years, thus data are not available for some of these metrics for prior years.

LONG-TERM TRENDS IN CANNABIS USE

INTRODUCTION

Although medical and recreational cannabis use is legal at the state level in Michigan and many other states, cannabis remains an illegal drug at the federal level with no exemptions for medical use. Despite this, after alcohol and tobacco, cannabis is the third most commonly used drug in Michigan, as well as throughout the United States (US).[8] This section of the report compiles data on long-term trends in cannabis use and will address how cannabis use rates have changed over time in Michigan, providing comparisons to both the Midwest and the US in general. These trends reflect the time periods before and after the passage of the medical cannabis law (2008) and the recreational cannabis law (2018) in Michigan. Although not reported here, when evaluating cannabis use over time, it is important to note that there are documented increases in the average amount of Delta-9-tetrahydrocannabinol (THC; the psychoactive component of cannabis that results in a "high") found in cannabis nationally[9,10], and that this increase in potency is associated with accelerated onset of symptoms of cannabis use disorder (CUD).[11]

FINDINGS

The National Survey on Drug Use and Health (NSDUH), which began in 1971, is a nationwide study that provides annual data on alcohol, drug, and tobacco use in the US. It is one of the most comprehensive population-based surveys of drug use and health in the US and is conducted in all 50 states and the District of Columbia.[12] Each year, the NSDUH team interviews US residents aged 12 years or older, thus all data below reflect ages 12 or older. All interviews are conducted in private. State-level estimates for Michigan (as well as national and regional estimates) are from the Interactive NSDUH State Estimates website (available at: https://datatools.samhsa.gov/saes/state), where data are provided in combined two-year intervals. Data from 2020 are not included due to the impact of the COVID-19 pandemic on the data collection.

Trends in Self-Reported Past-Year Cannabis Use in Michigan

In the following section, data from the NSDUH provide estimates regarding the percentage (prevalence) of people using cannabis in Michigan, how these estimates have changed over time, and how these percentages compare with the rest of the US. Understanding the percentage of people in Michigan using cannabis and the trends in this use over time will allow public health practitioners to monitor any changes in prevalence of use, especially before and after the enactment of the recreational cannabis law in Michigan, and can allow for comparisons with other states that have similar laws. Data on both past-year and past-month cannabis use are reported for the sake of completeness. Further, it is important to note that NSDUH measures "cannabis use" by asking about use of marijuana or hashish that is usually smoked, cooked in food, or used as hash oil. Note also that the most recent state-level data that are publicly available are from 2021-2022. Finally, NSDUH indicates that "Estimates from 2021-2022 are not comparable to estimates from previous years due to changes in NSDUH survey methodology," thus we recommend that readers consider this when reading descriptions of the data below.

Past-Year Cannabis Use in Michigan

- In 2021-2022, an estimated 25.6% of Michigan residents ages 12 or older reported past-year cannabis use. Note that although the percentage was 20.8% in 2018-2019, past-year cannabis use was rising prior to 2018-2019.
- For 2021-2022, Michigan ranked 11th (tied with Montana) out of the 50 states and the District of Columbia in terms of the percentage of residents that reported past-year cannabis use. In data from 2016-2017 included in our baseline report, Michigan ranked 15th in the nation.
- Of note, in 2021-2022, Vermont had the highest percentage of residents reporting cannabis use (32.9%) and Alabama had the lowest percentage of residents reporting cannabis use (13.5%)[8] (See Figure 3a). [Note: During 2021-2022, Vermont had recreational and medical cannabis laws, and Alabama approved medical cannabis law in 2021, but the law has been delayed in its implementation.]

Comparing Trends in Michigan to the Midwest and Other US States

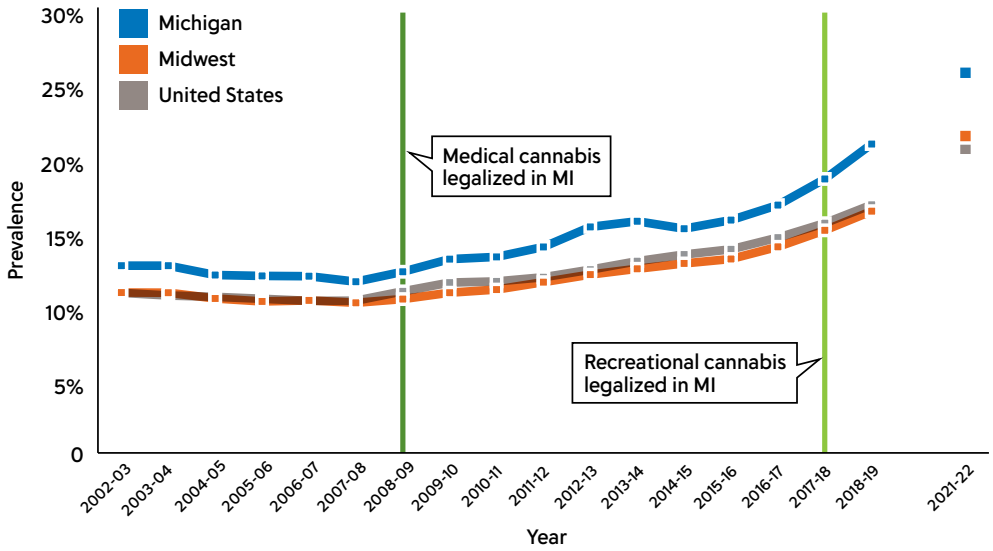
- Between 2002-2003 and 2016-2017, there was a 32.5% increase in reported past-year cannabis use among Michigan residents (increasing from 12.6% in 2002-2003 to 16.7% in 2016-2017)[8] (See Figure 3a). More recently, between 2016-2017 and 2021-2022, there has been a 53.3% increase in past-year cannabis use among Michigan residents (increasing from 16.7% in 2016-17 to 25.6% in 2021-2022).
- In 2021-2022, the percentage of Michigan residents reporting past-year cannabis use was 25.6%, which is higher than the prevalence among residents in the entire Midwest region (21.3%) and the US population overall (20.5%).
- Examination of these trends since 2002-2003 suggests that Michigan's rate of increase for past-year cannabis use (i.e., 103.2% increase in prevalence of use since 2002-2003) is rising slightly faster than both the Midwest region (i.e., the prevalence of past-year use has increased by 97.2% from 2002-2003 to 2021-2022) and the overall US prevalence, which has increased 89.8% from 2002-2003 to 2021-2022.

The increases in prevalence of past-year cannabis use have almost exclusively occurred since 2008, which coincides with the 2008 legalization of medical cannabis use in Michigan. Specifically, the prevalence of past-year cannabis use was relatively flat between 2002-2003 and 2007-2008, followed by a 36.8% increase in prevalence between 2008-2009 and 2016-2017, during the window when only medical cannabis was legal. There has been a further 38.8% increase in prevalence after recreational cannabis legalization in Michigan when comparing 2017-2018 and 2021-2022.

FIGURE 3a

Cannabis Use in the Past Year Among Individuals Ages 12 or Older by Geographic Area

*Data from 2020 are not included due to the impact of the COVID-19 pandemic on data collection.



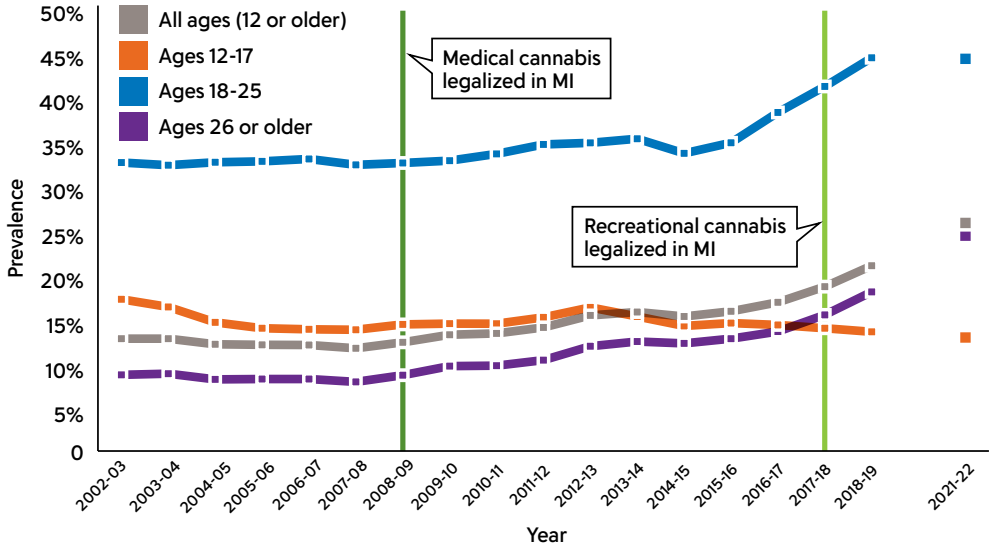
Past-Year Cannabis Use in Michigan by Age Group

- In Michigan, the young adult age group (ages 18-25) has the highest prevalence of cannabis use as compared with other age groups, with 44.0% reporting past-year use in 2021-2022 (See Figure 3b). Cannabis use among young adults appeared to be rising prior to recreational cannabis legalization (e.g., 33.4% in 2014-2015 to 44.1% in 2018-2019).
- For adults ages 26 or older, as a group, 24.2% used cannabis in the past year in 2021-2022. Use among adults appeared to be steadily rising prior to recreational cannabis legalization (e.g., 8.5% in 2008-2009 to 17.9% in 2018-2019).
- Among 12-17-year-old adolescents, 12.7% reported past-year use in 2021-2022. Use among adolescents appeared to be declining steadily prior to recreational cannabis legalization (e.g., 16.1% in 2012-2013 down to 13.4% in 2018-2019).

FIGURE 3b

Cannabis Use in the Past Year Among Individuals Ages 12 or Older in Michigan by Age Group

*Data from 2020 are not included due to the impact of the COVID-19 pandemic on data collection.



Trends in the Percentage of People in Michigan Reporting Past-Month Cannabis Use

In the following section, data from the NSDUH are used to estimate the percentage of people reporting cannabis use in the past month in Michigan, how this has changed over time, and how these trends compare with the Midwest and other US states.

Past-Month Cannabis Use in Michigan

- In 2021, 18.5% of Michigan residents reported past-month cannabis use. Prior to 2018-2019, past-month cannabis use was rising (See Figure 3c).
- Michigan ranks 12th out of the 50 states and the District of Columbia with respect to the percentage of residents reporting past-month cannabis use. This is a rise in the ranking from our baseline report when Michigan ranked 14th.
- For comparison, Vermont had the highest percentage of residents reporting past-month cannabis use (24.2% of population) and Alabama had the lowest (8.7% of population).[8]

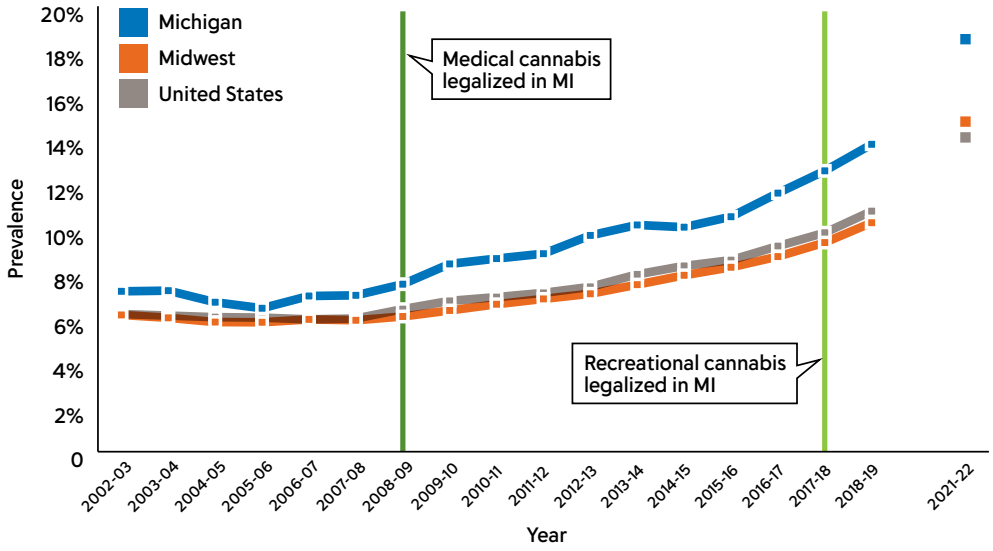
Comparing Trends in Michigan to the Midwest and Other US States

- The prevalence of past-month cannabis use in Michigan increased 61.1% since 2002-2003, rising from 7.2% in 2002-2003 to 11.6% in 2016-2017 among individuals aged 12 years or older[8] (See Figure 3c). By 2021-2022, it further increased by 59.5% to a past-month prevalence of 18.5% among individuals ages 12 years or older.
- The percentage of people reporting past-month cannabis use has been consistently higher in Michigan than in the Midwest region, as a whole, or the US overall, since 2002-2003.
- Examination of these trends shows the increase among Michigan residents (156.9% increase in prevalence from 2002-2003 to 2021-2022) has occurred faster than those among other residents within the Midwest region as a whole (increased 142.6% from 2002-2003 to 2021-2022), as well as the US in general, which increased 127.4% from 2002-2003 to 2021-2022.
- Of note, the increasing prevalence of past-month cannabis use among Michigan residents has almost exclusively occurred since the legalization of medical cannabis in 2008, with a relatively stable prevalence between 2002-2003 and 2007-2008 and a 65.7% increase between 2007-2008 and 2016-2017. Further, since the legalization of recreational cannabis in 2018, Michigan saw an additional 46.8% increase in past-month use (increasing from 12.6% in 2017-2018 to 18.5% in 2021-2022).

FIGURE 3c

Cannabis Use in the Past Month Among Individuals Ages 12 or Older by Geographic Area*

*Data from 2020 are not included due to the impact of the COVID-19 pandemic on data collection.



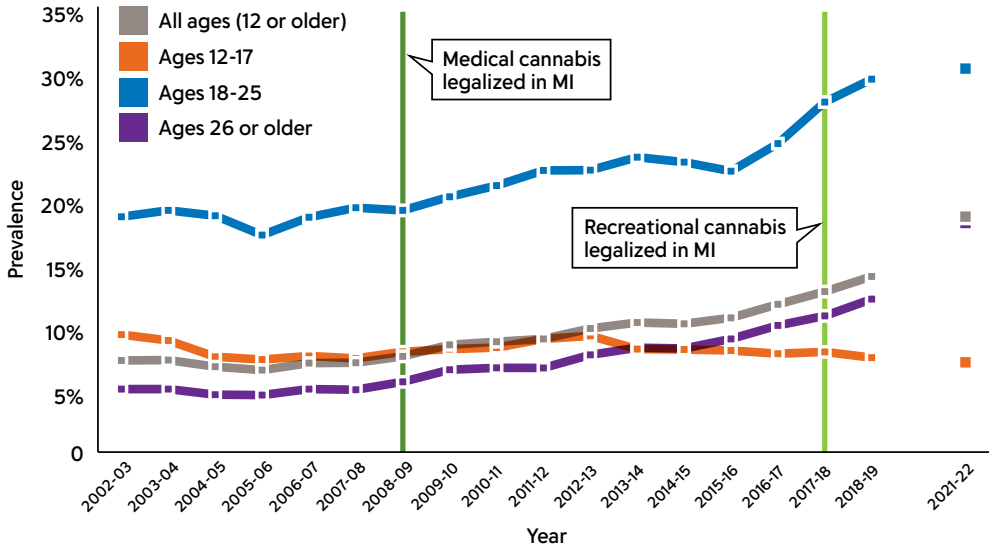
Past-Month Cannabis Use in Michigan by Age Group

- In Michigan, young adults (ages 18-25) have the highest prevalence of past-month cannabis use when compared with other age groups, with 30.1% reporting past-month use in 2021-2022[8] (See Figure 3d). Cannabis use among young adults has been increasing since 2015-2016 when the percentage of young adults with past-month cannabis use was 22.1%; it rose to 27.5%.
- For adolescents, past-month use has been steadily declining over time from peaks of just over 9.0%. For example, 9.1% of adolescents reported past-month use in 2012-2013, dropping to 7.4% in 2018-2019 and 7.1% in 2021-2022.
- Use among adults ages 26 or older has been increasing over time since the legalization of medical cannabis (5.5% in 2008-2009), reaching 10.7% in 2017-2018. There was a 68.2% jump to 18.0% prevalence in 2021-2022.

FIGURE 3d

Cannabis Use in the Past Month Among Individuals Ages 12 or Older in Michigan by Age Group*

*Data from 2020 are not included due to the impact of the COVID-19 pandemic on data collection.



Initiation of Cannabis Use Among Michigan Residents

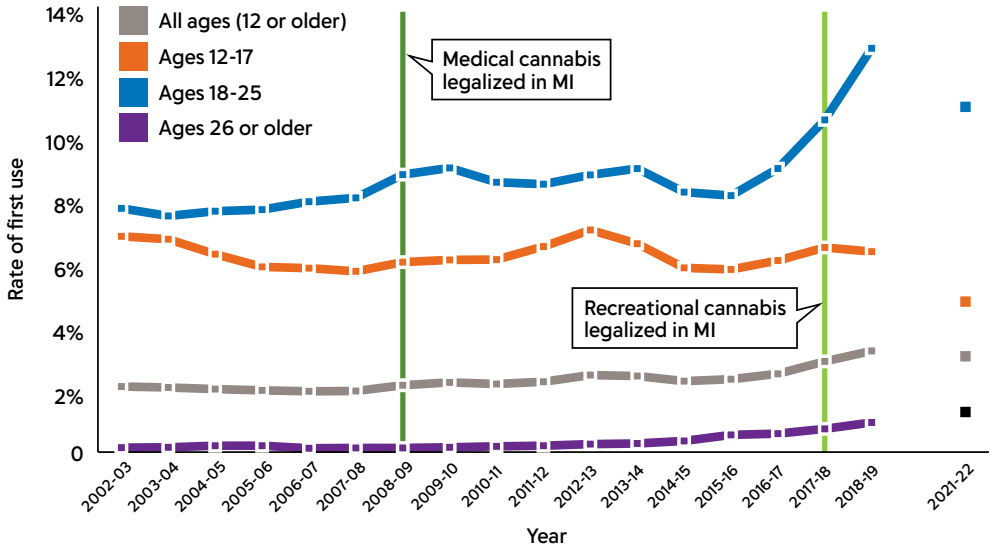
The following section details the percentage of individuals who report that they used cannabis for the first time in the past year. Examining the trends regarding these estimates may give public health professionals an understanding of how legalization at both the medical and recreation level impacts the initiation of cannabis use, and whether additional prevention programming needs to be implemented in the state in response to changes in cannabis policy.

- In 2021-2022, 3.0% of all Michigan residents (ages 12 or older) reported using cannabis for the first time (See Figure 3e).
- There was a 42.9% increase in first-time cannabis use when comparing rates in 2021-2022 (3.0%) to rates in 2002-2003 (2.1%).[8] During the onset of legalization, these percentages were increasing (2.9% in 2017-2018 and 3.2% in 2018-2019), with a small decline to a rate of 3.0% in the most current data from 2021-2022.
- In Michigan, the highest prevalence of first-time use has consistently been among young adult populations since 2002-2003, with the lowest rate of first-time use occurring among those who are ages 26 or older. The prevalence estimates for cannabis initiation in 2021-2022 were 10.9% for young adults, 4.7% for adolescents, and 1.3% for adults ages 26 or older.
- For young adults, new initiation increased in the years leading up to and immediately following recreational cannabis legalization (2015-2016: 8.1%, 2017-2018: 10.4%, 2018-2019: 12.7%), though the most recent rate has dropped to 10.9%.
- Adolescent initiation ticked up slightly immediately following recreational cannabis legalization (2015-2016: 5.7%, 2016-2017: 6.0%, 2017-2018: 6.4%). However, it has not returned to its recorded high of 7.0% (2012-2013). In 2021-2022, adolescent initiation reached its lowest recorded level at 4.7%.
- Initiation among adults has slowly increased since 2002-2003. For example, in recent years, initiation estimates rose from 0.5% in 2015-2016 to 0.7% in 2017-2018, to 0.9% in 2018-2019 at the onset of recreational cannabis legalization, and to 1.3% in 2021-2022.

FIGURE 3e

Average Annual Rate of First Use of Cannabis in Michigan by Age Group*

*Data from 2020 are not included due to the impact of the COVID-19 pandemic on data collection.



CONCLUSIONS

- Past-year and past-month prevalence estimates of cannabis use, or the percentage of residents using cannabis, in Michigan are higher than those observed in the entire Midwest region and across the US as a whole.
- Both the past-year and past-month prevalence of use has been increasing across Michigan since 2002-2003; these rates are increasing faster in Michigan than across the Midwest. The observed increases in prevalence of use among Michigan residents has notably occurred in the years following legalization of medical and, even further, recreational cannabis use. More years of data are needed to aid direct comparisons of use rates before and after legalization of recreational cannabis use, given changes to the NSDUH survey methodology.
- Young adults (ages 18-25) consistently had the highest prevalence of use, at both timescales (past-year and past-month), and the highest rates of cannabis use initiation.
- From 2002-2003 to 2021-2022, rates of initiation (i.e., first use) of cannabis use were highest among adolescents (ages 12-17) and young adults (ages 18-25), whereas initiation was relatively rare for Michigan residents ages 26 or older.

PUBLIC PERCEPTIONS OF CANNABIS RISKS

INTRODUCTION

This section of the report characterizes public perceptions of risks associated with cannabis use. Data presented below display how these perceptions have changed over time in Michigan and examine changes prior to as well as following the passage of the Michigan medical and recreational cannabis laws. Future iterations of this report may provide additional years of data and possible further clarity regarding whether and how perceived risk of cannabis use changes following the passage of such laws. Trends in perceived risk of cannabis use can reflect changing societal norms. In particular, understanding public opinion (i.e., about the risk of using cannabis) can inform avenues for public health messaging and educational efforts. Further, understanding perceptions of the risk of harm from cannabis use is important, as it is a strong indicator of future use.[13,14]

FINDINGS

Michigan Trends in Perceptions of Great Risk Associated with Cannabis Use

The following section details state-representative data that come from individuals' perceptions regarding the risk associated with using cannabis. Data come from annual National Survey on Drug Use and Health (NSDUH) surveys, which include the following question: "How much do people risk harming themselves physically or in other ways when they smoke marijuana once a month?" Respondents can choose from the following answer choices: no risk, slight risk, moderate risk, or great risk; data below are based on NSDUH state-level reports of the percentage of people reporting "great risk."[15] State-level estimates for Michigan are from the Interactive NSDUH State Estimates website (available at: https://datatools.samhsa.gov/saes/state), where data are provided in combined two-year intervals.

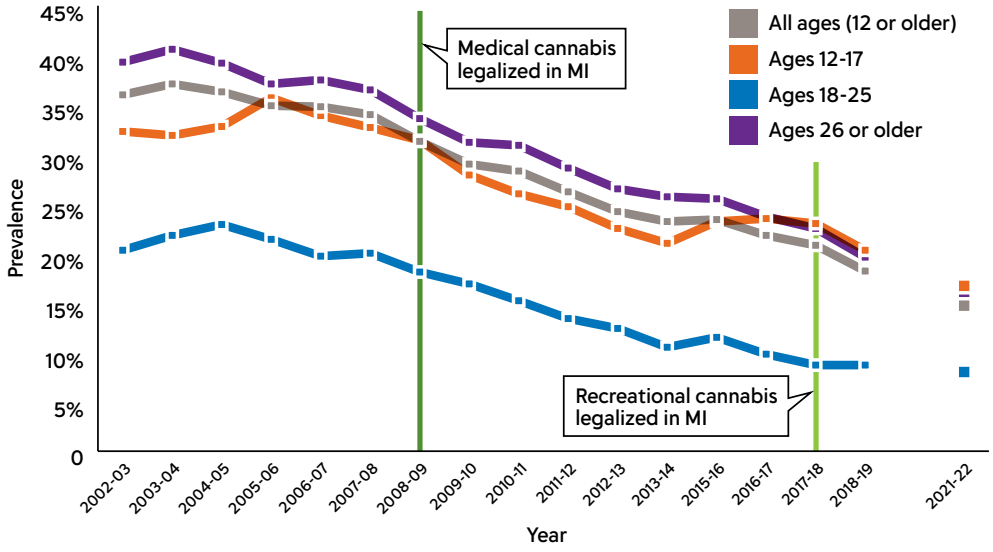
Cannabis Risk Perceptions

- Overall, 14.7% of the Michigan population perceived that smoking cannabis once a month would result in a "great risk" of personal harm in 2021-2022. This is a 59.1% decline in the percentage of the population that characterized this level of use as posing a "great risk" since 2002-2003 (36.0%) and a 32.4% decline since 2016-2017 (21.8%), which was just prior to implementation of the recreational cannabis law in the state (See Figure 4a).[16,17]
- As a group, young adults (ages 18-25) consistently had the lowest levels of perceived risk, as characterized by the percentage of that population reporting that smoking cannabis once a month posed a "great risk" of personal harm (8.0% in 2021-2022). Although the perceived risk of smoking cannabis decreased across all age groups, those ages 26 or older demonstrated the largest reduction over the past 5 years, from 23.7% of the population in 2016-2017 to 15.6% in 2021-2022.

FIGURE 4a

Prevalence of Reporting Perceptions of Great Risk from Smoking Cannabis Once a Month Among All Persons Ages 12 or Older in Michigan by Age Group*

*Data from 2020 are not included due to the impact of the COVID-19 pandemic on data collection.



CONCLUSIONS

- Michigan residents' perceptions regarding the risk of smoking cannabis regularly have decreased over the past two decades, with perception of risk lowest among young adults (ages 18-25), the age group with the highest prevalence of cannabis use in the general population in Michigan (See page 37).
- Due to changes in the methodology of the survey conducted, it is not clear yet how risk perceptions may or may not have changed since implementation of the recreational cannabis law in 2018.
- Note also that the NSDUH no longer provides public access to state-level data on other cannabis-related beliefs (e.g., perceptions of legal penalties, perceived ease of obtaining cannabis, parental approval/disapproval), which precludes ongoing monitoring of trends in these beliefs in relation to recreational cannabis legalization.
- Public health messaging that accurately conveys the appropriate risks, harms, and potential benefits of cannabis use is warranted—particularly as the potency of cannabis continues to rise—because increased potency is associated with increased risk for adverse outcomes.[11,18] Risk perceptions related to other cannabis use modalities (e.g., vaping, dabbing, edibles) should also be examined.[19]

IMPACTS

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CANNABIS USE AND PREGNANCY

INTRODUCTION

There is growing interest and concern regarding cannabis use among specific population subgroups, including women of childbearing age. These women are of particular concern, given potential adverse effects of cannabis use on the developing fetus during pregnancy.[20-23] Furthermore, maternal use of cannabis post-partum is associated with increased risk for adverse experiences for the developing child.[24-26] The Michigan Pregnancy Risk Assessment Monitoring System (MI PRAMS) provides unique data regarding cannabis use in and around the perinatal period among mothers giving birth.[27] Specifically, MI PRAMS is an annual survey of mothers who are Michigan residents and deliver a live-born singleton, twin, or triplet infant in-state. Surveys occur around 9-12 weeks after birth, and responses by mail, web, and phone are accepted until 9 months after birth; most survey responses are obtained between 3 and 6 months following birth. Cannabis questions were added to the MI PRAMS starting in 2016; our 2020 baseline report was based on 3,695 survey respondents from the 2016 and 2017 birth years, representative of 217,729 Michigan mothers. In this section, we will review the current (2,726 respondents representing 200,629 mothers) and prior data on cannabis use among new mothers in Michigan before pregnancy (12 months before), during pregnancy, and in the time after delivery (since the new baby was born).

FINDINGS

Cannabis Use Among Mothers Giving Birth in 2016-2017 vs. 2021-2022

In 2021 and 2022, the majority (74.4%) of Michigan mothers who gave birth did not report using cannabis at any time point (i.e., before, during, or after pregnancy), while approximately 9.0% reported using cannabis at some point during their pregnancy (See Table 5a). This percentage (9.0%) comprises 7.1% who used before, during, and after their pregnancy, 1.5% who used before and during their pregnancy but not after, and 0.4% who only used during their pregnancy. Compared to our baseline report data from 2016 to 2017 the percentage of mothers who used cannabis during pregnancy increased more than three-fold (from 2.9% to 9.0%).

TABLE 5a

Cannabis Use Among Mothers Who Gave Birth in Michigan 2016-2017 vs. 2021-2022

^ Relative Standard Error exceeds 30%, interpret with caution

* Estimate suppressed due to <6 responders or RSE exceeding 50%

	2016-2017	2021-2022
No use at any time points measured (before, during, after pregnancy)	**86.7%**	**74.4%**
Used during pregnancy	**2.9%**	**9.0%**
Used at all time points measured (before, during, after pregnancy)	2.0%	7.1%
Used before and during and stopped after	0.7%	1.5%
Used during pregnancy only^	0.2%	0.4%
Used before pregnancy only	**7.6%**	**10.9%**
Used after pregnancy only	**0.7%**	**1.0%**
Used before, stopped, resumed	**2.0%**	**4.7%**
Started use during and continued after*	*	*

Cannabis Use Before Pregnancy in 2021 and 2022

- One in 4 mothers giving birth (24.1%) reported using cannabis in the 12 months prior to their pregnancy vs. 1 in 8 (12.4%) in 2016-2017. Pre-pregnancy cannabis use was highest among women under age 20 (40.9%) and tended to decrease with increasing age. Use was lowest in mothers who were over age 30 (18.8%), although this is a marked increase from pre-pregnancy use among this same age category in 2016-2017 (7.8%).
- Pre-pregnancy cannabis use was more common among women who reported the lowest education (33.4% for those who did not complete high school) and income (45.8% for those in households earning less than $16,000) categories.
- Pre-pregnancy cannabis use was reported by fewer women from higher education and income levels (11.6% for mothers with at least 4 years of post-high school education; 14.8% for mothers with household incomes greater than $60,000).
- Unmarried women (41.4%) were about 3 times more likely to report cannabis use before pregnancy compared to married women (13.6%).
- Non-Hispanic Black mothers were more likely than mothers from all other race/ethnicity groups to report cannabis use before pregnancy (31.4% vs. 22.5%).

Cannabis Use During Pregnancy in 2021 and 2022

- Approximately 1 in 11 mothers (9.0%) reported using cannabis while pregnant, an over three-fold increase from 1 in 30 mothers (2.9%) in 2016-2017.
- Similar to the pre-pregnancy period, cannabis use during pregnancy was most common for women who were under 20 years of age (21.2%), those that did not complete high school (18.6%), and those with incomes under $16,000 (28.5%).
- Women who were not married were 7 times as likely to use cannabis during pregnancy compared to married women (19.6% vs. 2.7%).
- Non-Hispanic Black mothers were slightly more likely to use cannabis while pregnant compared to mothers from all other race/ethnicity groups (12.8% vs. 8.1%).
- About two-thirds of women who used cannabis before pregnancy did not report using cannabis during pregnancy (64.5%, down from 77.4% in 2016- 2017). This proportion of "pregnancy quitters" displays some differences across demographic groups. Most mothers (90.3%) with a college degree who reported cannabis use before pregnancy reported no use during pregnancy. Mothers under the age of 20 reported the highest pre-pregnancy cannabis usage (40.9%), and they also had the lowest reported levels of pregnancy quitting with only half (50.1%) stopping use for pregnancy.
- Data also show greater quit rates as education and income categories increase. The proportion of pregnancy quitters was similar for non-Hispanic Black (63.1%) and non-Hispanic white (62.9%) mothers.
- Looking exclusively among those reporting any cannabis use during pregnancy, only 4.3% within this group initiated cannabis use while pregnant. Rather, the majority (95.7%) of mothers reporting cannabis use during pregnancy had also used it before pregnancy, which is similar to the 91.0% who reported so in the 2016-2017 data.

Cannabis Use Following Pregnancy in 2021 and 2022

- About 1 in 8 mothers (12.7%) reported any cannabis use in the months following birth, up from about 1 in 20 (4.8%) in 2016-2017.
- The prevalence of post-pregnancy use was higher among younger women (34.2% under age 20 vs. 6.4% over age 35), and those from lower education (22.9% who did not complete high school vs. 3.6% who completed 4 years or more of post-high school education) and income (31.4% for less than $16,000 vs. 5.3% for more than $60,000) categories.
- Non-Hispanic Black mothers were somewhat more likely to report any cannabis use following pregnancy compared to mothers from all other race/ethnicity groups (17.7% vs. 11.6%), as were unmarried mothers compared to married mothers (25.5% vs. 5.5%).
- Three of every 4 Michigan mothers (75.4%) reach the postpartum period having used no cannabis before or during their pregnancy. Among this group, very few mothers (1.3%) reported initiating cannabis in the months immediately following pregnancy. The remaining 98.7% of women who did not use cannabis before or during pregnancy continued to abstain after pregnancy.
- Among mothers who quit using cannabis during pregnancy, the majority (70.1%, down from 79.5% in 2016-2017) reported that they did ***not*** return to cannabis use in the months following birth.
- About 3 in 10 mothers (29.9%) with pre-pregnancy use reported resuming cannabis use after pregnancy. This did not vary greatly across demographic categories.

CONCLUSIONS

- Most Michigan mothers who gave birth in 2021-2022 did not use cannabis before, during, or after pregnancy; however, like trends in the increased prevalence of cannabis use in the general Michigan population, prevalence appears to be increasing among a population-representative sample of Michigan mothers.
- Most women who used cannabis during pregnancy also used it prior to pregnancy. These findings may reflect sociodemographic risk factors for cannabis use among women in Michigan and/or disparities in access to healthcare or prevention-based services. Further work is needed to examine these possible associations.
- Cannabis use during pregnancy, currently at 9.0%, has tripled since 2016-2017. Enhanced assessment, education, and interventions through healthcare systems may be needed to curtail this trend in the context of recreational cannabis legalization. Screening for cannabis use risk among women planning to become pregnant or in the early stages of pregnancy may be important, followed by interventions and/or referrals for women using cannabis to provide support.

CANNABIS USE IN THE MICHIGAN WORKFORCE

INTRODUCTION

Given that cannabis use may increase risks for workplace-related injury and has been associated with absenteeism and other negative employment outcomes (e.g., workplace injury),[28-30] cannabis use among the workforce in Michigan is important to gauge and understand. Results from the Quest Diagnostics Drug Testing Index[31] in Michigan are illustrative in this domain; however, it should be noted that the data below are not necessarily a representative sample of the Michigan or national workforces, given that testing is not a uniform practice across all employers. Although thought to generally reflect the US workforce by including federally mandated, safety-sensitive workers and general workforce employees (e.g., approximately 9 million tests in 2021),[32,33] it should be noted that these data only include test results from workplaces that test employees via Quest.

FINDINGS

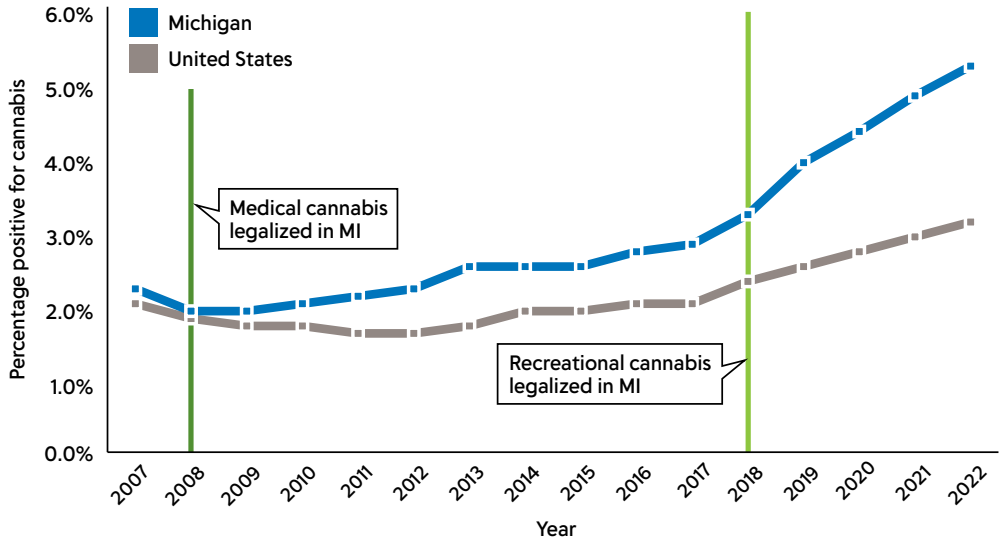
Comparing Michigan to the US

- The percentage of cannabis-positive urine drug tests in Quest workforce testing in Michigan was 5.2% in 2022, the most recent year for which data were available. Although this overall percentage is relatively small, it represents a 136.4% increase in the percentage of cannabis-positive drug tests since 2007 (earliest data available), when the percentage was 2.2% within the tested population.
- Since 2018, the year when recreational cannabis was legalized in Michigan, the percentage of cannabis-positive drug tests among the workforce increased 62.5%, from 3.2% in 2018 to 5.2% in 2022.
- The percentage of cannabis-positive drug tests among the workforce has increased every year since cannabis legalization—after remaining relatively steady in the preceding 5 years (ranging from 2.5% in 2013 to 2.8% in 2017).

Of note, the percentage testing positive in the Michigan workforce in 2022 (5.2%) is higher than the corresponding percentage observed in the US workforce population tested (3.1%), which also observed a smaller relative increase over time (See Figure 6a).

FIGURE 6a

Percentage of Urine Drug Tests Positive for Cannabis Among the Workforce in Michigan vs. the US



CONCLUSIONS

- The percentage of cannabis-positive urine drug tests for Michigan employees among those that have been tested via Quest Diagnostics is increasing.
- Additional data are needed on workplace policies for hiring potential employees who screen positive for cannabis.
- Data are needed regarding policies and procedures used by employee assistance programs for employees who screen positive for cannabis, in terms of assessment for cannabis use disorder and referrals to treatment as indicated.
- An important caveat is that these data reflect the years 2007 through 2022. In 2023, the Michigan Civil Service Commission approved a policy in which most public employees would not be required to complete pre-employment cannabis screening (effective October 2023).[34] Exceptions to this policy include positions that are deemed "test-designated" and have specific safety requirements (e.g., law enforcement). In addition, there are other states and municipalities across the country that have eased policies for both existing employees and pre-employment testing for cannabis (e.g., California, Connecticut) and some employers are easing enforcement of cannabis drug testing policies.[35]

CANNABIS AND THE OPIOID EPIDEMIC

INTRODUCTION

The US opioid epidemic contributed to over 80,000 drug overdose deaths (~75.0% involved opioids) nationwide in 2023[36] and 1,904 opioid overdose deaths in Michigan, based on provisional data from the CDC.[37] This epidemic is rooted in a history of over-prescribing of opioids to treat chronic pain, though more recent data attribute the ongoing epidemic to the availability of fentanyl and increases in stimulant use.[38] Some have proposed using cannabis as an alternative treatment for chronic pain, and that availability of medical and/or recreational cannabis might contribute to lowering opioid overdose rates[39,40]; however, research on this topic yields mixed findings, likely reflecting the range of methodologies and data sources used.[41-47] As an example, note that a 2014 ecological study by Bachhuber et al. that compared states with and without medical cannabis laws helped fuel speculation that enhanced legal cannabis access could reduce opioid overdoses.[48] That study found that, compared with states without medical cannabis laws, states with medical cannabis laws had lower rates of opioid overdose deaths from 1999 to 2010.[48] However, a more recent update of the study, published in 2019 by Shover et al., used parallel methods with additional years of data and reported that the original findings did not persist over the longer time period.[40] In fact, the authors of the 2019 study found that the association between state medical cannabis laws and opioid overdose deaths reversed direction over time, demonstrating that states with laws allowing medical cannabis actually experienced an increase in overdose deaths. Further, it is important to note that such studies examining state-level trends do not provide appropriate data for making definitive conclusions about individuals or causal inference about cannabis policy effects. In this section of the report, data relevant to cannabis and opioid overdose deaths in Michigan are reviewed.

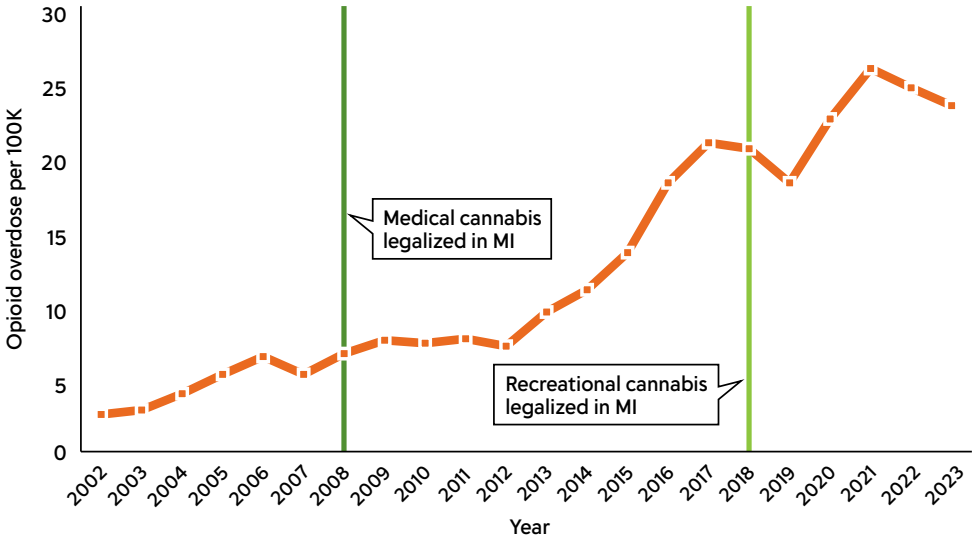
FINDINGS

To first understand the context of the opioid epidemic in Michigan, note the following data:

- According to the Michigan Automated Prescription System (MAPS), the number of opioid prescriptions dispensed increased from 9.7 million in 2013 (first year data were available) to more than 10 million per year from 2014 to 2016.[49] In 2017, the number of opioid prescriptions dispensed returned to below the 2013 level (9.4 million) and has since declined to 6.7 million in 2021 (the most recent year for which data are available).
- Data from the Centers for Disease Control and Prevention Wide-Ranging Online Data for Epidemiologic Research (CDC WONDER) Multiple Cause of Death file show the overall rate for opioid overdose deaths across all ages in Michigan.
    - Over roughly 20 years, opioid overdose deaths increased 932.0% from a crude rate of 2.5 per 100K in 2002 to a peak of 25.8 per 100K in 2021[50] (See Figure 7a).
    - Opioid overdose deaths declined from 2017 to 2019 (20.8 down to 18.1 per 100K), prior to the COVID-19 pandemic.
    - Opioid overdose deaths rose from 2019 to 2021 (18.1 to 25.8 per 100K) but have since declined to roughly 23.3 per 100K in 2023 (a 9.9% decline since 2021).
    - During the same years (2002-2021) the prevalence of cannabis use was also increasing within Michigan (See page 36), and cannabis use rose by 96.0%.

FIGURE 7a

Opioid Overdose Mortality, Crude Rate per 100K in Michigan by Year



CONCLUSIONS

- Based on available information through 2021, opioid overdose deaths increased in Michigan during the same period that cannabis use increased. In two more recent years (2022 and 2023), opioid overdose deaths decreased, while cannabis use increased.
- Given the lack of individual-level data and potential confounding factors, these trends should be interpreted with caution, as they may or may not be related to each other. For example, these data are focused on time trends and do not tell us about individuals who were at risk for overdose who may have switched from opioids to cannabis, or other options for pain management, and avoided overdose.
- Further data are needed, especially to examine both medical and recreational use of cannabis and opioids over time, as well as individual-level associations between cannabis use, opioid use, and adverse consequences such as overdose.

STATE POISON CENTER CALLS INVOLVING CANNABIS-RELATED EXPOSURES

INTRODUCTION

The following section provides data on cannabis-related cases reported to the Michigan Poison & Drug Information Center at the Wayne State University School of Medicine. The Michigan Poison & Drug Information Center is Michigan's sole poison center. Poison control centers are integral national and statewide toxicosurveillance resources for monitoring the potential impact of substance exposures and overdoses in the community. Calls to poison control centers can originate from households as well as healthcare facilities/providers, although most calls come from personal residences. Calls to the state poison center are answered by trained physicians, nurses, pharmacists, and/or other healthcare professionals providing expert medical and toxicologic clinical management recommendations. As increased potency and availability of diverse cannabis products become more widespread, monitoring trends in adverse impacts from acute cannabis poisoning reported to the poison center is imperative. Prior research has shown increases in poison center calls in the wake of increased cannabis access via policy changes in other locations[51], demonstrating the potential acute consequences of intentional and unintentional cannabis use and exposure, especially in children and teenagers.[52-55]

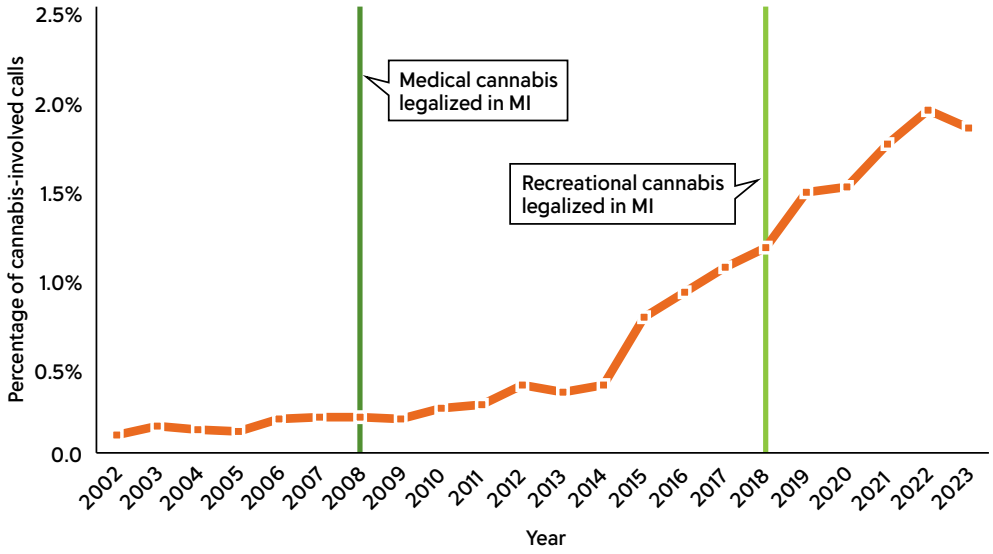
FINDINGS

- Calls to the Michigan Poison & Drug Information Center generally decreased over the past two decades, from a high of 87,376 annual calls in 2002 to 52,305 in 2022 (with a similar number, 52,460 in 2023, the most recent year data are available). Exceptions to the general pattern of decrease occurred in 2005 and 2006 (28,736 and 48,503), which saw the lowest call volumes during this period prior to increasing back to over 82,000 in 2007.
- The percentage of poison control center calls involving cannabis has risen over the past two decades from 0.1% in 2002 to 1.8% in 2023 (See Figure 8a). Most calls involve unintentional exposures and ingestions (i.e., versus inhalation or other exposure routes).
- The percentage of poison control center calls related to cannabis exposure rose slightly in the years proceeding medical cannabis legalization in 2008. Relative stability in exposure trends was observed until a notable rise in 2015, where the rate of poison control center calls involving cannabis exposure doubled from 0.4% in 2014 to 0.8% in 2015.
- Since recreational cannabis legalization in 2018 (1.0% of calls were related to cannabis) until 2023 (1.8% of calls were related to cannabis), the percentage of cannabis-related exposure calls to the poison control center has increased by 82%.

FIGURE 8a

Percentage of Poison Center Calls Involving Cannabis, 2002-2023

*Data for 2006 are not available for those younger than 12.

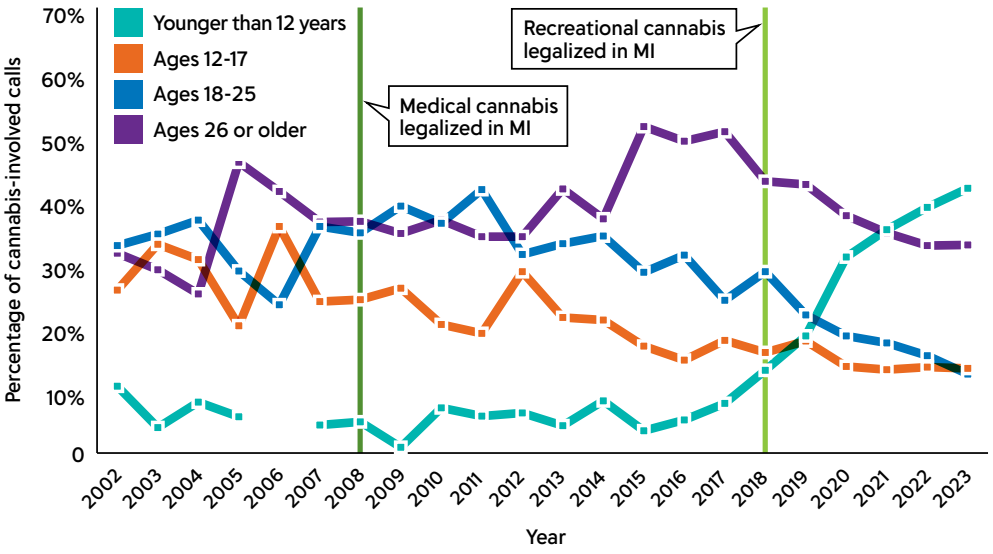


- Prior to recreational cannabis legalization (e.g., 2014-2018), most cannabis exposure calls reported to the state poison center involved adults ages 26 or older, followed by those ages 18-25 and ages 12-17, with children under age 12 accounting for the smallest share of calls (See Figure 8b).
- Following recreational cannabis legalization, the proportion of cannabis exposure calls to the poison control center involving children under 12 years has risen sharply and continues to increase, with the largest proportion of cannabis-related exposure calls comprising this demographic.
    - Children under age 12 accounted for 13.0% of cannabis-related exposure calls in 2018, with an increase to 41.6% in 2023. The increase in the proportion of poison center calls involving children under age 12 is offset by decreases in the other age groups, with the largest reductions in those over age 18 years (calls involving individuals ages 18-25 decreased from 28.5% to 12.4% while calls related to adults ages 26 or older decreased from 42.7% to 32.7%). Overall, this suggests the preponderance of recent increases in cannabis-related exposure calls as a proportion of total poison center calls is driven primarily by exposures in children under age 12.

FIGURE 8b

Cannabis-Involved Poison Center Calls in Michigan by Age*

*Data for 2006 are not available for those age 12 or younger.

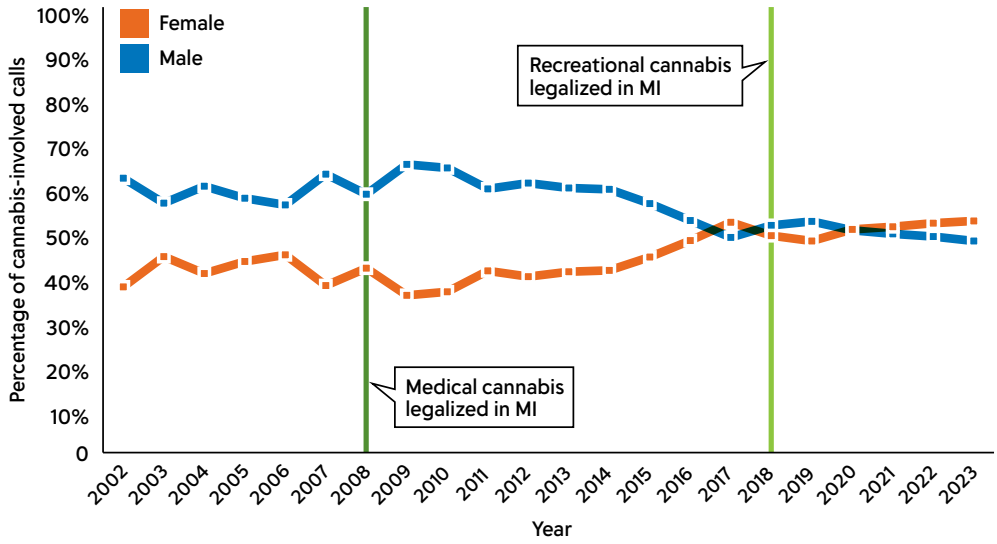


- Historically, men accounted for a greater proportion of cannabis-related exposure calls compared to women, with the largest discrepancy occurring in 2009, when 64.7% of cannabis-related exposure calls involved men versus 35.3% involving women. Since 2016, the reported exposure discrepancy has narrowed considerably, with the most recent data demonstrating an inversion of historical trends with 52.0% of cannabis-related exposure calls involving women, while 47.5% involved men (with minor percentages attributed to those with unknown sex) (See Figure 8c).

FIGURE 8c

Cannabis-Involved Poison Center Calls in Michigan by Gender*

*Data for 2006 are not available for those age 12 or younger.



- In 2023, calls involving exposures in women broke down as follows: 38.9% under age 12, 16.1% ages 12-17, 11.9% ages 18-25, and 33.1% age 26 or older.
- In 2023, calls involving exposures in men broke down as follows: 42.9% under age 12, 10.4% ages 12-17, 13.0% ages 18-25, and 32.7% age 26 or older.

CONCLUSIONS

- Cannabis exposure is increasingly represented in calls to the Michigan Poison & Drug Information Center, with the most recent (2023) data demonstrating a 92.0% increase in cannabis-related exposure calls as a proportion of total calls post-legalization of recreational cannabis.
- Poison center calls related to cannabis exposure do not show any discernible biological sex-related trends in recent years, though more detail on gender identity could be useful in future years to better understand potential gender-related trends.
- Since recreational cannabis legalization, a sharp increase has been observed in cannabis-related exposure calls related to children under age 12, often involving unintentional ingestion of edible cannabis products.
- These findings suggest a need for greater public health messaging and strategies regarding safe cannabis storage to help keep products away and out of reach from children given the appeal of these products to this demographic (e.g., edible cannabis products resembling candies, cookies, and other food items, which tends to drive cannabis-related exposure calls[55]). Increased legislative oversight on the packaging and advertising of products is warranted (e.g., gummies resembling candy, colorful packaging) to avoid appealing to children.
- As the potency and diversity of cannabis product formulations continue to evolve, toxicosurveillance is at a premium to help detect trends that can be addressed via targeted public health interventions and outreach. As many cases are referred to health care facilities, it is important that the healthcare workforce be prepared to assess and address the clinical manifestations of acute cannabis exposures.

HEALTHCARE UTILIZATION

INTRODUCTION

Given the prior state-level legalization of cannabis for approved medical conditions in 2008 and the more recent legalization of recreational cannabis in 2018, coupled with trends showing the rising prevalence of cannabis use in Michigan, there are concerns about the potential for adverse health effects among Michigan's citizens. Emergency department (ED) visits and inpatient hospitalizations are important indicators of the acute health consequences experienced by a portion of those who use cannabis and are critical to track over time. Cannabis-related ED visits have been noted to be increasing nationally in the US, with the most recent paper from the CDC showing an average increase of 12.1% per year.[56] In areas where cannabis has been legalized for recreational purposes, data has also shown increases specifically in traffic injury ED visits[57] as well other cannabis-related ED visits, as documented by increased THC in immunoassay testing and ICD-10 codes related to cannabis.[58]

Further, cannabis use disorder (CUD) is a potential consequence of ongoing cannabis use for some individuals. CUD is a serious, chronic health condition that can benefit from psychosocial treatment. Substance use disorder treatment utilization data can provide an indicator of the scope of CUD in the treatment system, although treatment rates for individuals with CUD are generally low[59]; in fact, the vast majority of individuals who meet criteria for any substance use disorder do not receive appropriate treatment.[60] The following sections provide an overview of the information that is available in Michigan regarding indicators of cannabis-related healthcare utilization, described separately for ED visits, inpatient hospitalizations, and substance use disorder treatment utilization.

FINDINGS

Emergency Department (ED) Visits

ED data has been compiled from the Michigan Outpatient Database (MODB)[61] at Michigan Health and Hospital Association-member (MHA) acute-care hospitals. The MHA is the statewide leader representing all community hospitals across Michigan. The MODB catalogs all healthcare visits discharged from the ED at MHA-member acute-care hospitals located in Michigan, which cover approximately 89-91% of all hospitals in the state. The MODB includes patient demographic information as well as diagnosis and procedure codes associated with each visit. Rates of cannabis-related diagnoses among ED patients seeking care at Michigan hospitals from 2016 through 2021 are presented next, and broadly fall into either adverse effects of cannabis use, cannabis poisoning, or cannabis-related disorders.

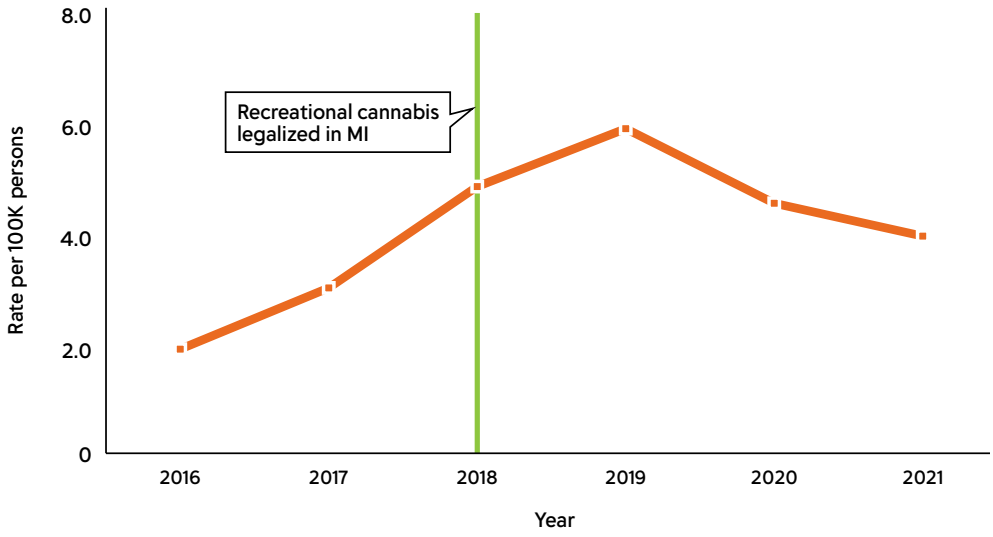
Adverse effects of cannabis use include undesirable symptoms related to acute toxicity, including mild anxiety, agitation, decreased coordination, slowed reaction time, nausea, and lethargy. These symptoms exist on a spectrum with cannabis poisoning, which is characterized by more severe toxicity symptoms, including mental status changes (e.g., delirium, delusions, hallucinations), amnesia, agitation, problems with coordination and reaction time, decreased steadiness, slurred speech, tachycardia, and nausea/vomiting.[62] The data below include ED visits with a diagnosis of adverse effects related to cannabis use. This is followed by data demonstrating ED visits with a diagnosis of cannabis poisoning that resulted from intentional (self-harm), unintentional (accidental), assault, and undetermined mechanisms. Note that adverse cannabis effects and cannabis poisoning are specific diagnoses and clinicians may use more generic diagnoses to describe underlying symptoms (e.g., vomiting, mental status changes) associated with toxicity. Thus, rates of ED visits related to adverse effects of cannabis may be an underestimate. Finally, we report ED visits that included cannabis-related disorders among the diagnoses. Note that rates in this section of the report are calculated as the rate of ED visits per 100K in the Michigan residential population, per census estimates.[63] Finally, given that ED data is reported for 2020 and 2021 (during COVID-19), caution is needed when interpreting these findings as overall ED visits declined during this period in Michigan.[64,65]

Adverse Effects of Cannabis Use

- In Michigan, ED visits with any listed diagnosis of adverse effects related to cannabis use increased from 1.8 to a peak of 5.8 per 100K from 2016 to 2019. During the COVID-19 pandemic, ED visits for the adverse effects of cannabis use dropped to 3.9 per 100K in 2021 (See Figure 9a).

FIGURE 9a

ED Visits: Adverse Effects of Cannabis Use As Any Listed Diagnosis by Year



- Males and females were responsible for similar percentages of ED visits between 2019 and 2021 where adverse effects of cannabis use as a diagnosis comprised 49.1% males and 50.9% females. For 2016-2018, these numbers were 53.7% for males and 46.3% for females.
- As shown in Table 9b, between 2019 and 2021, people ages 15-24 accounted for the largest percentage of ED visits where adverse effects of cannabis were listed as a diagnosis (30.5%). People ages 25-34 accounted for the second highest percentage (24.2%). The largest increase in the proportion of ED visits for cannabis-related adverse effects occurred among those under age 15, which increased 177.8% from the 2016-2018 period to the 2019-2021 period.

TABLE 9b

Percentage of ED Visits for Adverse Effects of Cannabis (As Any Listed Diagnosis) Before and After Recreational Cannabis Legalization Onset by Age Group

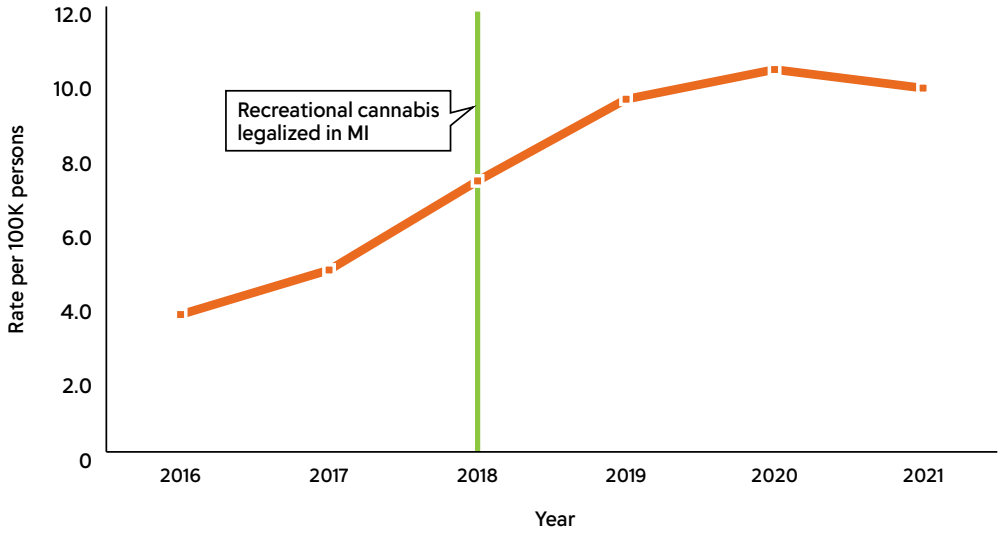
Age group	2016-2018	2019-2021
<15	1.8%	5.0%
15-24	31.5%	30.5%
25-34	30.3%	24.2%
35-44	15.3%	14.7%
45-54	9.8%	11.2%
55-64	6.7%	7.7%
65-74	3.1%	4.6%
75+	Not shown due to suppression of low numbers	

Cannabis Poisoning

- In Michigan, ED visits with any listed diagnosis of cannabis poisoning nearly doubled (93.8% increase) from 3.7 per 100K in 2016 to 7.3 per 100K in 2018 (See Figure 9c). Between 2019 and 2021, after the legalization of recreational cannabis, ED visits for cannabis poisoning have remained at roughly 10 per 100K each year—an increase of roughly another third from 2018.

FIGURE 9c

ED Visits: Cannabis Poisoning As Any Listed Diagnosis by Year



- Comparing 2016-2018 with 2019-2021, males accounted for 53.4% and 48.8% of these visits, respectively, whereas females accounted for 46.6% before rising to 51.2%
- Adolescents and young adults ages 15-24 years accounted for the largest proportion of ED visits where cannabis poisoning was included as a diagnosis between 2016 and 2021 (ranging between 36.4% in 2018 to 24.4% in 2020). However, from comparing recent data (2019-2021) to pre-legalization data (2016-2018), this figure has declined by 22.5% as shown in Table 9d. Also shown, the proportion of cannabis poisoning visits accounted for by those under age 15 increased 57.7% in 2019-2021 compared to 2016-2018.

TABLE 9d

Percentage of ED Visits for Cannabis Poisoning (As Any Listed Diagnosis) Before and After Recreational Cannabis Legalization Onset by Age Group

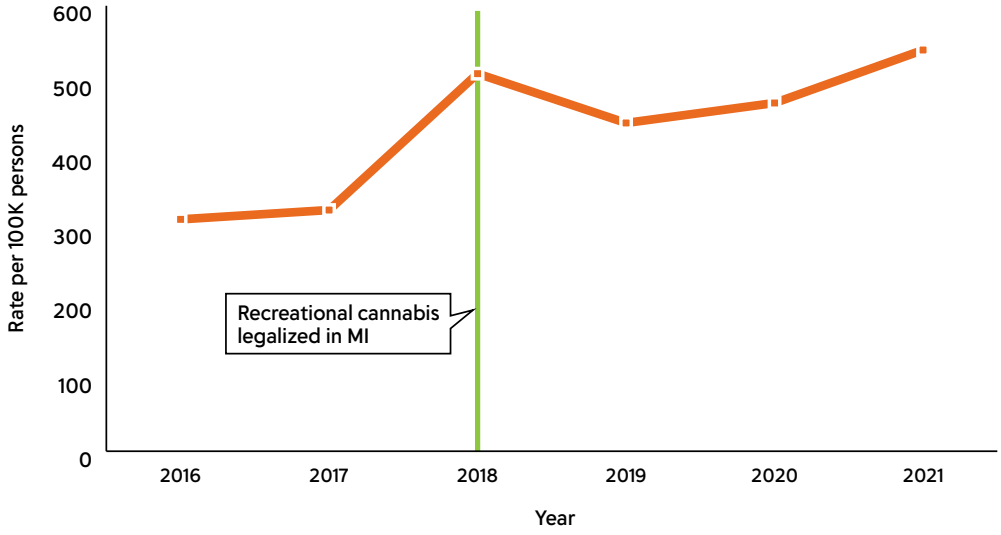
Age group	2016-2018	2019-2021
<15	10.4%	16.4%
15-24	35.1%	27.2%
25-34	21.6%	21.3%
35-44	11.6%	12.7%
45-54	9.7%	9.2%
55-64	6.1%	6.4%
65-74	3.7%	3.5%
75+	Not shown due to suppression of low numbers	

Cannabis-Related Disorders

- Cannabis-related disorders diagnosed at the time of a Michigan ED visit reflect cannabis abuse and dependence (i.e., cannabis use disorders) as well as cannabis use, in general, with or without associated complications (e.g., acute intoxication, psychological impairment).
- In Michigan, ED visits with any listed diagnosis of a cannabis-related disorder increased 4.0% from 312.3 to 324.8 per 100K from 2016 to 2017, respectively (See Figure 9e). In 2018, the year Michigan voted in November to legalize recreational cannabis, ED visits with a diagnosis of cannabis-related disorder increased by 56.5% relative to 2017 (from 324.8 per 100K to 508.5 per 100K). There was a subsequent decrease in 2019, with trends heading upward again to their highest level, 540.4 per 100K, by 2021.

FIGURE 9e

ED Visits: Cannabis-Related Disorders As Any Listed Diagnosis by Year



- Between 2016 and 2021, males have consistently accounted for most ED visits where a diagnosis included a cannabis-related disorder. However, that share has declined steadily from 58.0% in 2016 to 52.7% in 2021 (the percentage of females rose from 41.9% to 47.3% in this period).
- Adults ages 25-34 years accounted for the largest proportion of ED visits where a cannabis-related disorder was included as a diagnosis (ranging from 27.7% in 2016 to 30.9% in 2020). As shown in Table 9f, the percentage of each group composing these ED visits was similar before and after recreational cannabis legalization.

TABLE 9f

Percentage of ED Visits for Cannabis-Related Disorders (As Any Listed Diagnosis) Before and After Recreational Cannabis Legalization Onset by Age Group

Age group	2016-2018	2019-2021
<15	0.5%	0.7%
15-24	25.6%	25.6%
25-34	28.6%	30.4%
35-44	18.9%	18.4%
45-54	14.5%	12.1%
55-64	9.2%	9.2%
65-74	2.4%	3.1%
75-84	0.3%	0.4%
85+	0.0%	0.0%
Unknown	0.0%	0.1%

Inpatient Hospitalizations

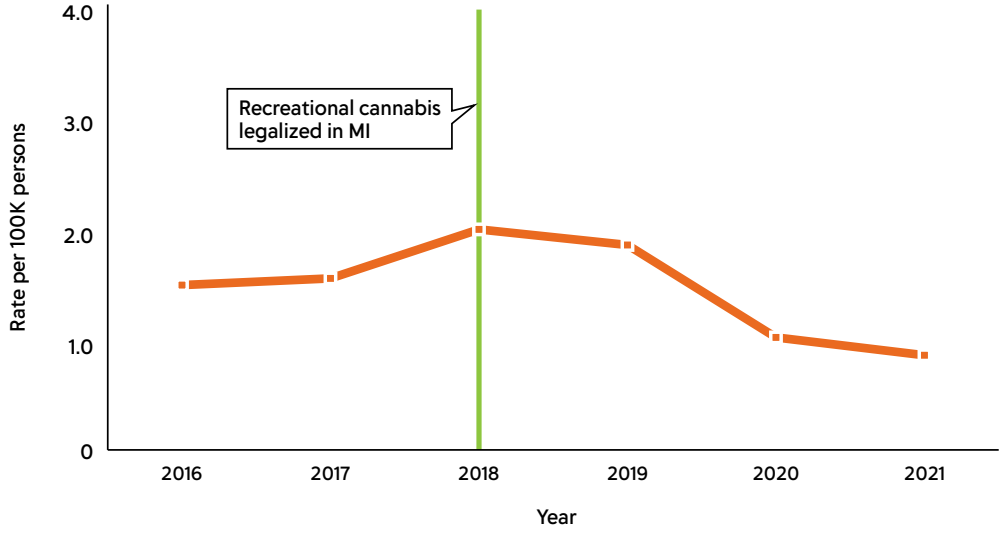
Michigan hospitalization data obtained from the Michigan Inpatient Database (MIDB)[66] include all inpatient hospital admissions from 2010 to 2021 at MHA-member hospitals. The MIDB catalogs all inpatient hospital admissions at MHA-member hospitals located in Michigan (approximately 94.0-95.0% of all hospitalizations statewide). The MIDB includes patient demographic information as well as diagnosis and procedure codes associated with each inpatient visit. Below, we describe the rates for adverse effects of cannabis use, cannabis poisonings, and cannabis-related disorders associated with inpatient hospitalizations. As noted above, given the effects of COVID-19 (especially in 2020-2021), caution is required when interpreting the data regarding hospitalizations.

Adverse Effects of Cannabis Use

- In Michigan, the rate of hospitalizations involving adverse effects of cannabis use (among any listed diagnoses) increased 28.6% in 2018 (increasing from 1.5 per 100K in 2017 to 2.0 per 100K in 2018). This rate then declined 45.1% in 2020 (decreasing from 1.8 per 100K in 2019 to 1.0 per 100K in 2020) and fell further to 0.9 per 100K in 2021, the most recent year for which data are publicly available (See Figure 9g).

FIGURE 9g

Hospitalizations: Adverse Effects of Cannabis Use As Any Listed Diagnosis by Year



- Overall, males and females each accounted for about half of hospitalizations involving adverse effect of cannabis use (between 2016-2021, 52.7% male and 47.3% female). However, notable differences occurred in 2016 and 2018, when males accounted for 61.2% and 57.1% of such admissions, respectively.
- Younger adults ages 25-34 account for the largest proportion of hospitalizations involving adverse effects of cannabis use (21.8% since Q4 of 2015). Overall, the age distribution of these hospitalizations has evidenced a few shifts since recreational cannabis legalization (See Table 9h). Of note, the share of patients ages 35-44 has declined from 17.7% to 14.1%, while the share of patients ages 65-74 has increased from 7.0% to 10.5%.

TABLE 9h

Percentage of Inpatient Hospitalizations for Adverse Effects of Cannabis (As Any Listed Diagnosis) Before and After Recreational Cannabis Legalization Onset by Age Group

*2015 Q4 included due to otherwise suppressible counts in the 2016-2018 window

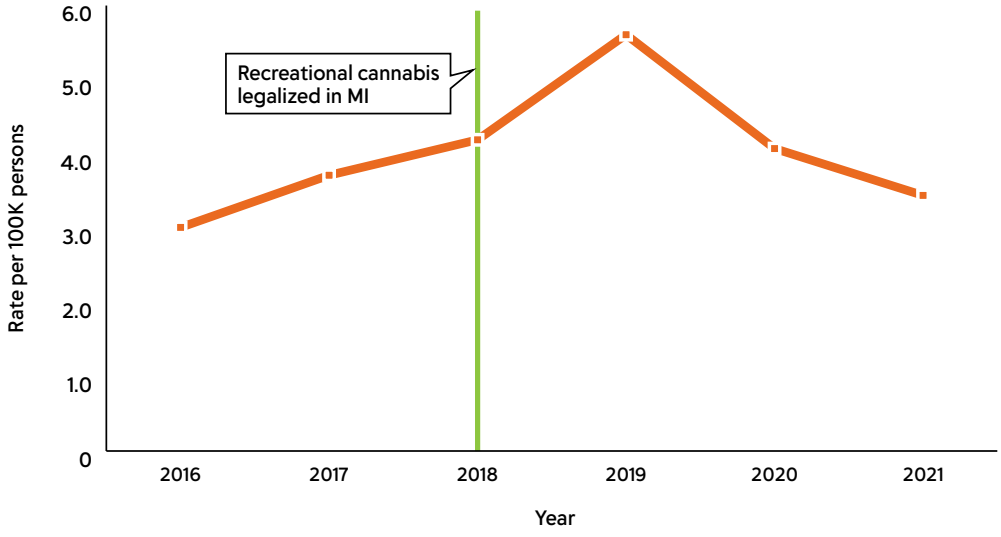
Age group	Q4 2015-2018*	2019-2021
<15	Not shown due to suppression of low numbers	
15-24	16.2%	15.1%
25-34	22.2%	21.1%
35-44	17.7%	14.1%
45-54	15.4%	15.7%
55-64	15.8%	15.9%
65-74	7.0%	10.5%
75+	Not shown due to suppression of low numbers	

Cannabis Poisoning

- The data presented below includes hospitalizations resulting from a diagnosis of cannabis poisoning, including those resulting from intentional (self-harm), unintentional (accidental), assault, and undetermined injury-related mechanisms.
- In the few years preceding legalization of recreational cannabis, rates of hospitalization for cannabis poisoning (as any listed diagnosis) were lowest in 2016 (i.e., 3.0 per 100K), but increased each year through 2019 (5.6 per 100K; See Figure 9i). There appeared to be a sharper increase from 2018 to 2019 versus 2017 to 2018. Following 2019, the rate proceeded to decline to slightly below 2017 levels (3.4 per 100K) in 2021, which may reflect the impact of acute COVID-19 waves on other hospitalizations during these years.

FIGURE 9i

Hospitalizations: Cannabis Poisoning As Any Listed Diagnosis by Year



- For the pre-legalization-of-recreational-cannabis period (2016-2018), men made up 59.3% and women made up 40.7% of these inpatient hospitalizations, declining post-legalization to 56.6% for men to 43.4% for women.
- While some age groups remain stable in terms of their relative share of inpatient hospitalizations for cannabis poisoning post-legalization of recreational cannabis (2019-2021, compared to 2016-2018) some groups have changed (See Table 9j). The share of hospitalizations accounted for by those under age 15 has increased 66.7% (up from 6.0% to 10.0%) and 41.3% for older adults ages 65-74 (up from 4.6% to 6.5%). The corresponding share of hospitalizations has declined for 15-24-year-olds by 20.9% (down from 19.8% to 15.6%).

TABLE 9j

Percentage of Inpatient Hospitalizations for Cannabis Poisoning (As Any Listed Diagnosis) Before and After Recreational Cannabis Legalization Onset by Age Group

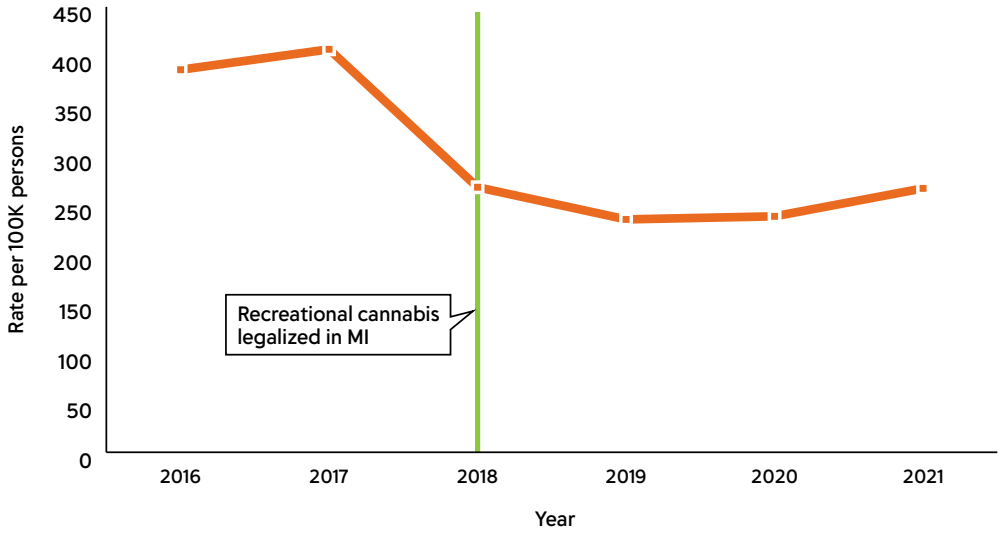
Age group	2016-2018	2019-2021
<15	6.0%	10.0%
15-24	19.8%	15.6%
25-34	25.0%	22.9%
35-44	17.8%	17.1%
45-54	12.6%	13.7%
55-64	12.3%	10.2%
65-74	4.6%	6.5%
75+	Not shown due to suppression of low numbers	

Cannabis-Related Disorders

- Inpatient hospitalizations with a cannabis-related disorder as any listed diagnosis can reflect cannabis abuse and dependence (i.e., cannabis use disorders) as well as cannabis use with or without an associated complication (e.g., acute intoxication, psychological impairment).
- The rate of inpatient hospitalizations involving cannabis-related disorders saw a decline prior to legalization of recreational cannabis (e.g., from 407 per 100K in 2017 to 268 per 100K in 2018; See Figure 9k) with a slight decline in 2019. Rates have increased slightly from 2019 (235.2 per 100K) to 2021 (266.6 per 100K).

FIGURE 9k

Hospitalizations: Cannabis-Related Disorders As Any Listed Diagnosis by Year



- Men accounted for more hospitalizations each year involving cannabis-related disorders compared to women. This was generally stable across years at approximately 60.0% male and 40.0% female in both the periods of 2016-2018 and 2019-2021.
- As shown in Table 9l many age groups were effectively stable in their respective shares of inpatient hospitalizations for cannabis-related disorders. Key changes from pre-legalization of recreational cannabis (2016-2018) to post-legalization (2019-2021) were seen for 15-24-year-olds, where the proportion of such diagnoses declined 19.7% (from 16.9% to 13.6%), and for 65-74-year-olds, where the corresponding percentage increased 37.9% (from 6.1% to 8.5%).

TABLE 9l

Percentage of Inpatient Hospitalizations for Cannabis-Related Disorders (As Any Listed Diagnosis) Before and After Legalization of Recreational Cannabis by Age Group

Age group	2016-2018	2019-2021
<15	0.2%	0.2%
15-24	16.9%	13.6%
25-34	22.2%	22.1%
35-44	17.5%	18.8%
45-54	18.7%	17.4%
55-64	17.3%	18.0%
65-74	6.1%	8.5%
75-84	0.8%	1.0%
85+	0.1%	0.1%
Unknown	0.1%	0.3%

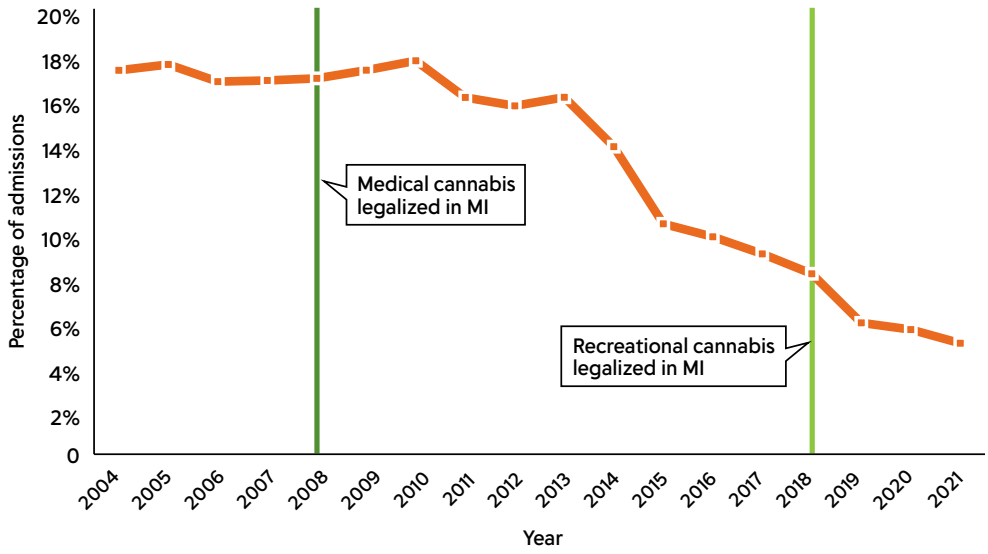
Substance Use Disorder Treatment

In the US, few people with cannabis use disorders receive substance use disorder treatment. According to the National Survey on Drug Use and Health (NSDUH), the vast majority of individuals ages 12 or older with a cannabis use disorder do not receive treatment.[60] Thus, it is important to note that data pertaining to treatment admissions in the state of Michigan do not necessarily represent the entire population with a CUD diagnosis and/or the entire population that could potentially benefit from treatment. The Michigan Treatment Episode Data Set (TEDS) provides data on substance use treatment service utilization across programs receiving state alcohol/drug agency funding, including federal block grants.[67] These programs can provide a range of services across levels of care from admission to detoxification to outpatient or residential programs. Furthermore, rates of treatment for substance use disorders declined during COVID-19[68], requiring caution when interpreting these findings.

- While the total number of substance use treatment admissions fluctuated over the 18-year window between 2004 and 2021 (5.3% increase overall, from 60,190 to 63,356), the proportion of these admissions that were cannabis-related has consistently declined (See Figure 9m), resulting in a total decline of 69.6% during the same period (from 10,374 to 3,157).
- Specifically, the percentage of all substance use treatment admissions that were cannabis-related peaked in 2010 (17.7%), but has decreased overall from 17.2% in 2004 to 5.0% in 2021.[67]

FIGURE 9m

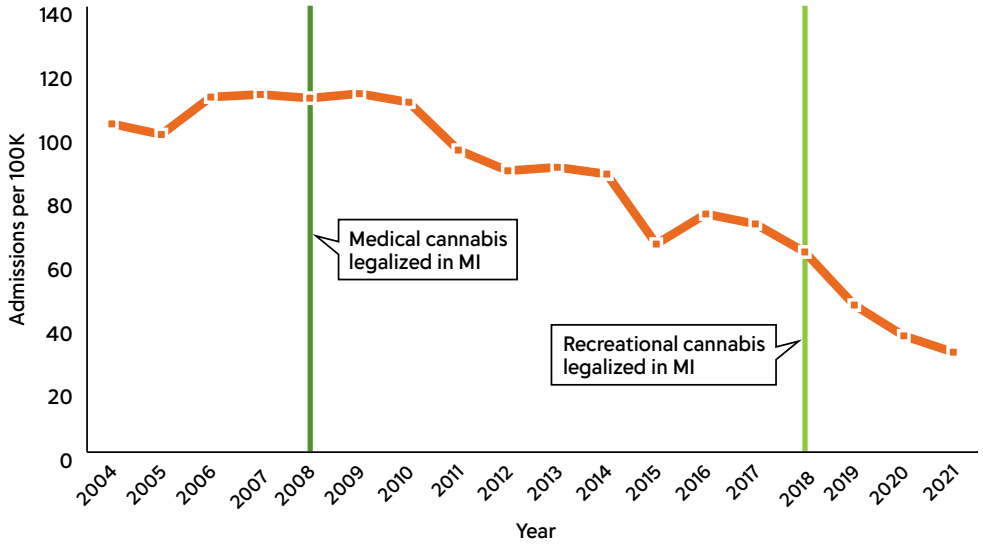
Cannabis-Related Substance Use Treatment Admissions by Year



- In terms of the population rate, cannabis-related admissions decreased overall from 2005 to 2021 with the highest being 112.4 per 100K in 2007 and the lowest being 31.4 per 100K in 2021[67] (See Figure 9n). There does not appear to be any change in this overall decline post-legalization of recreational cannabis.

FIGURE 9n

Cannabis-Related Substance Use Treatment Admissions per 100K by Year

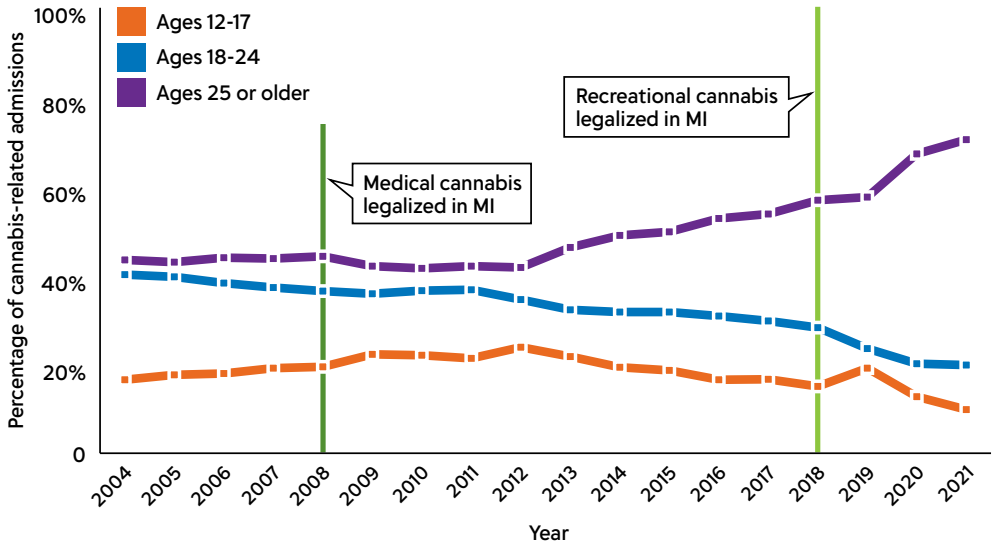


Recent annual online Michigan TEDS data[67] for the years 2004 to 2021 allows for examination of substance use disorder treatment admissions within different age groups.

- Adolescents (ages 12-17) accounted for 16.5% of treatment admissions with cannabis listed as the primary substance in 2004. This percentage peaked in 2012 (23.8%) before declining to 9.8% of such admissions in 2021.
- Young adults (ages 18-24) composed 40.1% of these treatment admissions in 2004, declining to 19.8% in 2021.
- Adults (age 25 or older) account for more treatment admissions, increasing from 43.4% in 2004 to 70.4% in 2021 (See Figure 9o).
- TEDS data from 2021 indicate that 72.5% of those seeking treatment related to cannabis were men and the remaining 27.5% were women. This ratio has not changed substantially over time, thus is not displayed.

FIGURE 9o

Cannabis-Related Substance Use Treatment Admissions by Age

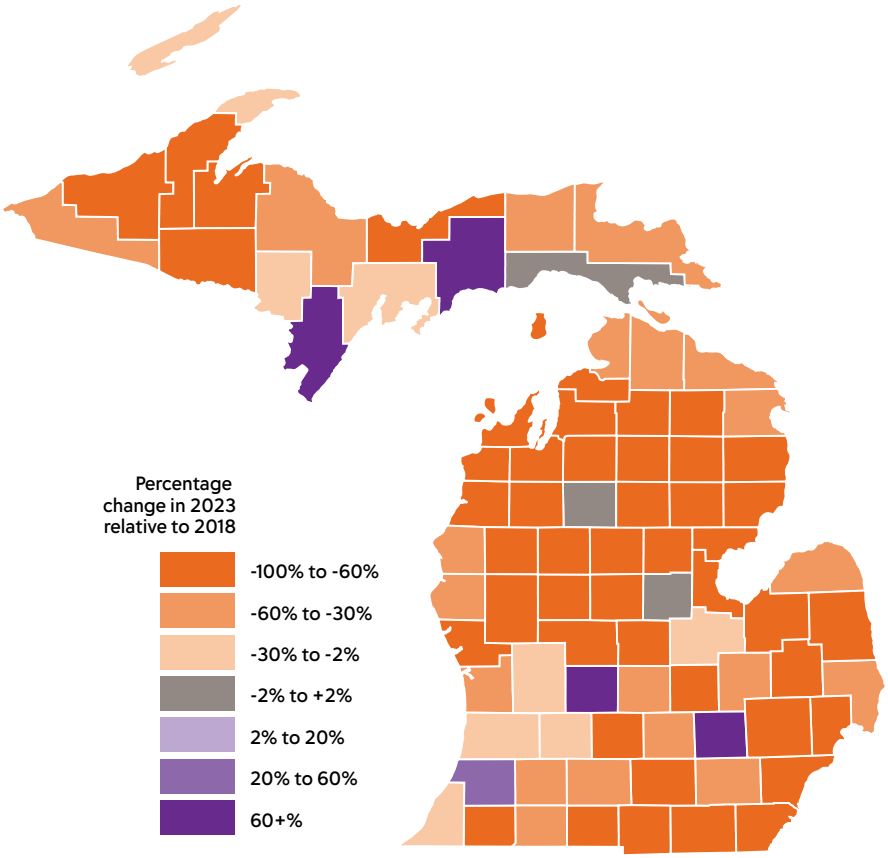


Data from Michigan TEDS provided by the Michigan Department of Health & Human Services (MDHHS) for years 2018 through 2023[67] was used to create a map depicting the percentage change in the rate of cannabis-related substance use treatment admissions (2023, relative to 2018 when legalization occurred) (See Figure 9p). Darker red colors indicate an increase in treatment admissions and darker blue-to-purple colors indicate a decrease in admissions.

- Eight counties (Barry, Berrien, Delta, Kent, Keweenaw, Mackinaw, Midland, and Missaukee) had relatively little change (<20.0% change in either direction).
- Five counties saw >20.0% increases in cannabis-related treatment admissions: Van Buren (26.7%), Menominee (99.8%), Ionia (113.4%), Schoolcraft (250.2%), and Livingston (311.1%).
- The largest reduction was in Arenac County, where the rate of cannabis-related substance use treatment admissions dropped to 0 in 2023. Other major counties showing reductions were Oakland (-83.7%), Macomb (-75.6%), Wayne (-72.3%), and Genesee (-55.8%); also, about three-quarters of Michigan counties saw a decrease greater than 50.0%.

FIGURE 9p

Percentage Change in Cannabis-Related Substance Use Treatment Admissions, 2023 Relative to 2018



CONCLUSIONS

- It is important to note that most data provided on healthcare utilization related to cannabis come from 2021 and earlier, reflecting a need for more recent data and consideration of the context of the COVID-19 pandemic (e.g., fluctuations in the number of patients attending EDs for care during acute COVID-19 waves).
- Regarding ED utilization, ED visits involving adverse effects of cannabis use increased slightly from 2018 to 2019, following a trend from prior years, but declined into 2020 and 2021.
- ED visits involving cannabis poisoning showed an increase post-legalization of recreational cannabis, though this appeared to level off in 2020 and 2021. Adolescents and young adults tend to make up a larger portion of these ED visits than other age groups.
- ED visits involving a cannabis-related disorder as a diagnosis increased since 2019 (after a decrease from 2018 to 2019). Adolescents and younger adults ages 15-34 make up the largest proportion of these visits, though the composition of visits by age has not substantially shifted in recent years.
- For ED visits across these different reasons, the proportion of visits accounted for by males has decreased in recent years, with slight increases among female patients.
- Inpatient hospitalizations involving adverse effects of cannabis use are relatively rare and have decreased in recent years after peaking in 2018; over half of these hospitalizations typically were accounted for by men. Although adults ages 25-34 make up the largest proportion of these hospitalizations, there have been post-legalization increases among older adults with decreases among adults ages 35-44.
- Inpatient hospitalizations involving cannabis poisonings increased sharply in 2019, followed by declines in 2020 and 2021. It is important to note that 2020 and 2021 saw unprecedented inpatient hospitalizations for the COVID-19 pandemic, and it is possible that the decline related to cannabis poisoning is attributable to efforts needed to care for those with more severe, life-threatening illnesses during the pandemic. Among those hospitalizations post-legalization, there were large increases in the proportion occurring among older adults and children, whereas other groups saw a decrease.
- Inpatient hospitalizations for cannabis-related disorders dropped sharply in 2018. Rates continued to tick down slightly after 2018, then increased slightly into 2021, though 2017 levels have not been matched. Decreases from pre-legalization of recreational cannabis to post-legalization were seen in the proportion of such hospitalizations that were accounted for by 15-24-year-olds, whereas the corresponding rates for 65-74-year-olds increased.
- Substance use disorder treatment admissions for cannabis as the primary drug associated with admission have decreased in state programs, continuing a pre-legalization trend. The proportion of cannabis-related treatment admissions that were among those ages 25 or older has increased over time, primarily offsetting a reduction in the proportion of admission attributed to those ages 18-24. This may reflect the increases in cannabis consumption among adults. It is also important to note that treatment services are drastically underutilized by those with cannabis use disorders,[69] with only a small minority of affected individuals receiving treatment. Thus, increased access to healthcare services for those with cannabis use disorder remains a priority.
- Most counties saw decreases from 2018 to 2023 in the rate of cannabis use disorder treatment admissions. While changes in admissions for cannabis use disorders in certain counties could relate to changes in funding priorities or availability of treatment beds and/or changes in the rates of other substance use disorders (e.g., opioid use disorders), data were not available to address this question. Additional data should be collected in future studies to clarify these findings.

CANNABIS-RELATED MORTALITY

INTRODUCTION

The following section provides data on cannabis as a cause of death among Michigan residents. While cannabis as a primary cause of death has not been extensively reported, heavy use in the setting of underlying severe medical conditions (e.g., cardiovascular disease, atherosclerotic disease, cancer) may result in cannabis serving as a contributing factor to fatal health outcomes.[70-75] Further, there are emerging data and case reports amongst patients with cannabinoid hyperemesis syndrome (i.e., cyclical nausea and vomiting), with most deaths in these patients resulting from electrolyte abnormalities and/or renal failure.[72] Available data for the State of Michigan focus on cannabis poisoning as a primary cause of death (e.g., symptoms that can include: rapid heartbeat, hallucinations, confusion, panic, anxiety, and/or extreme paranoia) with additional data regarding cannabis-related causes of death.[76]

FINDINGS

- Mortality data from all deaths occurring in Michigan in 2004-2022 are contained in the Michigan Resident Death File.[77] These deaths are typically reported in 5-year aggregate periods.
- During the entire period of 2004-2022, cannabis poisoning was recorded as a ***primary cause*** of death for 6 out of 1,804,273 total deaths.
- Cannabis poisoning was recorded as ***related to*** the cause of death for 78 total deaths during the same period. During 2004-2008 there were 18 deaths, with a low of 7 deaths 2011-2015. In 2013-2017 there were 14 deaths. The highest 5-year totals were seen in the periods 2017-2021 and 2018-2022, which both showed 31 deaths.
- A cannabis-related mental or behavioral disorder was recorded as a ***primary cause*** of death for fewer than 6 deaths during 2004-2022. There have been no deaths where this was recorded as the ***primary cause*** after 2015.
- A cannabis-related mental or behavioral disorder was a ***related*** cause of death for 129 total deaths in 2004-2022. These deaths have been increasing since 2004; for 2013-2017, 33 deaths were reported and for 2018-2022, 68 were reported.

CONCLUSIONS

- Cannabis poisoning and cannabis-related mental or behavioral disorders as the primary cause of death are extremely rare, and the number of these deaths is only slightly higher when examined as related to the cause of death, with some increasing trends which may reflect changes in toxicology testing.
- Given that data are provided in 5-year snapshots, the possible impacts of recreational legalization on cannabis-related deaths may not be clear for several years.
- In the future, when monitoring mortality trends over time it will be important to note that some cannabis-related deaths appeared to be increasing before 2018 when cannabis was legalized and before the availability of adult-use retail products in 2019 (although medical cannabis was legalized in 2008). Note, also, that the highest totals for every non-suppressed outcome were seen in 5-year intervals that included some post-legalization data.
- Improved efforts are needed for tracking cannabis involvement in deaths via more uniform toxicology testing, though this has improved greatly in the past several years.

SUICIDES AND HOMICIDES

INTRODUCTION

The following section provides information on cannabis as it relates to what are classified as violent deaths (i.e., suicides, homicides). Prior research has documented some links between cannabis consumption and an increased risk for suicide, particularly in adolescent and young adult populations,[78-82] whereas data regarding the relationship of cannabis with homicide are less clear.[83,84] Data on violent deaths come from the Michigan Violent Death Reporting System (MiVDRS),[85-87] which follows the CDC definition of violent death used by all states for the National Violent Death Reporting System (NVDRS).[88,89] NVDRS defines a violent death as a death that results from the intentional use of physical force or power, threatened or actual, against oneself, another person, or a group or community. This section presents data on findings for cannabis on toxicology testing among Michigan suicide and homicide deaths where the injury occurred in the state (regardless of the victim's residency). It is important to note that the presence of cannabis at the time of death does not provide specific causal evidence regarding cannabis as a contributor to homicide or suicide outcomes.

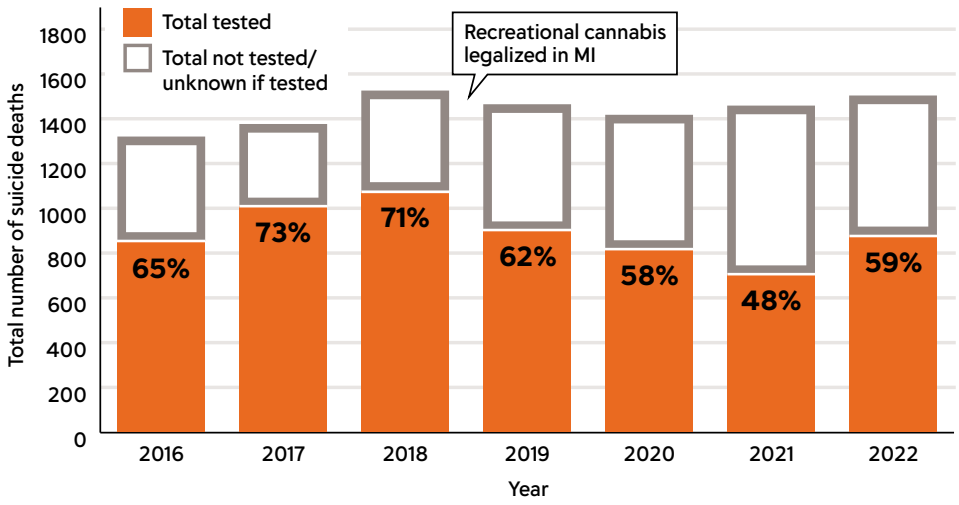
FINDINGS

Cannabis Testing Results for Michigan Suicide Deaths (2016-2022)

- From 2016 to 2022, the number of suicide deaths in Michigan among people ages 12 years or older rose from 1,320 to 1,503 (with a peak at 1,525 in 2018). Each year, a portion of suicides include toxicological information on cannabis testing, and that proportion ranged from 62.0% to 73.0% pre-COVID (2016-2019) to 48.0%-58.0% since 2020 (See Figure 10a).

FIGURE 10a

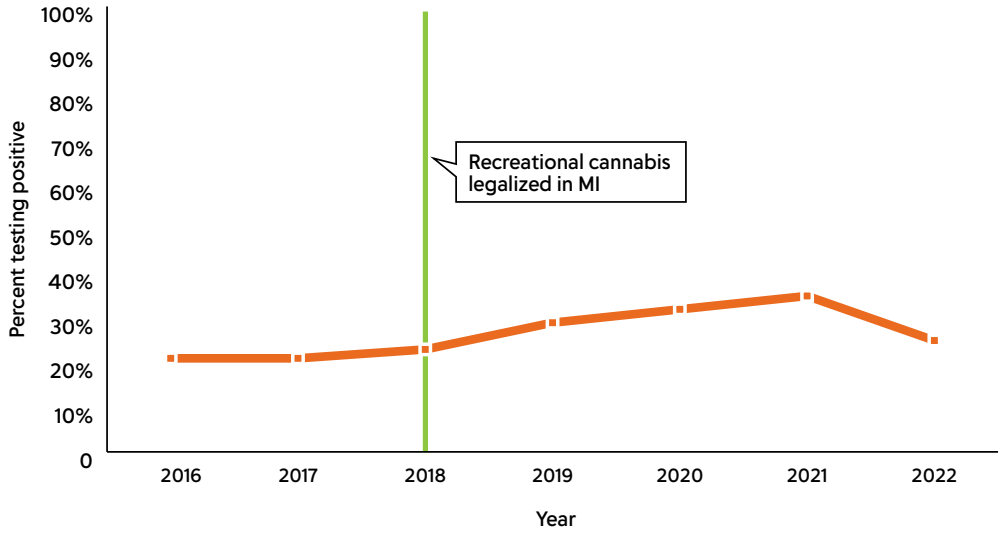
Cannabis Testing in Suicide Deaths in Michigan by Year



- Among those suicide victims receiving cannabis toxicology testing, the proportion testing positive for cannabis was relatively stable from 2016 (21.0%) to 2018 (23.0%). This proportion increased annually, reaching a peak of 35.0% in 2021, prior to declining to 25.0% in 2022 (See Figure 10b).

FIGURE 10b

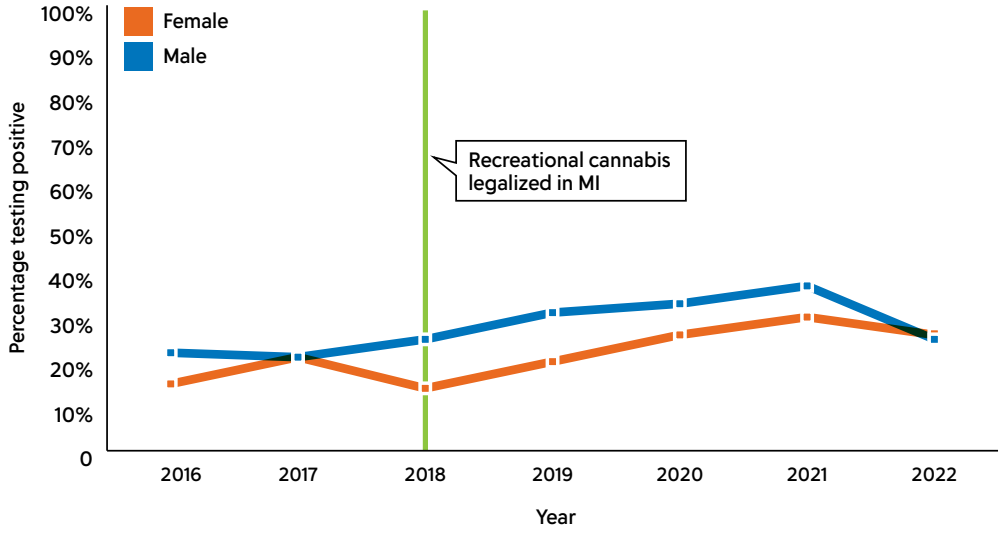
Positive Cannabis Testing Among Suicide Victims Tested by Year



- Over time, rates of positive cannabis toxicology have typically been higher in males. Two exceptions are: in 2017 when both males and females had a ~21.0% positivity rate and in 2022 when females had a 26.0% positivity rate (vs. 25.0% in males) (See Figure 10c).

FIGURE 10c

Positive Cannabis Testing Among Suicide Victims Tested by Sex by Year

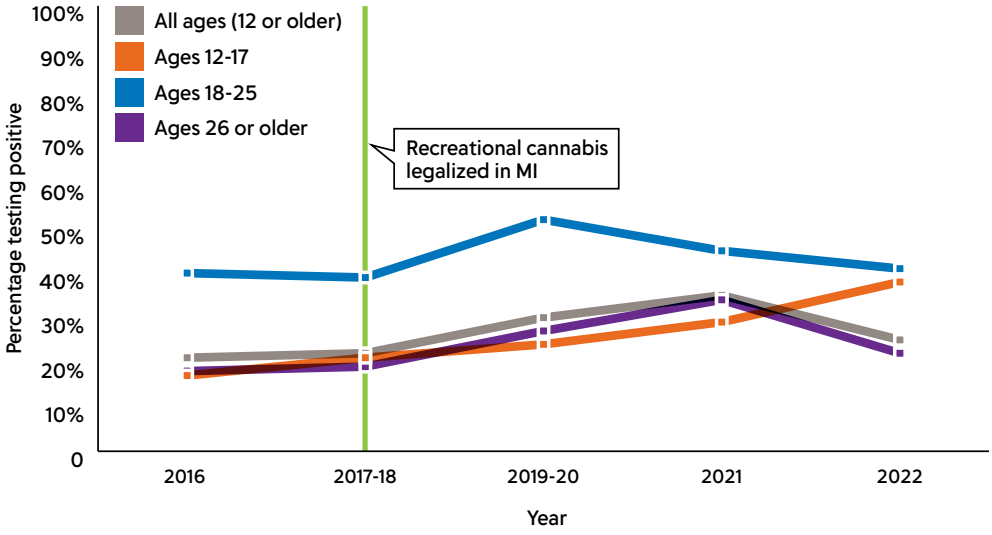


- Among suicide decedents, the proportion of positive tests among adolescents ages 12-17 years who were tested for cannabis has increased over time, from 17.0% in 2016 to more than double that at 38.0% in 2022. Other than a more substantive proportion positive for cannabis in 2019-2020 (52.0%), the proportion of positive tests has been relatively stable among young adult suicide decedents (ages 18-25), ranging from 39.0% to 45.0%. For all other adults (ages 26 or older) the proportion positive increased from 2016 (18.0%) through 2021 (34.0%), then dropped to 22.0% in 2022 (See Figure 10d).

FIGURE 10d

Positive Cannabis Testing Among Suicide Victims Tested by Age by Year*

*Age data for 2017-2018 and 2019-2020 not available for individual years due to low counts

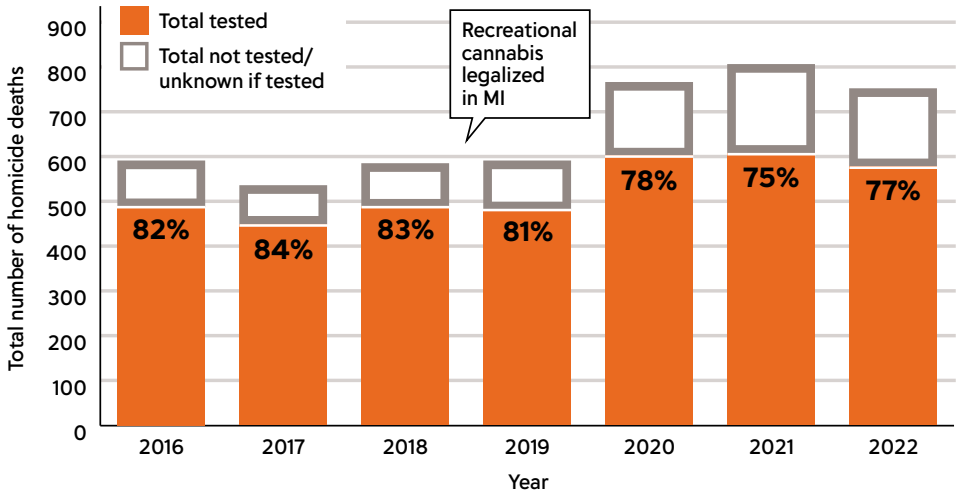


Cannabis Testing Results for Michigan Homicide Deaths (2016-2022)

- In 2016, there were 591 homicides (including deaths resulting from legal intervention) in Michigan among people ages 12 years or older. This number rose annually to a peak of 806 in 2021, then declined to 752 in 2022. Each year, a portion of these decedents' records contain toxicology testing inclusive of cannabis. The proportion with toxicology testing available varies from year to year, within a range of 75.0% (2021) to 84.0% (2017) (See Figure 10e).

FIGURE 10e

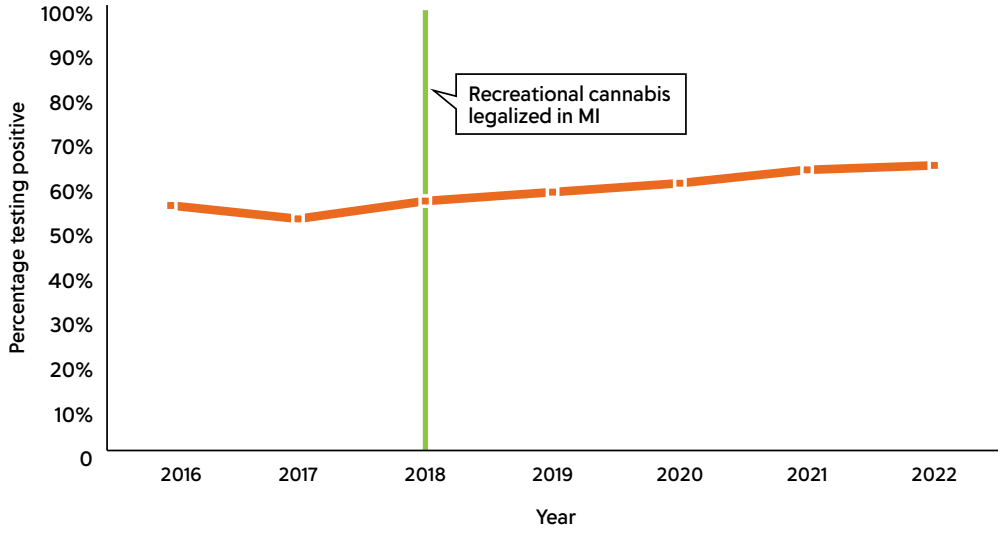
Cannabis Testing in Homicide Deaths in Michigan by Year



- Among those homicide victims known to undergo toxicology testing for cannabis, the proportion testing positive for cannabis decreased from 55.0% in 2016 to 52.0% in 2017. Starting with 2018 (56.0%), there has been a steady increase, up to a peak of 64.0% in 2022 (See Figure 10f).

FIGURE 10f

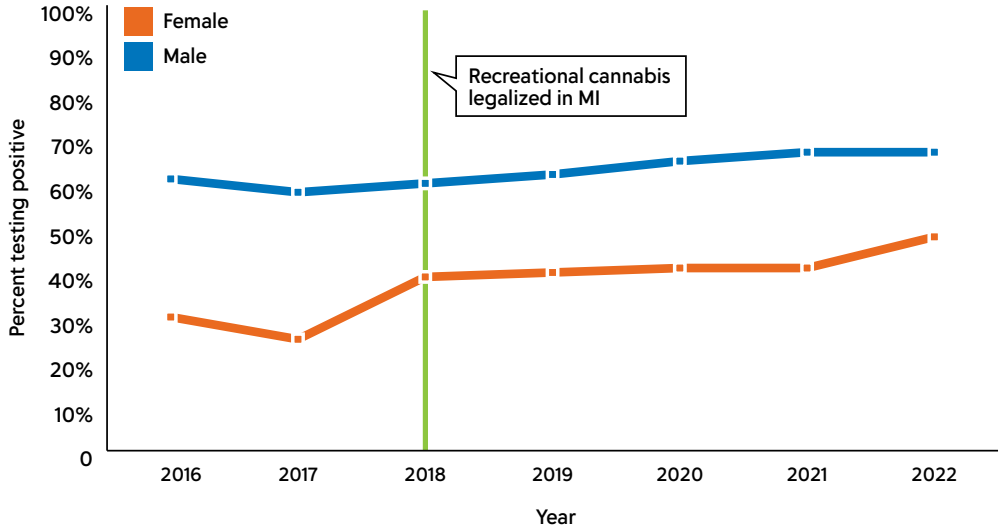
Positive Cannabis Testing Among Homicide Victims Tested by Year



- The pattern of decline in 2017, followed by increases through 2022 displayed in Figure 10g, was evident for both men and women. Nonetheless, positive cannabis toxicology was more common in males tested than females tested every year (See Figure 10g). Generally, the proportion of males testing positive ranged from 61.0% in 2016 (dipping to 58.0% in 2017) to 67.0% in 2022. For females, the increase over time was more substantial. In 2016, 30.0% of those tested were positive for cannabis; this dropped to 25.0% in 2017, then increased over time to a peak of 48.0% in 2022.

FIGURE 10g

Positive Cannabis Testing Among Homicide Victims Tested by Sex by Year

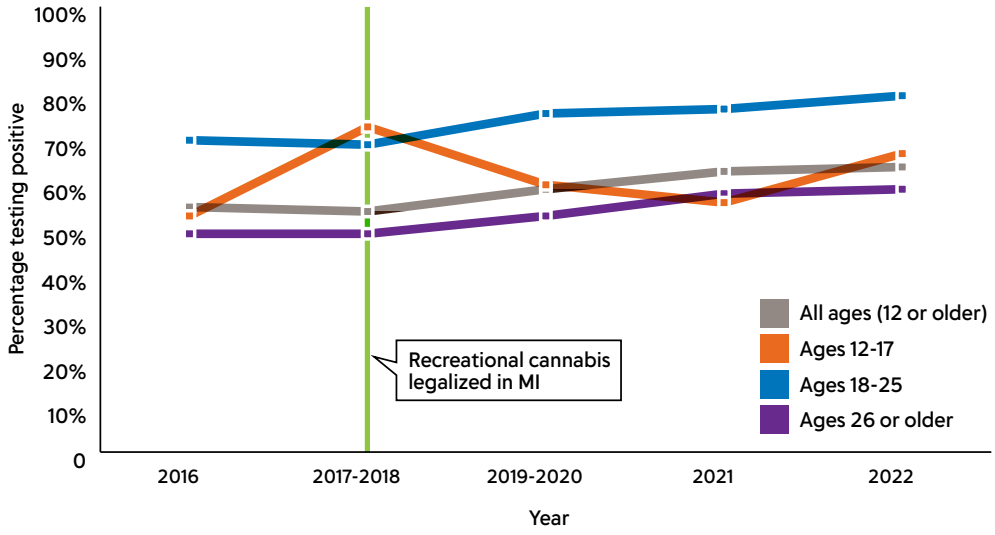


- Among homicide decedents tested for cannabis, the proportion of positive tests among adolescents ages 12-17 years has fluctuated over time. Starting at 52.0% in 2016, this proportion rose to 73.0% in 2017 before starting to decline to a low of 56.0% in 2021, and then it increased to 67.0% in 2022. For young adults (18-25 years), there was more stability 2016-2018 (69.0-70.0%) prior to post-legalization increases, which reached a high of 80.0% in 2022. All other adults (ages 26 or older) followed a similar trajectory as young adults, although their proportion of positive tests was lower: ~49.0% in 2016-2018 rising to 59.0% in 2022 (See Figure 10h).

FIGURE 10h

Positive Cannabis Testing Among Homicide Victims Tested by Age by Year*

*Age data for 2017-2018 and 2019-2020 not available for individual years due to low counts



CONCLUSIONS

- Cannabis toxicology testing among suicide decedents shows an increase in cannabis positivity over time, although an overall decrease from 2021 to 2022 was also evident, complicating the process of drawing conclusions about the impact of post-2018 legalization of recreational cannabis.
- Nonetheless, the increase over time in cannabis positivity among adolescent suicide decedents warrants monitoring and potential concern. Although cannabis use prevalence has declined somewhat in adolescents, it is possible that the specific individuals who are suffering from mental health conditions and/or suicidal ideation may be showing increases in cannabis use (e.g., perhaps in an attempt to ameliorate psychological symptoms) that are reflected here. However, there are small numbers of adolescent suicide deaths, and the limited toxicological testing results for these deaths makes it challenging to draw specific conclusions. More research is needed to understand the links between cannabis use and suicidality in youth in the context of the current national mental health crisis.
- Cannabis toxicology testing among homicide decedents shows a modest increase in cannabis positivity over time, with larger increases in women vs. men. Shifting trends in cannabis positivity among adolescent victims are challenging to interpret. Young adults had the greatest cannabis positivity rates, which may reflect that young adults are more likely than other age groups to engage in cannabis use, as consistent with population trends described in this report.
- Although the causes of and contexts surrounding suicide and homicide are complex, suicide and violence prevention programs could potentially benefit from addressing cannabis use to help mitigate risk. Additionally, treating co-occurring mental health and substance use concerns should be considered with respect to suicide prevention, particularly given increased access to cannabis during the current national mental health crisis.

CANNABIS PRESENCE IN DRIVERS OF FATAL MOTOR VEHICLE CRASHES

INTRODUCTION

Recent changes in cannabis laws that permit recreational use raise concern for the potential impact of these changes on motor vehicle safety and the prevention of crashes due to drug-impaired driving.[90] Cannabis has been shown in prior research to significantly impair driver judgement, motor coordination, and reaction time.[91-97] Further, simulator and test-track studies have identified a direct relationship between the concentration of Delta-9 Tetrahydrocannabinol (THC) in the bloodstream and impaired driving performance.[95-97] Nonetheless, studies on the relationship of cannabis to motor vehicle crash (MVC) risk remain mixed.[98,99] Understanding of that relationship is limited by lack of readily available data on cannabis intoxication at the time of an MVC, and the fact that cannabis can be detected in drug tests weeks after last use. Nevertheless, examination of trends in cannabis positivity in postmortem drug tests may provide information on population-level trends in cannabis use and use in relation to driving. This section reviews what is known about trends in annual fatal MVCs in Michigan and trends in cannabis positivity among deceased drivers in such crashes.

FINDINGS

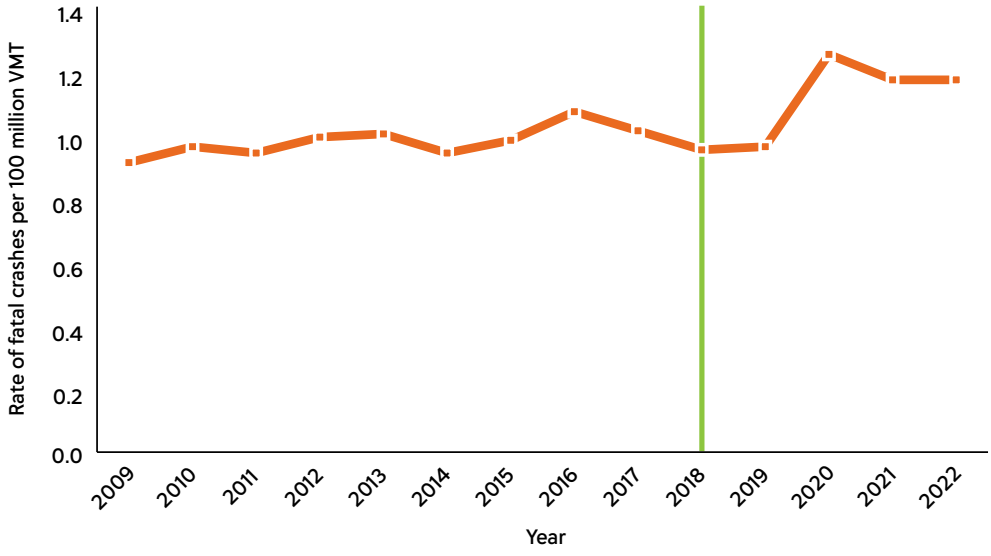
Fatal Motor Vehicle Crashes in Michigan

The role of cannabis in motor vehicle crashes in Michigan can be partially understood using statewide crash data from the Michigan Traffic Crash Facts (MTCF) website[100] and the Fatality Analysis Reporting System (FARS)[101] data, including overall rates of annual fatal motor vehicle crashes, the number of crash-involved drivers that were tested for drugs following the crash and, among those, the number that tested positive for cannabinoids.

- Data are presented regarding the overall rate of fatal crashes per 100 million vehicle miles traveled (VMT) in Michigan. This figure has increased 22.0% over the last 13 years of available data from 0.9 in 2009 to 1.2 in 2022[100] (See Figure 11a).

FIGURE 11a

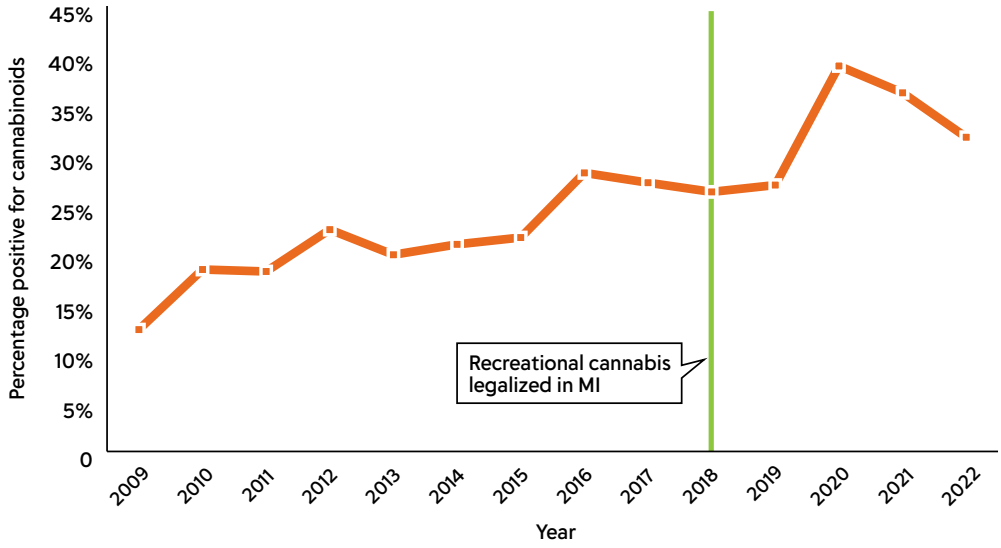
Rate of Annual Fatal Motor Vehicle Crashes in Michigan, 2009-2022



- Concurrently, the proportion of fatal MVCs where a drug test was given ranged from 32.8% to 42.6% in a given year; among those, between 81.6% and 92.2% had conclusive results reported for the drug test given (e.g., results codes other than "Results unknown" and "Drugs found, type unknown").[101]
- Among those tested with known and reported results, the proportion of tests that were positive for cannabinoids was rising prior to legalization in 2018 (when 26.2% tested positive for cannabis). There was a sharper increase from 2019 (26.9% positive) to 2020 (38.9% positive) concurrent with the opening of cannabis retail outlets. During active COVID-19 pandemic years, there was a decline in this figure to 31.7% in 2022, the last year for which data was available[101] (See Figure 11b).

FIGURE 11b

Percentage of Tested Drivers in Fatal Crashes in Michigan Who Tested Positive for Cannabinoid Drugs by Year



CONCLUSIONS

- The annual fatal MVC rate in Michigan increased in recent years, and although (among tested drivers with known results) the proportion positive for cannabis was increasing prior to legalization of recreational cannabis, there appeared to be a sharper increase post-legalization from 2019 to 2020, which may reflect increased availability and consumption. Despite a subsequent decline in cannabis-positive tests over the next 2 years coinciding with COVID-19 pandemic, there remains a need for public health approaches to prevent operating vehicles under the influence of cannabis.
- Increased and more consistent testing in fatal and non-fatal MVC and other traffic incidents is needed to better characterize the involvement or lack thereof of cannabis in various driving-related outcomes.
- Reliable testing methods to determine cannabis impairment among drivers at the time of a crash or traffic incident are also needed.

CRIMINAL JUSTICE AND LEGAL SYSTEM DATA

INTRODUCTION

The ways in which cannabis use, cultivation, and sales intersect with the legal and criminal justice systems are complex, given the changing policies and discrepancies between state and federal laws. Before the enactment of the Michigan Regulation and Taxation of Marihuana Act (MRTMA) in 2018, possession and use of cannabis for recreational purposes was illegal at the state-level (i.e., only individuals with medical certification from the State of Michigan could possess and use cannabis), and it remains illegal for those under the age of 21. This significant change in the legal status of cannabis use in Michigan calls for updated information on trends in cannabis-related criminal justice indicators. The sections below review information pertaining to cannabis-related legal charges and convictions, law enforcement seizures of illegally produced cannabis products, as well as information on trafficking of cannabis by federal teams.

FINDINGS

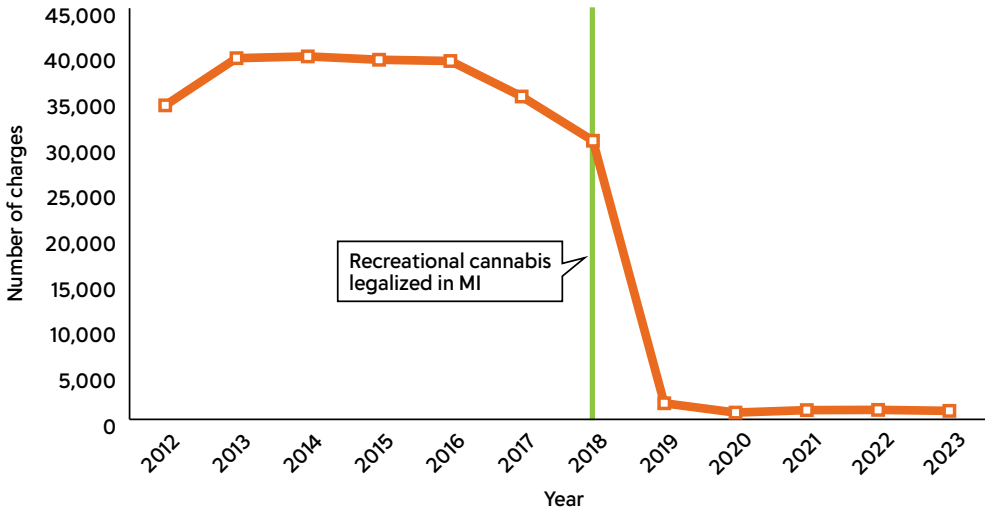
Cannabis-Related Legal Charges and Convictions

Data from the Michigan State Court Administrative Office's Judicial Data Warehouse (JDW) provides cannabis-related criminal justice information from individuals charged in the adult court system. In prior years, cannabis-related charges included any offense related to the possession, use, manufacturing, delivery, or distribution of cannabis products. Examples include possession of cannabis and delivery/manufacture of cannabis. Since legalization, these types of charges include violating the MRTMA, with examples such as operating a facility, consumption in a public/prohibited space, or possession of amounts exceeding what is legally allowed.

- A criminal prosecution begins when a prosecutor files a charge (a formal accusation) against a defendant. Although the total number of cannabis-related charges filed in Michigan declined modestly in the two years prior to legalization, total charges declined sharply after 2018. Specifically, from 2018 (30,497 cannabis-related charges) to 2019 charges declined by 94.2% to 1,764. The number has stayed low, dropping to 743 in 2020, with the most recent year's data showing 932 in 2023 (See Figure 12a).

FIGURE 12a

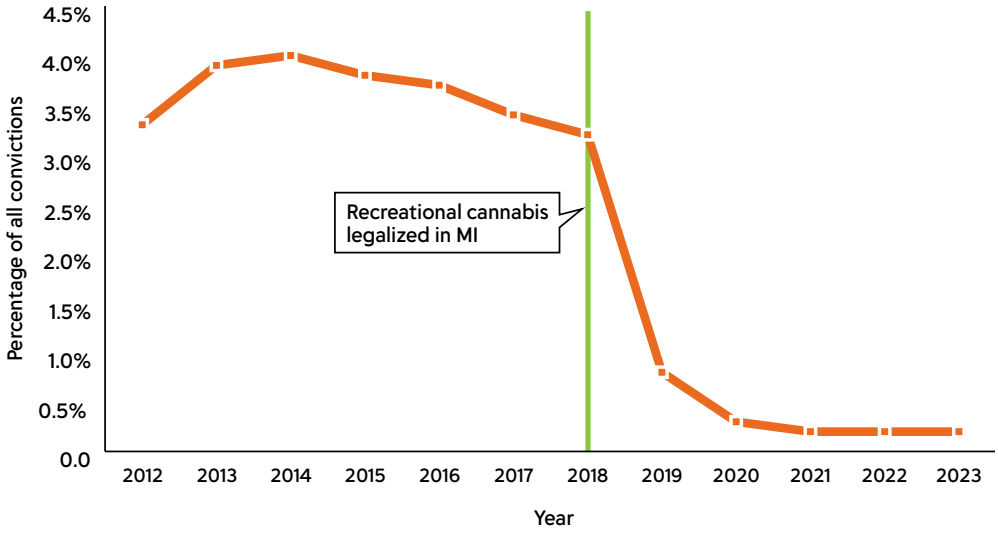
Cannabis-Related Legal Charges in Michigan by Year



- Given that not all legal charges result in convictions, we examined trends in cannabis-related convictions relative to all misdemeanor and felony convictions separately (See Figure 13b). Here, convictions include guilty pleas, nolo contendere pleas, guilty verdicts, findings of responsibility, and admissions of responsibility. Convictions do not include dismissals or deferrals.
- Of the nearly 3.4 million misdemeanor and felony convictions (from 2012 to 2023) in Michigan, 2.6% (88,113) were cannabis-related convictions; 0.4% (12,035) included a cannabis-related conviction and a concurrent non-cannabis-related felony conviction.
- In the years leading up to legalization of recreational cannabis, cannabis-related convictions accounted for anywhere from 3.3% to 4.0% of all misdemeanor and felony convictions. Since 2019, this figure has dropped precipitously. For example, in 2018, cannabis-related convictions made up 3.2% of convictions, dropping by three-quarters the next year in 2019 to 0.8%, with data in the subsequent years ranging from 0.3% to 0.2% annually (See Figure 12b).

FIGURE 12b

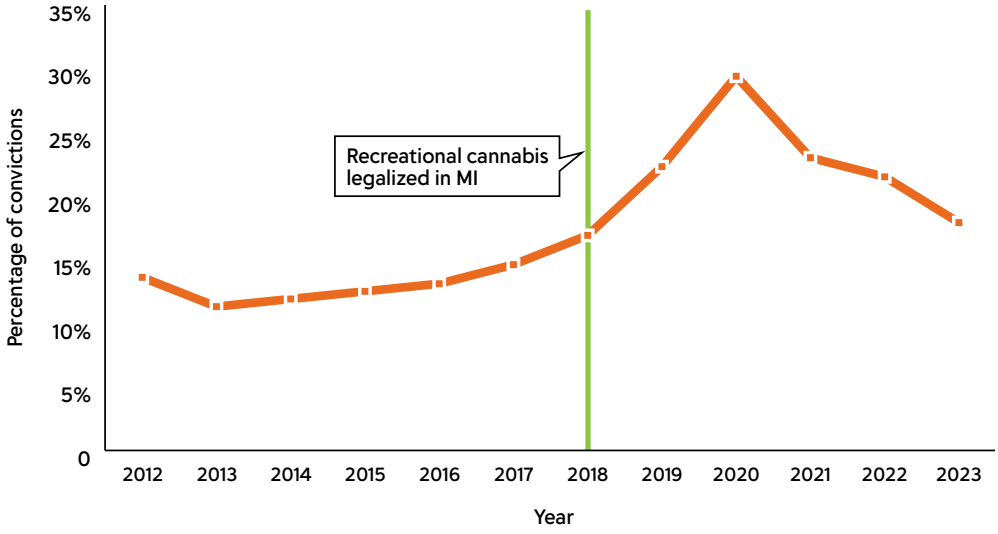
Cannabis-Related Convictions as a Percentage of All Misdemeanor and Felony Convictions in Michigan by Year



- Although rising modestly in the years leading up to recreational cannabis legalization, the percentage of cannabis convictions that involved a concurrent non-cannabis felony conviction rose from 2018 (16.9%) to 2020 (29.4%), increasing by nearly three-quarters. This figure has drifted downward since the 2020 peak to 17.9% in the most recent year (See Figure 12c).

FIGURE 12c

Percentage of Cannabis-Related Convictions That Involve Concurrent Non-Cannabis Felony Conviction by Year



Cannabis Seizures by Michigan HIDTA Task Force Teams

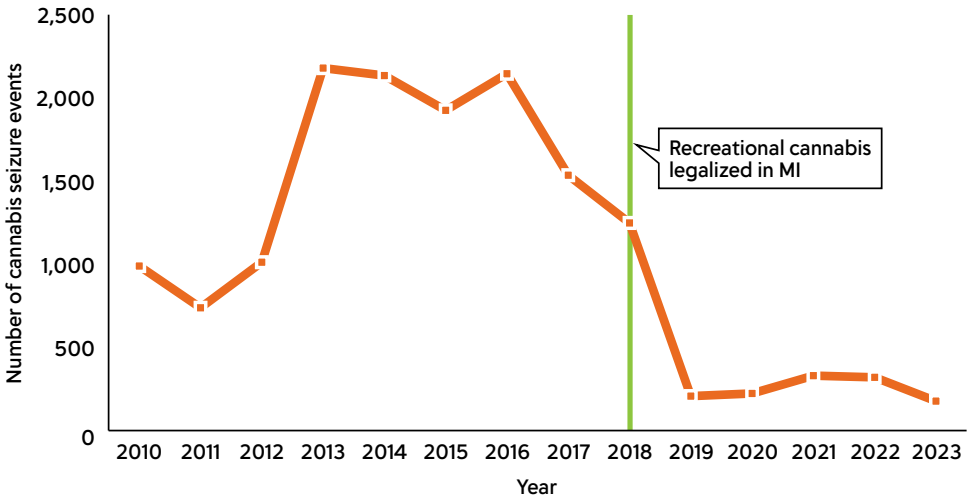
Drug seizure data provide important contextual information regarding cannabis cultivation and law enforcement seizures. Michigan has large areas of uncultivated land, and cannabis is grown across the state. Over time, prior to the MRTMA, grow operations in the state have been found in the Upper and Lower Peninsulas on state and federal land, as well as farmland and other land owned by private individuals and companies.[102] Data presented below come only from seizures made and reported by Task Force Teams sponsored by the Michigan High Intensity Drug Trafficking Areas (HIDTA).[103]

To provide some background,[103,104] HIDTA programs were created by Congress as part of the Anti-Drug Abuse Act of 1988 and are administered by the Office of National Drug Control Policy. HIDTA initiatives occur in localities identified as critical drug-trafficking corridors. The Michigan HIDTA's defined Area of Responsibility (AOR) includes the entire state of Michigan, along with 12 HIDTA-designated counties: Allegan, Genesee, Kalamazoo, Kent, Macomb, Muskegon, Oakland, Saginaw, St. Clair, Van Buren, Washtenaw, and Wayne. Within these counties, there are eight major drug markets: Detroit, Flint, Grand Rapids, Kalamazoo, Muskegon, Pontiac, Port Huron, and Saginaw. The HIDTA AOR includes an international border (Canada) and is critically located along major interstate routes between the Chicago and New York City drug markets. HIDTA programs seek to identify and remove drug trafficking and money laundering organizations (DTOs and MLOs) and in 2023 involved 121 partnering federal, local, and state agencies. Note that the data provided below regarding HIDTA seizure activities do not include seizures made by every law enforcement agency in the state.

- The total number of HIDTA team seizures that included cannabis has fluctuated over time, showing a pre-legalization low in 2011 at 738. These seizures peaked in 2013 at 2,179 and declined from 2,145 in 2016 to 1,248 in 2018 leading up to recreational cannabis legalization. Since 2019 the annual number of seizures involving cannabis has been much lower, ranging from 177 in 2023 to 330 in 2021 (See Figure 12d).
- This pattern could reflect changes in HIDTA team priorities as well as impediments stemming from the COVID-19 pandemic. Although cannabis is still widely available, it is no longer a top threat to many drug teams who avoid cannabis investigations due to medical and recreational cannabis legalization in Michigan and focus their resources on the greatest lethal drug threats to our region such as fentanyl, crystal methamphetamine, heroin, and cocaine.

FIGURE 12d

Total Cannabis Seizure Events by HIDTA in Michigan by Year



- We note that in our prior baseline report from 2020, we shared data provided by HIDTA regarding different types of cannabis seizures (e.g., plants, bulk processed cannabis, etc.), but current reporting practices that vary across HIDTA teams do not allow for such a granular assessment at this time; prior data should be interpreted with caution. Observation of available data does indicate a broad range in the quantity and value of cannabis seized, with smaller seizures likely occurring when other drug seizures are being made.

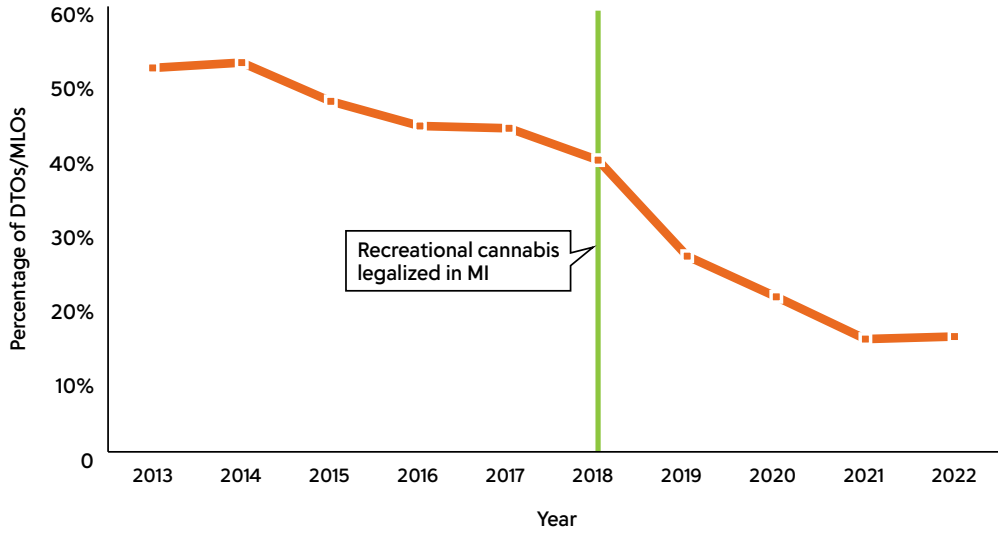
Cannabis Trafficking

Drug interdiction data continue to provide important information about the cannabis supply in Michigan. Cannabis is trafficked in Michigan from other locations via the US mail, express consignment, and by vehicles (e.g., plane, truck, other motor vehicles). DTOs and MLOs use major interstate corridors, especially I-75 and I-94, to transport drugs, including cannabis.

- Although businesses now can obtain licensure for the sales, production, and transport of cannabis, there remains active, illegal cannabis trafficking.
- Prior to the legalization of adult use of recreational cannabis in 2018, there was already a decline in the number and proportion of DTOs/MLOs under investigation by Michigan HIDTA teams that trafficked cannabis; however, the decline appeared to steepen after passage of the MRTMA and opening of the state-legalized recreational cannabis market.
- From 2013 to 2018 the number of DTOs/MLOs under investigation that trafficked cannabis decreased from 151 to 88 (from 51.7% to 39.3% of all DTOs/MLOs under investigation).
- Continuing from 2019 through 2022, this number fell from 58 to 41, such that in the most recent year for which data are available, roughly 15.0% of the 294 DTOs/MLOs under investigation were trafficking cannabis (See Figure 12e).

FIGURE 12e

Percentage of DTOs/MLOs Under Investigation That Were Trafficking Cannabis by Year



CONCLUSIONS

- The legalization of recreational adult-use cannabis has been accompanied by a large reduction in cannabis-related legal charges in the state of Michigan as well as cannabis-related convictions. Because the MRTMA stipulates specific legal circumstances for the production, sales, consumption, etc., of cannabis, there remain a smaller number of cannabis-related legal charges and convictions in the wake of legalization. Notably, criminal justice data on youth are lacking and should be examined in the future.
- Ultimately the number of cannabis seizures by HIDTA teams in Michigan has declined, possibly reflecting shifting priorities toward the drug threats to our region of fentanyl, crystal methamphetamine, heroin, and cocaine.
- Similarly, the number of DTOs/MLOs that are trafficking cannabis has decreased, likely in response to legal availability of cannabis for a large portion of the population. However, violations of the guidance set forth by the MRTMA in the state mean that non-regulated cannabis production and sales, as well as possession and use by anyone under age 21, are illegal.

FUTURE DIRECTIONS

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FUTURE DIRECTIONS

Although the data summarized in this report reflect a variety of areas potentially impacted by cannabis use, there are other areas where we were unable to identify a data source or were outside the scope of the current report. In addition to addressing the limitations of current data, to the extent data become available in the future, we suggest several areas for potential inclusion in future reports and for tracking cannabis-related trends over time. Additional information pertaining to these areas may provide a more comprehensive view of the long-term impact of recreational cannabis legalization in Michigan. These areas include:

1. Further data pertaining to cannabis-related fatal and non-fatal MVCs (e.g., increased and uniform blood testing for cannabis among drivers in crashes).
2. Vaping cannabis and related morbidity and mortality.
3. Cannabis-related injuries, including workplace injuries.
4. Outcomes of cannabis use among older adults.
5. Residential and industrial fires due to cannabis use and production.
6. Data from the 211 call center to report on the number of people who call to seek help for cannabis use disorders.
7. Cannabis-related school suspensions and expulsions among youth.
8. Cannabis-related reports to and investigations by Children's Protective Services (CPS).
9. Trends associated with use of other substances (e.g., alcohol, other drugs).
10. Potency data for cannabis plants and products seized and those on the retail market.
11. Population exposure, particularly youth, to cannabis-related advertising.
12. Cost evaluation (cost for management/oversight relative to cost related to education and effects on health).
13. More spatially granular data (e.g., county-level) on cannabis use rates and consequences to better understand relationships between cannabis policy and outcomes across different communities.

LIMITATIONS OF DATA

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LIMITATIONS OF THE DATA USED IN THIS REPORT

We have highlighted limitations of the datasets from each section in order of appearance within the text of the report. We encourage readers to view the full report to understand the findings in light of these limitations of the available data.

The New Landscape of Recreational Cannabis Legalization

Limitations of Available State Reports on Recreational Cannabis

While the data provided from publicly available reports from the CRA help quantify several aspects of the state's retail recreational cannabis activities, there are some limitations. For example, information regarding numbers of licenses processed each year is impacted by the speed at which applications are approved, which could account for some fluctuation in total numbers from year to year. Cannabis-related business licenses are active for one year from the initial licensure date, and licenses must be renewed annually to remain active. For geocoded analyses, we identified inactive licenses based on a lapse in yearly license renewal, therefore the estimates of active cannabis outlet licenses may slightly impact the accuracy of the reported prevalence of operational recreational cannabis establishments.

Trends in Medical Cannabis

Limitations of Available State Reports on Medical Cannabis

While the data provided from these reports help quantify several aspects of the state's medical cannabis program, there are some limitations to note. First, although medical cannabis was approved in 2008, data from FY 2009 are excluded from our report because the entire FY is not represented. Further, we found that the 2010 statistical report data were not available per our communication with the Michigan Department of Licensing and Regulatory Affairs (LARA). Thus, some data are limited to FY 2011 and after and do not represent the entire history of the medical cannabis program in this state. Also, while minors can obtain a medical cannabis certification under certain regulations, data pertaining to minors were only publicly reported in 2011 and 2012. Further, changes in the allowed qualifying conditions over the life of the medical cannabis program in Michigan complicates tracking trends in qualifying medical conditions over time; that a person can have more than one qualifying condition also complicates tracking these trends. Next, information regarding numbers of patients, caregivers, and licenses processed each year is impacted by the speed at which applications are approved, which could account for some fluctuation in total numbers (e.g., new licenses, renewals) from year to year if delays occur. Finally, the creation of the MMFLA in 2016 led to a new system for tracking metrics related to cannabis licenses, facilities, sales, etc., that was onboarded over subsequent years, thus data are not available for some of these metrics for prior years.

Long-Term Trends in Cannabis Use

Limitations of the National Survey on Drug Use and Health (NSDUH)

Limitations of NSDUH include standard concerns regarding retrospective, self-reported data, such as that it is subject to recall bias and demand characteristics; thus, under- and/or over-reporting are both possible.[105] Similarly, given that these data are cross-sectional, causal interpretations are discouraged and inferences should be limited to the examination of population trends, rather than individual changes over time. Generalizability of these data is limited to civilian, non-institutionalized individuals; active-duty military and institutionalized persons (e.g., those in hospitals, prisons, inpatient/residential treatment, nursing homes) are excluded. Thus, some individuals who are at higher risk for drug use may be excluded due to homelessness, incarceration, and/or treatment. In addition, note that assessment of cannabis use does not provide fine-grained detail regarding different consumption methods (e.g., vaping, dabbing, tinctures, etc.), and/or quantity or potency of cannabis. For example, items about perceived risk only ask about risk of smoking cannabis. Also, it is important to note that there were major methodological changes made to the NSDUH in 2021; estimates from 2021 forward should be interpreted with caution. Finally, some data described in our original 2020 baseline report were not publicly available, and thus we cannot provide updated information on cannabis use

disorder, public perceptions of cannabis-related legal penalties, and perceived approval of cannabis use by peers and parents.

Cannabis Use and Pregnancy

Limitations of Michigan Pregnancy Risk Assessment Monitoring System (MI PRAMS)

The MI PRAMS assessment of cannabis use is a self-report instrument and only measures the concept of "any use," and is therefore unable to provide granularity about how much or how often cannabis is used as well as the types of methods used (e.g., smoking, ingestion). Additionally, MI PRAMS did not assess the strain and/or potency of the cannabis used, and there were not available data about reasons for cannabis use during pregnancy (e.g., pregnancy-related nausea) or other contextual factors that could influence cannabis use (e.g., household members' use). Although missing data may be a limitation, the proportion of those skipping these survey questions was relatively low in 2016-2017 (4.2% of survey respondents) and has been lower since (2.6% in 2021-2022). Those who share their experiences and opinions with PRAMS do so from the comfort of home, often through a paper or digital survey. The hesitancy to share personal information may be lower than what is experienced when clinicians and care providers inquire face-to-face about such factors in the clinic. Note also that survey responses could be obtained between 11 weeks and 9 months post-partum, meaning that there was variation in the period over which participants had to recall their pre-pregnancy cannabis use as well as the period assessing post-birth cannabis use.

Cannabis Use in the Michigan Workforce

Limitations of the Quest Diagnostics Drug Testing Index

These data only represent companies that use the Quest service and do not fully generalize to the entire Michigan or national workforces, as there are other providers used for pre-employment drug testing, when required. In addition, there is more general variation across employers in criteria and universality of drug testing procedures. Note also that data from 2007-2018 were previously gathered via the Quest website and used in our 2020 report, with data through 2017 duplicated herein. Data from 2018-2022 were provided directly to our team by Quest staff, who indicated that these data reflect the same data source and indices as what was previously publicly available. Note, however, that the 2018 data provided directly to our team varied slightly from the 2018 data previously reported and we could not confirm a reason for this discrepancy; we chose to include the 2018 data provided directly from Quest. Finally, individual-level data are not publicly available and therefore trends in cannabis positive tests in this sample cannot be further examined.

Cannabis and the Opioid Epidemic

Limitations of the Michigan Automated Prescription System (MAPS)

One limitation of the MAPS system is that it does not include all opioids dispensed as there are a few reporting exemptions (e.g., substances administered to patients, samples provided to patients, substances administered at a medical facility for fewer than 48 hours).[106] Further, MAPS does not account for prescriptions written or filled out of state. These data are also reported year to year in the context of changes affecting prescribing.[107] In 2018, legal changes in the state of Michigan also increased regulations regarding who must use the MAPS system, requiring physicians prescribing or dispensing a controlled substance to register with MAPS and those releasing more than a 3-day supply to obtain and review a MAPS report for the patient. Prescribing limits for acute pain (limiting to a 7-day supply) were also enacted in 2017.

Limitations of Centers for Disease Control and Prevention Wide-Ranging Online Data for Epidemiologic Research (CDC WONDER) Data

The overdose data presented in this section were restricted to opioid overdose mortality, and thus the association between cannabis availability and non-fatal overdose trends are not examined. Regarding the mortality data, these are based on death certificates, which may be limited because not all deaths involve toxicology testing with results recorded to the death certificate. Moreover, when toxicology testing is completed, specific drugs may not be indicated for several reasons, such as inconclusive testing, leading to potential undercounting of the number of

opioid overdoses. It is also important to note that medical examiner practices and the accuracy and completion of information reported on death certificates also have individual variation, which has been noted particularly with regard to comparing overdose rates across locales.[108] Further, analysis of the relationship between cannabis use and opioid-related deaths cannot be used to estimate the preventable fraction of opioid-related deaths, which is a key question. That is, we cannot use these data to show whether individuals who were at risk for opioid overdose switched from opioids to cannabis for pain management and potentially avoided overdose. This remains a question for future investigation.

State Poison Center Calls Involving Cannabis-Related Exposures

Limitations of the Michigan Poison & Drug Information Center Data

Data reported are retrospective observational cases from a single state poison center from January 1, 2003, to December 31, 2023. Poison center data are inherently limited because the system relies on passive, voluntary, and/or self-reporting of data, and not all poisoning events in the state are reported to poison control. Therefore, the data should not be interpreted as a representation of the true statewide incidence of all cannabis-related exposures. Poison center call volumes fluctuate over time. Although data collected for each call are aligned with standard criteria (NPDS Coding Users' Manual of America's Poison Centers), some information may be incomplete, and longitudinal follow-up does not occur to track the outcome of cases over time. Calls were included herein if cannabis was mentioned at all as part of the call, and this can include cannabidiol products.

Healthcare Utilization

Limitations of the Michigan Outpatient Database (MODB)

The MODB is an event-level dataset (e.g., emergency department visits), therefore it is possible that the same individual is represented multiple times if they had more than one emergency department (ED) visit in a calendar year. The MODB does not include patients who are admitted as an inpatient. Race and ethnicity information is often missing or unreliable, therefore data cannot be reported based on these characteristics. The MODB data for ED visits are not available prior to 2016. Out-of-state ED visits by Michigan residents were not included in these data.

Limitations of the Michigan Inpatient Database (MIDB)

The Michigan Inpatient Database (MIDB) is an event-level dataset; therefore, it is possible that the same individual will be represented multiple times if they were hospitalized more than once in a calendar year. The MIDB does not include patients who are only seen in the emergency department (ED) or held on observation status and never admitted as an inpatient. Race and ethnicity information is often missing and/or unreliable; thus, data cannot be stratified by these characteristics. Caution is also warranted in interpreting changes in rates over time, which may reflect, for example, changes in the International Classification of Diseases (ICD) coding system and/or changes in insurance status, especially for younger ages after passage of the Affordable Care Act (ACA) and Health Michigan plan. Out-of-state hospitalizations among Michigan residents are not included in these data.

Limitations of the Treatment Episode Data Set (TEDS)

It is important to note that there are limitations of the TEDS data, despite it being a comprehensive and very useful database. These limitations are detailed fully online,[67] but we note a few important ones here. First, TEDS data is based on events (i.e., treatment episodes such as going to detox or entering an outpatient program), and therefore these data do not represent individuals who could have been responsible for more than one treatment episode in the data during a calendar year (e.g., a person going to detox multiple times in a year). While TEDS attempts to track treatment episodes that are linked (i.e., transition from residential to outpatient), this is not always possible, and a new admission record may represent a transfer in care within a single treatment episode. Due to this, the number of treatment admissions reported is likely an overestimate of treatment episodes at TEDS facilities. Given that TEDS does not include all treatment programs in the state (e.g., excludes private pay), its data do not represent all cannabis-related admissions and do not represent the demand for treatment (e.g., waiting lists). TEDS also does not include federal facilities providing treatment such as the Veterans Administration or Bureau of Prisons. Further, only the primary,

secondary, and tertiary drugs listed at treatment admission are included in these data and may under-represent cannabis use problems among individuals in treatment.

Cannabis-Related Mortality

Limitations of the Michigan Resident Death File (2004-2022)

The Michigan Resident Death File contains death certificate data on all deaths of Michigan residents. Each death is classified by the underlying cause of death and up to 17 related causes of death as determined by the attending physician or medical examiner. Consideration of these mortality data should take limitations into account. First, we do not have data on deaths of Michigan residents that occurred outside the state. Next, for a death to be classified as occurring due to cannabis poisoning, toxicology testing must be performed and recorded on the death certificate. Roughly 24.0% of all drug overdose deaths from 2004 to 2017 did not have a specific drug or class of drug indicated on the death certificate; this can occur for several reasons (e.g., inadequate sample for testing, inconclusive testing, lack of an appropriate International Classification of Diseases (ICD) code for the substance identified). However, the proportion of overdoses with a specified drug listed on the death certificate has increased over the time period; for example, in 2022, 97.0% of overdose deaths had a specific drug indicated. Furthermore, it may be difficult for examiners to conclude cannabis involvement in a death; similar dynamics have been observed, for example, in ascertaining stimulant involvement in emergency department cases, which are more often concluded to be cardiopulmonary or psychiatric diagnoses.[109] Analogous dynamics may lead to underdiagnosis of cannabis-related conditions. It is also important to note that medical examiner practices and information included in a death certificate vary across medical examiners, which has been noted particularly regarding comparing opioid overdose rates across counties.[108]

Suicides and Homicides

Limitations of the Michigan Violent Death Reporting System (MiVDRS)

There are some limitations of the MiVDRS system, including that medical examiner files are not received and abstracted for all decedents (i.e., annually, medical examiner files are abstracted for 69.0% to 88.0% of suicide decedents and 82.0 to 94.0% of homicide decedents). In addition, to limit costs, some medical examiners do not run toxicology tests when the death is judged to be an "obvious suicide" unrelated to substance use (and sometimes the medical examiner only tests for the presence or absence of alcohol), resulting in an incomplete picture regarding cannabis use among homicide and suicide decedents. Even if some toxicology information is available, data abstractors may not have information to indicate whether a cannabis test was run or not, leading to a portion of cases where tested/not tested information was missing. This occurred for 307 suicide cases and 70 homicide cases from 2016 to 2022. Note also that Michigan Department of Health and Human Services Public Health Administration policy requires counts of 1 to 5 be suppressed to protect decedents' confidentiality. Due to small numbers, some data were combined to allow greater detail to be displayed. Information on decedents under age 12 was suppressed due to small cell sizes. Note also that the presence of cannabis as a substance on toxicology tests does not automatically imply that the drug use occurred proximal to the violent death.

Cannabis Presence in Drivers of Fatal Motor Vehicle Crashes

Limitations of the Data from the Michigan Traffic Crash Facts (MTCF) Website

The MTCF website provides annual Michigan police-reported crash data. One limitation of the data is that police-reported crash data are collected for administrative reasons and accuracy is encouraged, but there is variation in how individual police officers collect and report these data. The second major limitation is that not everyone is tested for drugs; especially, if the driver has sufficiently high Blood Alcohol Concentration (BAC) levels (unless the driver dies). Finally, roughly 8-19% of those tested for drugs did not have available drug test results; it is unclear whether those people are more, or less, likely to test positive for cannabis, leaving the possibility that test positivity estimates are not representative of the population of drivers killed in MVCs in Michigan.

Limitations of the Fatality Analysis Reporting System (FARS)

There are a number of caveats and limitations to consider when making sense of the FARS data.[110] It is important to note, when trying to understand impaired driving, that a positive drug test, which indicates the presence of a drug in one's body, does not necessarily indicate that an individual was impaired at the moment that they were driving. Specifically, the data obtained from FARS can elucidate whether a person had a drug in their system at the time of testing, but cannot prove that an individual was impaired at the time of the motor vehicle crash (MVC). In particular, cannabis can be detected via a test, weeks after use. Other limitations pertaining to FARS data include that policies and testing procedures can vary within a state and over time. For example, FARS[101] suggests that some localities test all drivers in fatal crashes and some test only those drivers who were fatally injured. There is also no standard for choosing the substances tested. The type of test used and how well it detects the presence of a drug can also vary, as well as whether a confirmatory test is administered. Further, there is a potential that some labs do not report drug test results to FARS specifically, and there are variations in how drug test data are recorded by FARS. For example, in some cases when there are more than three drugs detected in a testing scenario, only three drugs are entered, potentially resulting in excluding some cannabis-related results; this is in addition to the issue raised above regarding missing test results. Given that drug tests are not completed for most drivers in all fatal crashes, the extent to which cannabis is present among drivers is not clear. Further, FARS notes[101] that testing occurs more frequently among drivers who died in the MVC compared to surviving drivers. In light of these points, it is important to note that we cannot conclude whether our prevalence estimates are representative and, therefore, whether driving under the influence of cannabis is truly increasing over time.

Criminal Justice and Legal System Data

Limitations of the Judicial Data Warehouse (JDW)

There is a small amount of non-reporting that occurs with the JDW. Specifically, District courts in Grand Rapids and Circuit and District Courts in Berrien County do not send data to the JDW and are excluded from the analyses. This is a limitation of the data, and it is unclear how it may impact the estimates produced; thus, the generalizability of these estimates should be considered in that context.

Limitations of Michigan HIDTA Drug Threat Assessments and Performance Management Process (PMP) Data

There are several limitations of these data. First, note that drug seizures by the High Intensity Drug Trafficking Area (HIDTA) teams do not represent all drug seizures in the state (as state police and other jurisdictions are also involved in cannabis seizures) and that changing trends in seizures could reflect multiple factors. For example, it is important to note that the observed decreases in seizures by HIDTA and Michigan State Police's Domestic Cannabis Eradication and Suppression Program may not represent a decrease in illegal cannabis production in Michigan. Instead, the reduction may be affected by lower rates of targeting and investigation of cannabis grow operations by law enforcement, especially due to the passage of the MRTMA. Further, in our 2020 baseline report we included data on seizure types and amounts (in kg and dollar value); however, inconsistencies in how cannabis seizures are reported across teams creates difficulties interpreting the data. We also note that the seizures reported herein included a range from very small quantities of cannabis (likely seized in the context of another drug seizure) to very large quantities. Moreover, law enforcement agencies note that reductions in seizures as well as investigations into organizations trafficking cannabis may be due to increased prioritization of fentanyl, heroin, and crystal methamphetamine investigations.[102]

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