Maryland **M**edical **C**annabis **P**atient **S**urvey Report **2022**

PREPARED BY
CANNABIS PUBLIC POLICY CONSULTING

PREPARED FOR
MARYLAND MEDICAL CANNABIS COMMISSION

MMCC
MARYLAND MEDICAL CANNABIS COMMISSION

The Maryland Medical Cannabis Commission sponsored this survey and report from Cannabis Public Policy Consulting (CPPC) to examine patterns of use, perceptions of risk and benefit, and occurrence of high-risk behaviors related to cannabis use in the medical cannabis patient population. More than 13,000 medical cannabis patients took part in the survey, which was conducted in September 2022, prior to the General Election referendum to legalize adult use in the state. A second, post-referendum survey is planned for fall 2023.

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NOTHING IN THIS REPORT IS INTENDED AS MEDICAL ADVICE

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Executive Summary

The current report details the methods and results of the first year of a two-year study, the 2022 Maryland Medical Cannabis Patient Survey (MMCPS-22), commissioned by the Maryland Medical Cannabis Commission (MMCC) and conducted by Cannabis Public Policy Consulting (CPPC) in September 2022. The study was designed to examine patterns of use, perceptions of risk and benefit, and occurrence of high-risk behaviors related to cannabis use in the medical cannabis patient population. The intent of the study was for MMCC to obtain data on medical cannabis use to help inform future programmatic and policy efforts and ensure the safe use of cannabis in Maryland. The first wave (i.e., the first year) of the survey was conducted prior to the ballot referendum to legalize nonmedical (adult-use) cannabis, which voters approved on November 8, 2022. Participant recruitment began via email on September 19, 2022, and within two days reached well over its anticipated number of 7,500 responses. In total, this survey analyzed data from over 13,000 medical cannabis patients in Maryland. To our knowledge, this is one of the largest single recruitments of individuals using cannabis, let alone medical cannabis patients, conducted to date. This finding strongly suggests that many medical cannabis patients in Maryland are committed to and engaged with Maryland's medical cannabis program. A second wave (MMCPS-23) is planned for post adult-use legalization and is scheduled to be implemented in late summer/early fall 2023.

Executive Summary

CRITICAL TAKEAWAYS

1. Current Medical Cannabis Patients in Maryland Largely Plan to Remain Medical Patients

- Relatively few medical cannabis patients in this sample (9%) intend to shift from the medical program to an adult-use market.

- Less than 1% of current patients in this sample report solely using cannabis for nonmedical reasons, which suggests it is likely that there will be stability in the medical program upon the implementation of adult-use cannabis in Maryland.

- Respondents reporting burdensome paperwork associated with the medical program who also reported consuming at least half of their cannabis for recreational purposes were the most likely (four times greater) to report an intention to switch to the adult-use program once it is implemented.

2. "Dose" Was Measured for the First Time in Maryland Medical Cannabis Patients

- A key accomplishment of the study was providing initial validation for the mg/THC dose measure used in the survey. This is one of largest such studies to date, and the first of any state-related program, to measure dose.

- The median dose per sitting was lowest for those who primarily consumed edibles (8 mg/THC) and highest for flower and concentrates (45 and 42.3mg/THC, respectively). To better understand this difference in dose amounts, further research is needed on how the effects of THC vary across methods of administration.

- The median dose per sitting across all respondents was 27.6 mg/THC, which may be higher than is therapeutically necessary.[1,2] However, definitive dose recommendations have not yet been established for medical or nonmedical purposes, and thus emerging dose research should be monitored.

3. Respondents Perceive Cannabis to Be Effective for Their Qualifying Conditions

- Severe chronic pain was the most prevalent qualifying medical condition, reported by nearly half (46%) of medical cannabis participants in Maryland. About one-third of respondents reported "Other" as their qualifying condition, and among them, two-thirds reported anxiety or depression as their primary condition.

- Respondents whose primary condition was epileptic seizures, anorexia, or post-traumatic stress disorder (PTSD) endorsed cannabis as an extremely effective treatment at the greatest frequencies compared to participants with the other qualifying conditions.

- Twelve percent of respondents said they used cannabis to stop or replace their opioid use, and 13% said the same for benzodiazepines.

4. Insights into Public Health and Safety Measures for Adult-Use Cannabis

- Those who reported using edibles as their primary method of cannabis consumption consumed cannabis less frequently, in lower amounts, in lower potencies, and were less likely to demonstrate problematic cannabis use or drive under the influence of cannabis than those who reported smoking, vaping, or concentrates as their primary method.

[1] Freeman, T. P., & Lorenzetti, V. (2020). 'Standard THC units': A proposal to standardize dose across all cannabis products and methods of administration. *Addiction, 115*(7), 1207–1216. https://doi.org/10.1111/add.14842

[2] Volkow, N., & Sharpless, N. E. (2021, May 10). *Establishing 5mg of THC as the standard unit for research.* Nora's Blog, National Institute on Drug Abuse. https://nida.nih.gov/about-nida/noras-blog/2021/05/establishing-5mg-thc-standard-unit-research

- While most (80%) respondents reported abstaining from driving within 3 hours of consuming cannabis or while impaired in the past month, 6.4% reported driving within 3 hours of consuming cannabis or while impaired six times or more.

- Most (60%) respondents reported "never" to each of three questions aimed at identifying problematic cannabis use. Although this suggests a low prevalence of problematic use, MMCPS-22 used an abbreviated list of problematic use questions, and further research is needed on the topic.

Definitions and Acronyms

Cannabis flower/Flower — the smokable part of the cannabis plant

CBD — cannabidiol

Certified patient — an individual who has met their medical provider's criteria for treatment with medical cannabis and for whom the provider has issued a certification

Concentrate — a cannabis product that is a highly concentrated form of cannabis, including dabs, wax, shatter, resin, and Rick Simpson Oil

Consumption — using cannabis products

Correlated — having a mutual relationship or connection

Descriptive characteristics — a summary statistic that quantitatively describes or summarizes features from our sample

Dose — a quantity of a cannabis products taken or recommended to be taken at a particular time

DUIC — driving under the influence of cannabis; driving within 3 hours of consuming cannabis or while under the influence of cannabis

Edibles — food products infused with cannabis extract

Inferential findings — findings where statistical analysis was performed to identify and examine statistical relationship between variables and outcomes of interest

Medical cannabis use — cannabis used to relieve the symptoms of a medical condition

MMCC — Maryland Medical Cannabis Commission

MMCPS — Maryland Medical Cannabis Patient Survey

Patients — people registered and certified to use medical cannabis in Maryland

Polysubstance use — the use of more than one substance, including but not limited to alcohol and opioids

Principal investigator — the individual responsible for the preparation, conduct, and administration of the study

Problematic use — a problematic pattern of cannabis use leading to clinically significant impairment or distress

PTSD — post-traumatic stress disorder

Qualifying conditions — include cachexia, anorexia, wasting syndrome, severe or chronic pain, severe nausea, seizures, severe or persistent muscle spasms, glaucoma, PTSD, or another chronic medical condition which is severe and for which other treatments have been ineffective and the symptoms reasonably can be expected to be relieved by the medical use of cannabis

Recreational cannabis use — cannabis used for anything other than to relieve the symptoms of a medical condition

Respondents/Participants — Maryland medical cannabis patients who completed the MMCPS-22 survey

THC — Tetrahydrocannabinol

Vaping — the action of inhaling and exhaling vapor containing cannabis concentrate

Section 1.

Research Design

Survey questions, methods, and analyses used for this study were based on validated peer-reviewed, scientific publications authored by the Principal Investigator of this study and/or other investigators who examine consumption and source patterns of cannabis use in the United States.[3] To our knowledge, this is one of the largest surveys to date on cannabis use patterns and cannabis-related public health outcomes in medical cannabis patients nationwide, with 13,011 complete survey responses kept for analysis after data cleaning. The survey was administered online, with an invitation to participate sent via email to all certified medical cannabis patients over age 18. Minor-aged patients, who make up 0.17% of the total certified medical cannabis patient population, and caregivers were not included in the survey.

The survey sample showed a strong match in demographic characteristics relative to the Maryland medical cannabis population, which improves confidence that the findings reported in the survey are indicative of those seen in the medical cannabis population. Tables 1–3 show distributions for race, age, and jurisdiction for all medical cannabis patients in Maryland and the sample of patients surveyed for this study. For each outcome, the correlation between the distributions for each demographic sub-option (e.g., % living in Allegany County) from the survey was very strongly correlated to distribution observed from the actual medical patient population.

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[3] Sofis, M. J., Budney, A. J., Stanger, C., Knapp, A. A., & Borodovsky, J. T. (2020). Greater delay discounting and cannabis coping motives are associated with more frequent cannabis use in a large sample of adult cannabis users. *Drug and Alcohol Dependence, 207*, Article 107820. https://doi.org/10.1016/j.drugalcdep.2019.107820; Sofis, M. J., Lemley, S. M., Lee, D. C., & Budney, A. J. (2020). A web-based episodic specificity and future thinking session modulates delay discounting in cannabis users. *Psychology of Addictive Behaviors, 34*(4), 532–540. https://doi.org/10.1037/adb0000557; Sofis, M. J., Borodovsky, J. T., Pike, C. K., Liu, L., Jacobson, N. C., & Budney, A. J. (2021). Sifting through the weeds: Relationships between cannabis use frequency measures and delay discounting. *Addictive Behaviors, 112,* Article 106573. https://doi.org/10.1016/j.addbeh.2020.106573; Borodovsky, J. T., Marsch, L. A., Scherer, E., Grucza, R. A., Hasin, D. S., & Budney, A. J. (2020). Perceived safety of cannabis intoxication predicts frequency of driving while intoxicated. *Preventive Medicine, 131,* 105956. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6942456/

Specifically, when all demographic and geographic variables were examined, the surveyed patient sample was a 93% match with the actual medical patient population in Maryland, which strongly supports the representativeness of the survey findings.

Researchers used descriptive and inferential statistical methods for analyzing the data. IBM SPSS statistical software was used for all analyses. Demographic and descriptive characteristics of the study sample were explored using frequencies, percentages, cross-tabulations, and the Wald test of significance. Inferential findings were explored using regression models while controlling for statistically significant covariates. The researchers interpreted all differential findings on targeted outcomes to facilitate easily understandable implications for outcomes and public health.

Section 2.

Characteristics of MMCPS Respondents

46%

Nearly half (46%) of medical cannabis respondents in Maryland reported severe chronic pain as their qualifying medical condition. "Other" conditions were reported by approximately 1 in 3 (33%) respondents, and of those reporting using medical cannabis for "other conditions," by far the most reported condition was anxiety (50%).

Respondents *with* children at home reported higher frequency than those *without* children at home of storing their cannabis in a safe, locked place (78% vs. 56%) and lower frequency of smoking cannabis inside the home (48% vs. 65%). However, both groups reported a roughly equivalent rate of vaping cannabis in the home (64% vs. 66%).

The surveyed patient sample was a 93% match with the actual medical patient population in Maryland on demographic characteristics, which strongly supports the representativeness of the survey findings.

On average, respondents spent $122.19 per purchase on medical cannabis products.

More frequent cannabis use in the past month and younger age were both associated with elevated risk of driving under the influence of cannabis (DUIC) in the past month.

More than 75% of respondents reported feeling "very comfortable" or "extremely comfortable" that their friends, family, primary care provider (PCP), or other healthcare worker know that they use cannabis.

2.1. Demographics

For a complete review of descriptive demographic characteristics, refer to Appendix A of the report. Select demographic characteristics of the MMCPS-22 sample are summarized in Tables 1–4. A majority of respondents in the MMCPS-22 sample were White (78.2%) and between the ages of 36 and 45 (24.1%). Physical or sensory disabilities were reported by 32.2% of the sample, and the most commonly reported disability was a serious difficulty concentrating or making decisions due to a physical, mental, or emotional condition (17.8%). Furthermore, 0.9% of respondents were pregnant and/or breastfeeding, 9% of individuals have served in the armed forces, and 16.8% were enrolled in Medicaid.

Figure 1.

32%

of survey respondents live with a physical and/or sensory disability.
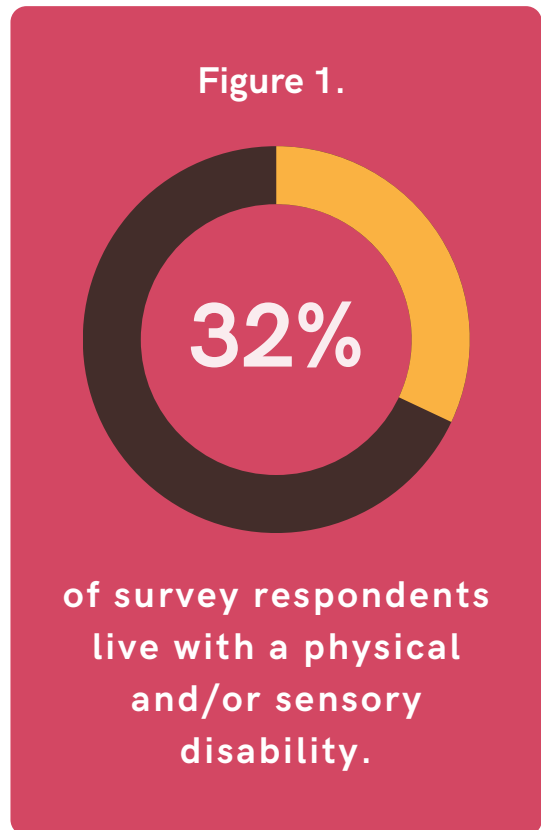
Table 1. Age (Median) Distributions of MMCPS-22 Sample and Total Patient Population

MMCC Patient Population (n= 154,638)	MMCPS-22 Participants (n=13,011)
36–45	40.5

Table 2. Race Distributions of MMCPS-22 Sample and Total Patient Population

Race	MMCC Patient Population (n= 154,638)	MMCPS-22 Participants (n=13,011)
American Indian or Alaska Native	0.4%	0.5%
Asian	1.4%	1.2%
Black or African American	18.4%	13.7%
Native Hawaiian or other Pacific Islander	0.1%	0.1%
White	66.9%	78.2%
Two or More Races	3.4%	3.3%
Other race not represented above	9.4%	2.9%

Over half of the respondents either received a bachelor's degree (24.9%), or had completed some college or received an associate's degree (32.1%). Most respondents were employed full-time (56%), while 18.1% were retired, and the median annual income for respondents in this sample was $62,500. The median length of time that respondents had been in the medical cannabis program was 2 years.

Table 3. County Distributions of MMCC Patient Population and MMCPS-22 Sample

County	MMCC Patient Population (n= 154,638)	MMCPS-22 Participants (n=13,011)
Allegany	2%	2%
Anne Arundel	12%	11%
Baltimore	14%	18%
Baltimore City	9%	9%
Calvert	2%	2%
Caroline	1%	1%
Carroll	4%	4%
Cecil	2%	2%
Charles	2%	2%
Dorchester	1%	1%
Frederick	8%	6%
Garrett	0%	1%
Harford	6%	6%
Howard	5%	5%
Kent	1%	0%
Montgomery	13%	13%
Prince George's	7%	6%
Queen Anne's	1%	1%
Somerset	0%	0%
St. Mary's	2%	2%
Talbot	1%	1%
Washington	3%	3%
Wicomico	2%	3%
Worcester	2%	2%

Table 4. Demographic Distributions of MMCPS-22 Sample

Gender Identity

53.8%
Female

43.7%
Male

1.2%
Non-binary

Level of Education

32.1%
Some college, associate degree

24.9%
Bachelor's degree

19.4%
Master's degree or PhD

Employment

56%
Employed full time

18.1%
Retired

8.3%
Working part time

Annual Income (Median)

$62,500

Time Certified as a Medical Cannabis Patient (Median)

Two years

2.2. Medical Conditions and/or Symptoms

Nearly half (46%) of respondents reported severe chronic pain as their qualifying medical condition. "Other" conditions were reported by approximately 1 in 3 (33.4%) respondents, and PTSD was reported by 12.5% of respondents. Severe muscle spasms (3%), severe nausea (2.6%), anorexia (1%), epileptic seizures (0.7%), and cachexia (0.2%) were reported less frequently.

Figure 2. Top Qualifying Conditions Reported for Medical Cannabis Use

1.9% Anorexia, epileptic seizures, or cachexia

2.6% Severe nausea

3% Severe muscle spasms

46% Severe Chronic Pain

12.5% PTSD

33.4% "Other"
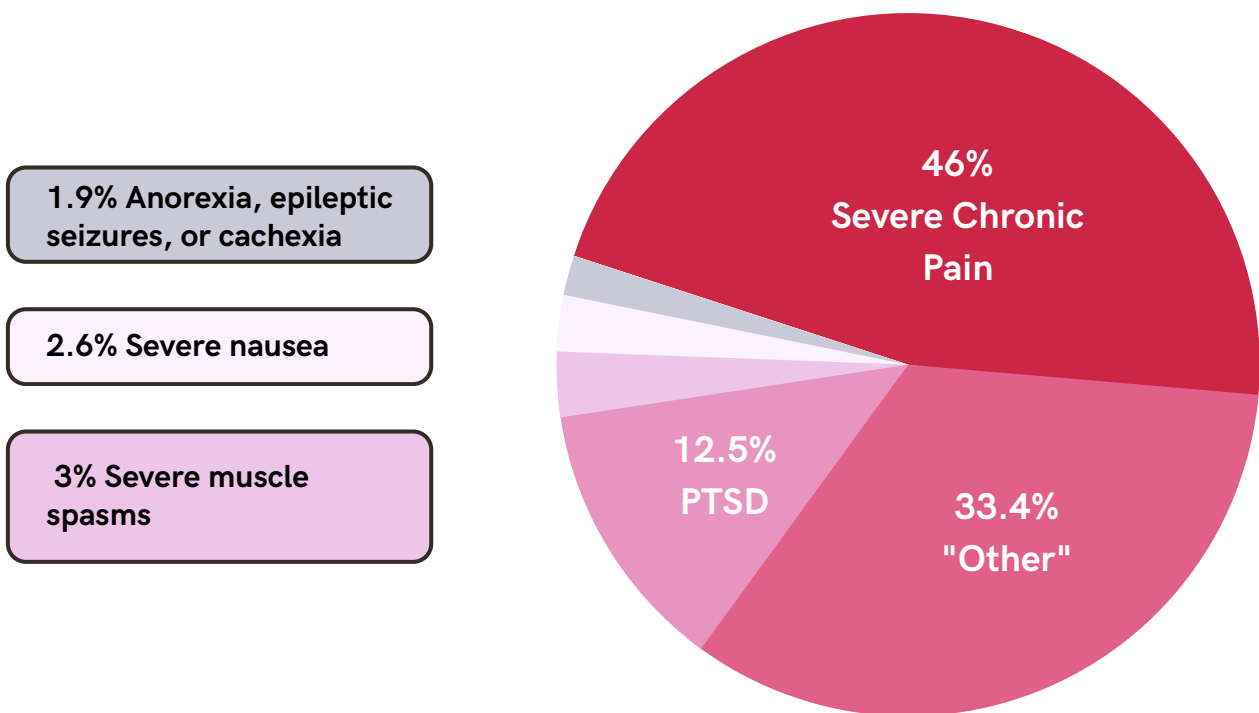
Figure 3. Percent of Respondents Reporting Common "Other" Conditions for Medical Cannabis Use

■ Commonly reported "Other" conditions
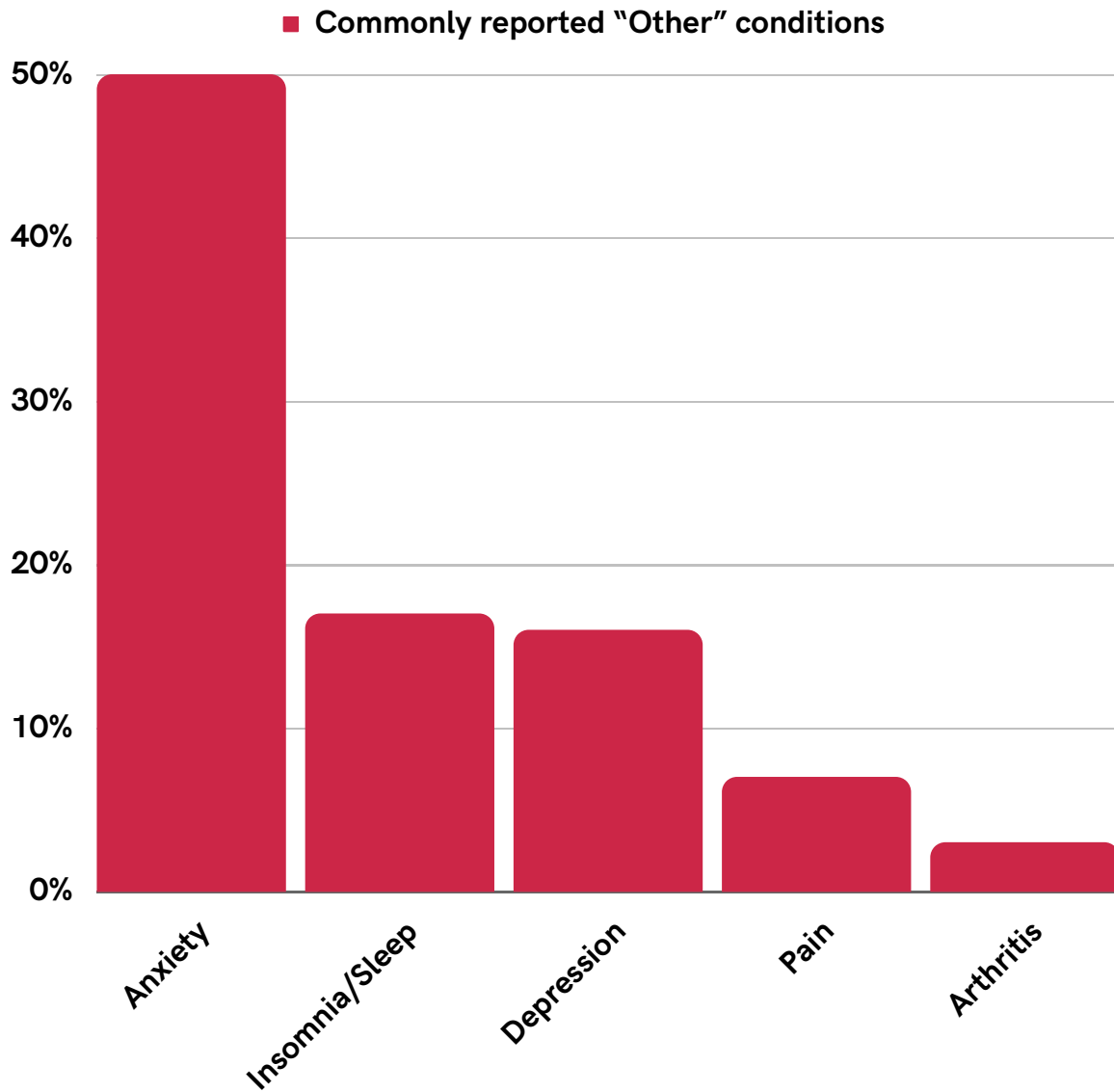
Of those reporting using medical cannabis for "other chronic conditions," the most commonly reported condition was anxiety (50%), followed by insomnia (17%) and depression (16%). Notably, 7% of this group reporting using medical cannabis for "other conditions" reported chronic pain, which is a qualifying condition, suggesting these respondents likely have not acquired certification to use cannabis to treat chronic pain. Together, the conditions shown in Figure 3 represent 93% of all conditions in the category of "other conditions.

2.2.1. Perceptions of Efficacy

Approximately three-quarters (74%) of the sample considered cannabis to be very effective or extremely effective for treating their medical condition or symptom. Nearly a quarter (21%) of respondents considered cannabis to be moderately effective, and only half a percent (0.5%) considered cannabis to not be effective at all.

96.4%

of respondents reported at least a moderate level of efficacy in treating medical conditions or symptoms with cannabis.

Perceptions of efficacy by qualifying medical condition are displayed in Table 5. Participants whose primary condition was epileptic seizures, anorexia, or PTSD endorsed cannabis as extremely effective at the greatest frequencies (45%, 41%, and 41%, respectively). Participants with cachexia (35%), muscle spasms (29%), or chronic pain (26%) most often reported cannabis as moderately effective for those conditions.

Table 5. Perceived Efficacy of Medical Cannabis by Condition

Condition	n*	Not effective at all	Slightly effective	Moderately effective	Very effective	Extremely effective
Anorexia	131	1%	5%	8%	45%	41%
Cachexia	20	0%	0%	35%	40%	25%
Chronic Pain	5978	0%	4%	26%	46%	23%
Epileptic Seizures	85	2%	2%	14%	36%	45%
Muscle Spasms	387	1%	4%	29%	41%	24%
Other	4342	1%	3%	18%	49%	29%
PTSD	1622	0%	2%	15%	41%	41%
Severe Nausea	334	1%	3%	15%	44%	37%

* "n" indicates the number of MMCPS-22 participants that reported each condition

2.3. Purchasing Behaviors

Survey respondents in this sample spent an average of $122.19 per purchase on medical cannabis products. Those who purchased concentrates spent the most per purchase ($138.76), and those who purchased edibles spent the least ($114.58), on average. However, survey respondents generally spent a similar amount on medical cannabis products, regardless of consumption type. Data from national samples indicate that the average amount spent per purchase is around $124, which is comparable to the average spent by respondents in this sample, indicating that this sample's spending is representative of most cannabis consumers in the United States.[4] Younger individuals responding to the MMCPS-22 (ages 18–30) spent an average of $105.49 per purchase, whereas those 31 and older spent an average of $124.10. Three counties in this sample had particularly high spending per purchase: Garrett County ($179.33), Kent County ($150.57), and Calvert County ($137.06).

Figure 4. Average Amount Spent per Purchase by Method of Consumption
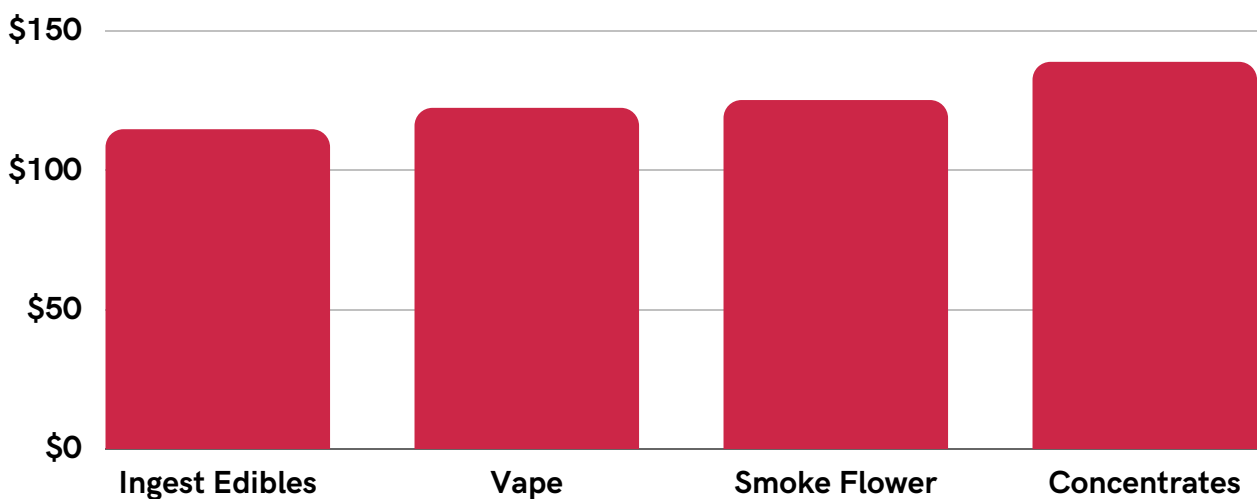
[4] Cannabis Public Policy Consulting. (2022). *Regulatory determinants of cannabis outcomes survey (RDCOS)*. [Unpublished manuscript].

2.4. Public Health, Safety, and Stigma Associated with Medical Cannabis

2.4.1. Safe Storage Practices, Use of Cannabis at Home, and Use by Pregnant and Breastfeeding Respondents

Studies have shown that cannabis use is becoming more common among parents who have children living in their homes.[5,6] A series of questions in the MMCPS-22 was designed to determine the patterns of cannabis consumption and safe storage practices among participants who had children under the age of 18 living in their homes. Table 6 shows comparisons of behaviors between those with and those without children living in the home. Respondents with children at home reported higher frequency than those without children at home of always storing their cannabis in a safe, locked place (78% vs. 56%) and lower frequency of smoking cannabis inside the home (48% vs. 65%). However, both groups reported a roughly equivalent rate of vaping cannabis in the home (64% vs. 66%). This suggests that respondents who have children living at home may be more cautious with their cannabis consumption and storage behaviors so as not to expose their children to cannabis. While responses showed increased awareness among participants with children in the home, there is room for improvement, and education efforts may be useful to reduce smoking and vaping cannabis in homes with children.

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[5] Goodwin, R. D., Kim, J. H., Cheslack-Postava, K., Weinberger, A. H., Wu, M., Wyka, K., & Kattan, M. (2021). Trends in cannabis use among adults with children in the home in the United States, 2004–2017: Impact of state-level legalization for recreational and medical use. *Addiction, 116*(10), 2770–2778. https://doi.org/10.1111/add.15472
[6] Goodwin, R. D., Cheslack-Postava, K., Santoscoy, S., Bakoyiannis, N., Hasin, D. S., Collins, B. N., Lepore, S. J., & Wall, W. M. (2018). Trends in cannabis and cigarette use among parents with children at home: 2002 to 2015. *Pediatrics, 141*(6), Article e20173506. https://doi.org/10.1542/peds.2017-3506

Table 6. Safe Storage and Use of Cannabis At Home

Among respondents who have children under age 18 living at home with them:

78%   **Always store cannabis in a safe, locked place.**

52%   **Never smoke cannabis inside the home.**

36%   **Never vape inside the home.**

The MMCPS-22 also aimed to contribute to state data on patterns of cannabis use by individuals who are pregnant and/or breastfeeding. A total of 106 respondents indicated they were currently pregnant and/or breastfeeding at the time of the survey, and among them, 92% reported consuming cannabis in the month preceding the survey. This is a concerning finding, considering that it is strongly recommended that pregnant and breastfeeding individuals avoid any use of cannabis due to the potential negative effects of cannabis exposure on infant health and development.[7]

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[7] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (2021, October). *Marijuana use and pregnancy.* https://www.cdc.gov/marijuana/factsheets/pdf/MarijuanaFactSheets-Pregnancy-508compliant.pdf

Chronic pain (27%), PTSD (22%), and other chronic conditions (38%) were the highest reported qualifying conditions for cannabis consumption in pregnant and breastfeeding respondents. In the "other chronic condition" category, respondents mainly reported using cannabis to treat anxiety, followed in frequency by depression, ADHD, insomnia, and multiple sclerosis (MS). Interestingly, pregnant and breastfeeding individuals did not primarily report consuming cannabis to relieve severe nausea (6%). Respondents who were breastfeeding reported twice as many days of cannabis use per month, on average (19.4 days), compared to those who were pregnant (9.5 days).

Figure 5. Reported Qualifying Conditions of Pregnant and/or Breastfeeding Women Who Are Currently Using Cannabis
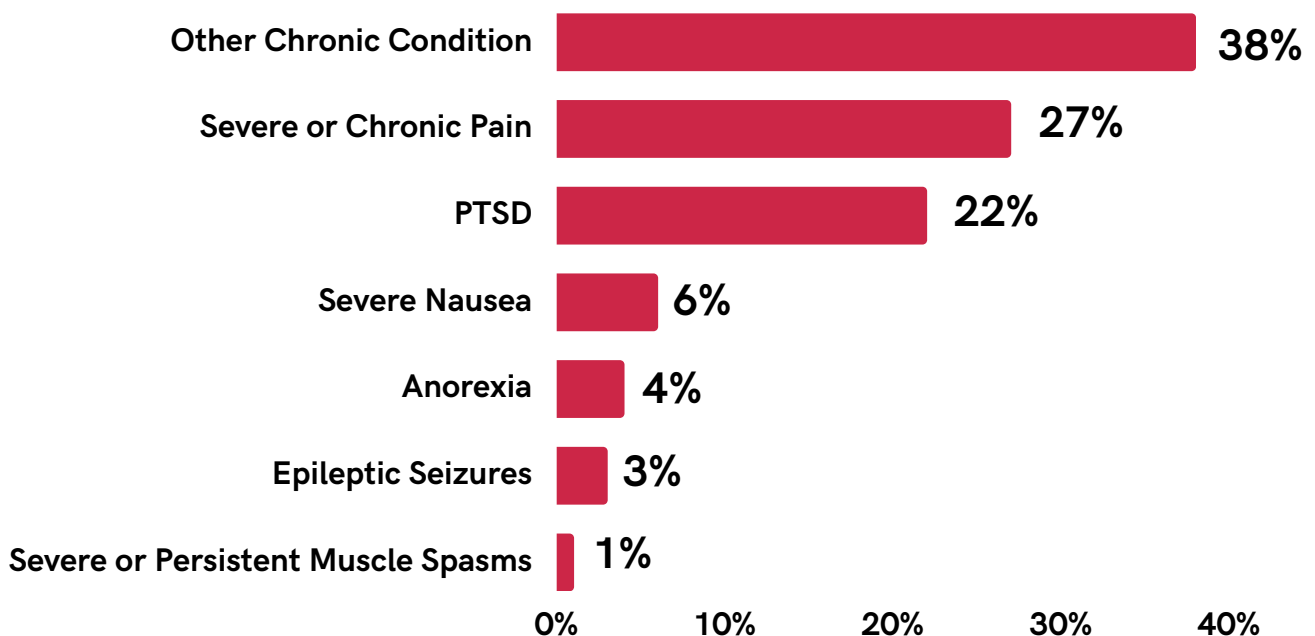
2.4.2. Driving Under the Influence of Cannabis (DUIC)

Evidence shows cannabis is one of the most common substances identified in impaired drivers, and thus the increasing prevalence of its use may pose a significant public health threat.[8] The MMCPS-22 assessed the number of times each respondent drove within three hours of using cannabis in the past month. Most (79.8%) respondents indicated that they did not drive within three hours of using cannabis or while under the influence of cannabis (DUIC) at all in the past month, 11.8% reported DUIC one to five times in the past month, and 6.4% reported DUIC six or more times in the past month. More frequent cannabis use in the past month and younger age were both associated with elevated risk of DUIC in the past month.

2.4.3. Stigma

Stigma has been a well-documented characteristic among medical cannabis patients across the United States. Despite changes in regulations, a lack of education and rigid guidelines to qualify as a medical patient may enhance stigma associated with medical cannabis use. Greater perceived stigma may limit disclosure of cannabis use to medical providers, friends, and family, which can promote feelings of isolation and negatively impact treatment or utilization of medical care.[9,10] It is critical that stigma associated with medical cannabis use be addressed to limit negative perceptions and improve communication between healthcare providers and patients. Fortunately, the data collected in the MMCPS-22 sample suggests that respondents are experiencing less perceived stigma compared to other medical cannabis patients across the country.

[8] Lloyd, S. L., Lopez-Quintero, C., & Striley, C. W. (2020). Sex differences in driving under the influence of cannabis: The role of medical and recreational cannabis use. *Addictive Behaviors, 110,* Article 106525. https://doi.org/10.1016/j.addbeh.2020.106525

[9] Hulaihel, A., Gliksberg, O., Feingold, D., Brill, S., Amit, B. H., Lev-ran, S., & Sznitman, S. R. (2022). Medical cannabis and stigma: A qualitative study with patients living with chronic pain. *Journal of Clinical Nursing, 00,* 1–12. https://doi.org/10.1111/jocn.16340

[10] Clary, K. L., Kang, H., Quintero Silva, L., & Bobitt, J. (2022). Weeding out the stigma: Older veterans in Illinois share their experiences using medical cannabis. *Journal of Psychoactive Drugs.* https://doi.org/10.1080/02791072.2022.2082901

Figure 6. Percent of Respondents Comfortable with Group Knowing Cannabis Use

Friends: 84.5%

Primary Care Provider: 80.4%

Family: 77.5%

Other Healthcare Professionals: 74.1%
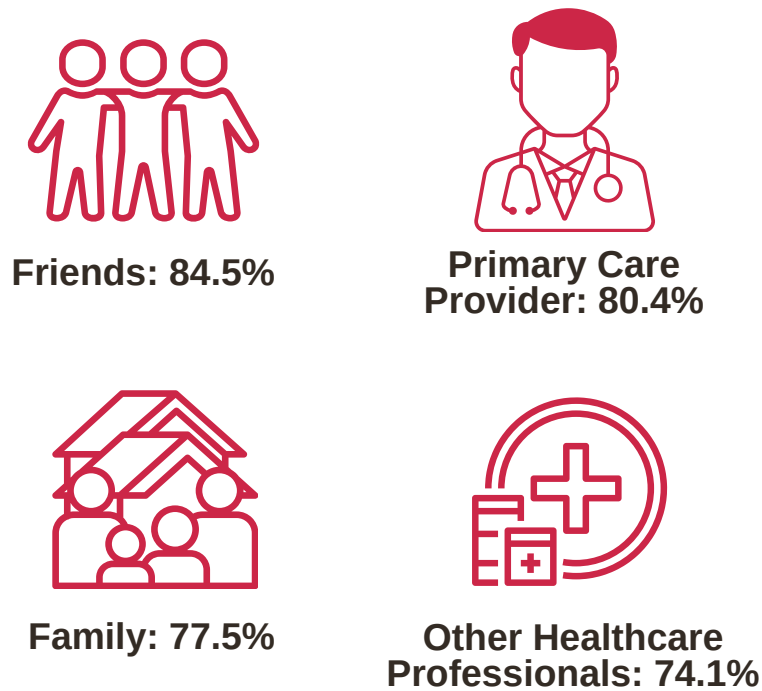
As Figure 6 illustrates, approximately 75% or more of medical cannabis respondents in Maryland reported feeling "very comfortable" or "extremely comfortable" telling their friends, family, primary care provider (PCP), or other healthcare professional(s) that they use cannabis. Respondents reporting neither male nor female gender identity did not show any differences in comfort telling family compared to respondents of other gender identities, but they did show more comfort telling friends, PCPs, and healthcare providers than did respondents of other gender identities. In general, these findings suggest that participants perceive relatively low levels of stigma related to medical cannabis use, and that effect appears to generalize across family, friends, and various types of primary and other healthcare providers. Follow-up analyses may be relevant that examine how individual differences in comfort with telling various family members may be associated with other positive health or social outcomes for patients.

Section 3.

Patterns of Cannabis Consumption

Smoking dried flower (46.9%), vaping (21.0%), ingesting edibles (20.2%), and using concentrates (3.6%) were identified as the four most common methods for consuming cannabis among respondents in this sample; however, a majority (51.5%) of respondents used three or more methods to consume cannabis in the past month.

Total days of past-month use was significantly lower for those whose primary method was edibles.

73.1%

Nearly three-quarters (73.1%) of respondents reported using two or more substances in the past month. Cannabis was also consumed at a much higher frequency compared to other substances.

64%

A majority of respondents (64%) reported that all of their cannabis use is for medical purposes, and about one percent (0.8%) reported all of their cannabis consumption is for recreational purposes.

The median dose across methods was 27.6 mg/THC. Dose findings that emerge in the scientific literature should be closely monitored to evaluate whether this relatively high median dose of 27.6 mg/THC is reason for concern.

Most respondents (59.7%) indicated "never" on problematic use questions (discussed in greater detail in Section 3.03), suggestive of a low proportion of problematic cannabis use behaviors in this sample.
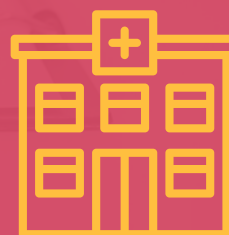
One percent (1%) of respondents utilized emergency room or urgent care services due to cannabis consumption in the past year.

Legalization of medical cannabis in Maryland spurred the development of a diverse cannabis market in which patients have access to an increasingly wide range of cannabis products. Research needs to be conducted to inform patients and policymakers on the outcomes associated with the consumption of different cannabis products, specifically in the context of medical cannabis. This section of the report details baseline data on cannabis use patterns, including method of administration, problematic cannabis use, dose, and use of other substances. Additional related outcomes are also assessed, including hospitalizations and further analyses related to DUIC.

3.1. Primary Methods of Administration

A series of questions in the MMCPS-22 was designed to identify respondents' preferred methods to consume cannabis and the characteristics and patterns of use that r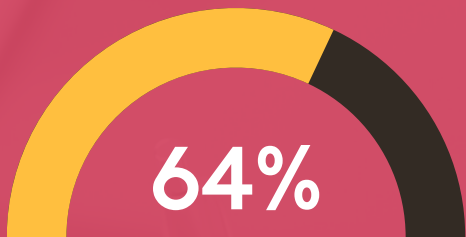elate to each method. Smoking dried flower (46.9%), vaping (21.0%), ingesting edibles (20.2%), and using concentrates (3.6%) were identified as the four most common methods for consuming cannabis among respondents, which is consistent across findings from other studies demonstrating the most common methods of consumption. [11]

[11] Knapp, A. A., Lee, D. C., Borodovsky, J. T., Auty, S. G., Gabrielli, J., & Budney, A. J. (2019). Emerging trends in cannabis administration among adolescent cannabis users. *Journal of Adolescent Health, 64*(4), 487–493. https://doi.org/10.1016/j.jadohealth.2018.07.012

Smoking was the most frequently reported method of administration among all races, followed by edibles and vaping, as shown in Table 7. Those who were Black or African American were less likely to report edibles as their primary method of administration and were more likely to report smoking relative to those who were White. Those who were Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, or two or more races all showed the same pattern, but to a lesser extent compared to Black or African American respondents.

Similarly, smoking was the most frequently reported method of administration among all gender identities and local jurisdictions. The same pattern existed across all age groups, except for the 76- to 85-year-old group, which reported edibles as the most frequent method of administration.

Table 7. Reported Methods of Administration by Race

Race	Smoking	Edibles	Vaping	Dabbing	Tinctures or oral sprays	Capsules/ tablets	Topicals
American Indian or Alaska Native	54%	20%	20%	2%	0%	2%	3%
Asian	48%	19%	25%	4%	1%	1%	1%
Black or African American	68%	14%	14%	1%	1%	0%	1%
Native Hawaiian or Other Pacific Islander	50%	17%	28%	6%	0%	0%	0%
Not included above	55%	15%	20%	7%	0%	1%	2%
Two or more races	55%	16%	20%	6%	1%	1%	1%
White or Caucasian	45%	23%	24%	4%	2%	1%	1%

Table 8. Reported Methods of Administration by Age

Age Group	Smoking	Edibles	Vaping	Dabbing	Tinctures or oral sprays	Capsules/ tablets	Topicals
18 to 20	97%	60%	92%	46%	9%	7%	11%
21 to 25	90%	60%	80%	41%	10%	9%	16%
26 to 35	84%	69%	73%	27%	12%	13%	22%
36 to 45	77%	72%	71%	21%	13%	13%	22%
46 to 55	72%	73%	64%	16%	14%	14%	26%
56 to 65	71%	67%	52%	8%	13%	13%	26%
66 to 75	63%	68%	44%	5%	14%	12%	24%
76 to 85	43%	66%	36%	4%	18%	13%	23%
86+	14%	71%	14%	21%	21%	21%	43%

Table 9. Reported Methods of Administration by Gender

Gender	Smoking	Edibles	Vaping	Dabbing	Tinctures or oral sprays	Capsules/ tablets	Topicals
Male	80%	66%	65%	22%	11%	12%	17%
Female	71%	72%	63%	15%	14%	13%	28%
Transgender female	83%	71%	63%	42%	25%	21%	17%
Transgender male	89%	65%	89%	37%	14%	17%	29%
Non-binary	81%	69%	75%	18%	13%	14%	30%
Other, not included above	100%	58%	100%	33%	17%	25%	17%

Even though each survey respondent reported one primary method (i.e., the method that they most commonly use to consume cannabis), most respondents reported using more than one method in a given month. Specifically, a majority (51.5%) of respondents used three or more methods to consume cannabis in the past month. To analyze this finding further, Figure 7 illustrates the average frequency that each primary method group consumed cannabis from each of the four most common methods in the past month. In other words, for those who reported a primary method of use (e.g., edibles), this figure shows the average number of days that that group consumed cannabis via other methods in the previous month. For example, Figure 7 shows those who primarily ingest edible cannabis (illustrated by the yellow bars) reported consuming edibles 15.5 days, vaping for 3.5 days, smoking flower for 3.2 days, and smoking concentrates for 0.2 days of the previous month, on average.

One important finding was that total days of past-month use was significantly lower for those whose primary method was edibles. Those who reported edibles as their primary method consumed cannabis, in any form, a total of 17 days in the past month, on average. This represents a statistically significant effect of lower frequency of past-month use, compared to averages for concentrates (28 days), smoking (25 days), and vaping (22 days).

Table 10 provides a summary of various medical cannabis use characteristics from the MMCPS survey sample, grouped by primary method (previously, it was analyzed by qualifying condition). Those who reported using concentrates and vaping as their primary method of medical cannabis consumption frequently reported using it to alleviate PTSD symptoms. Those who reported using medical cannabis for severe chronic pain frequently used edibles or flower cannabis. All respondents rated their use of medical cannabis, regardless of method of consumption, as a "very effective" treatment for their condition. Concentrates were reported to have the most frequent use, with an average of 27.5 days of use within the past month. Those reporting using flower products had an average of 24.6 days of use within the past month, followed by vaping (22.1 days/month) and edibles (17 days/month).

Survey respondents who primarily consumed cannabis flower reported the highest median dose of THC per session (45 mg) compared to concentrates (42.3 mg), vaping (19 mg), and edibles (8 mg). From this table, it is understood that the potency and dose per sitting varies among the methods of consumption, but all methods are rated as very effective for the ailment that the participants are aiming to treat.

The COVID-19 pandemic did not have a reported effect on usage for a majority of respondents (66%), but nearly one third (30%) said their cannabis consumption increased.

Figure 7. Frequency of Days Consuming Cannabis from Each Method in Past Month, Grouped by Primary Method of Administration

Example of Figure 7 interpretation: Those who primarily ingest edible cannabis (illustrated by the yellow bars) reported consuming edibles 15.5 days, vaping for 3.5 days, smoking flower for 3.2 days, and smoking concentrates for 0.2 days of the previous month, on average. Overall, they reported consuming cannabis in any form a total of 17 days.
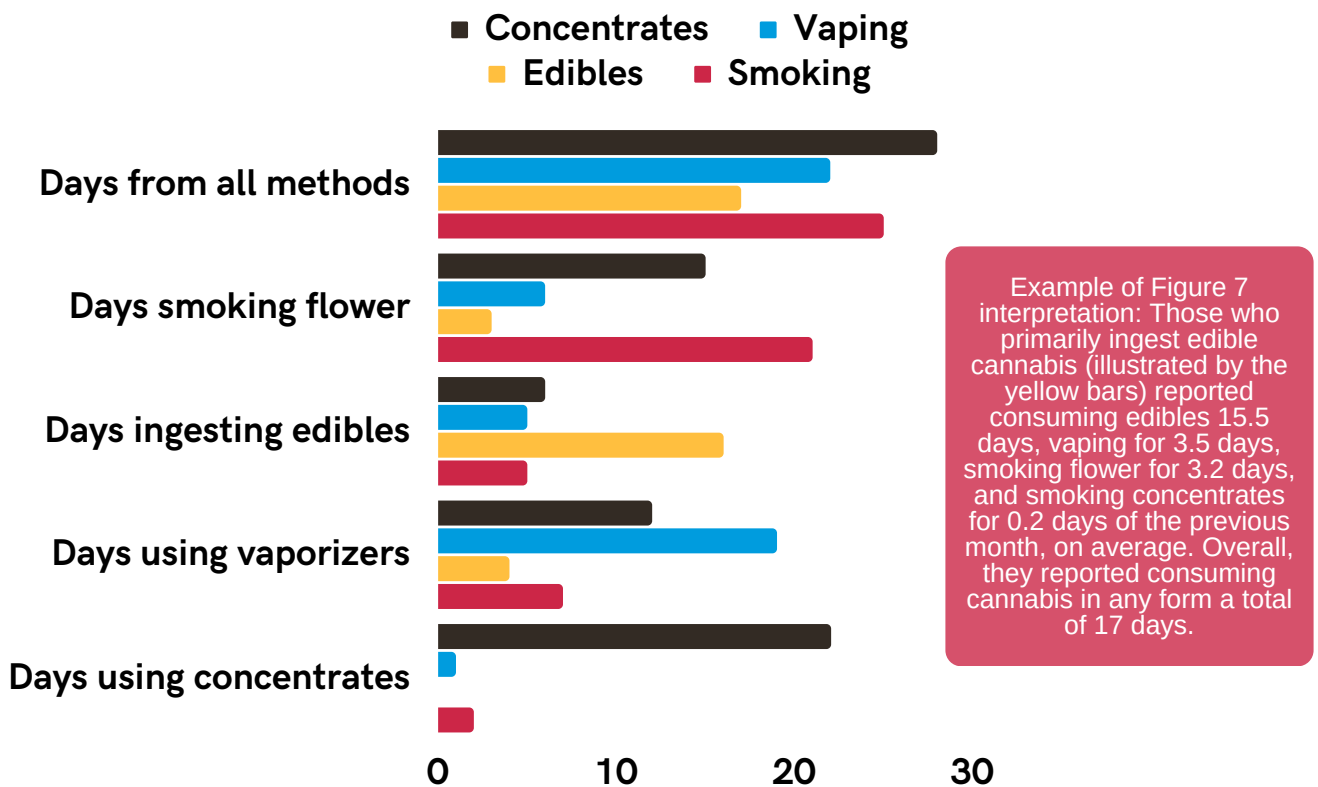
Table 10. Medical Cannabis Characteristics by Primary Method of Consumption

Characteristics	Concentrates	Vaping	Edibles	Flower
Most common condition (Median)	PTSD	PTSD	Severe chronic pain	Severe chronic pain
Efficacy for treatment of condition (Median)	Very effective	Very effective	Very effective	Very effective
Days of use in past month (Mean)	27.5 days	22.1 days	17 days	24.6 days
THC potency of typical product (Mean)	75.95%	66.89%	12.41 mg	28.25%
CBD potency of typical product (Mean)	15.24%	17.88%	No data	14.66%
Amount spent per purchase (Mean)	$138.76	$122.25	$114.58	$125.05
Average dose of THC per sitting (Median)	42.3 mg	19 mg	8 mg	45 mg

Note on Table 10: The THC potency for edibles is given in a different unit than the rest because edible product labels typically present THC potency in mg rather than percent.

3.1.1. Protective Factors Associated with Edibles as Primary Method

Interestingly, reporting edible use as the primary method of consumption was associated with a significantly lower likelihood of DUIC in this sample. Given these findings and statistical relevance, medical cannabis consumption of edibles may have protective factors for DUIC. Notably, the medical cannabis program regulations include potency caps for edible products. While future research on this area is required to draw conclusions, given that medical patients who consume edibles as their primary method also prioritize lower dosage, findings can be generalized to deduce that potency limitations on medical cannabis edible products, along with lower dosage per sitting, may be contributing to positive outcomes.

3.1.2. Nonmedical Cannabis Use

Generally, medical cannabis patients across the United States report that some amount of their cannabis consumption is for recreational purposes. Similarly, 14.4% of MMCPS-22 survey respondents reported that half or more of the cannabis they consume is for recreational purposes, while the rest is for medical purposes. A majority of respondents (64%) reported that all of their cannabis use is for medical purposes, and about one percent (0.8%) reported that all of their cannabis consumption is for recreational purposes. Those who used it frequently before registering as a medical patient tended to be younger and reported lower income.
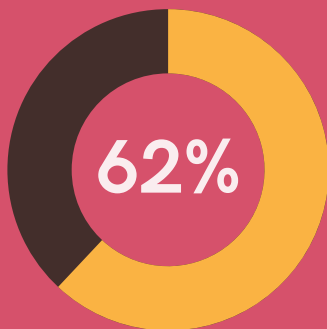
Figure 8. Nearly two-thirds of respondents in the sample reported using cannabis at least monthly in the year prior to registering as a medical cannabis patient.

62%

Figure 9. Percent of Cannabis Consumed for Medical vs. Recreational Purposes
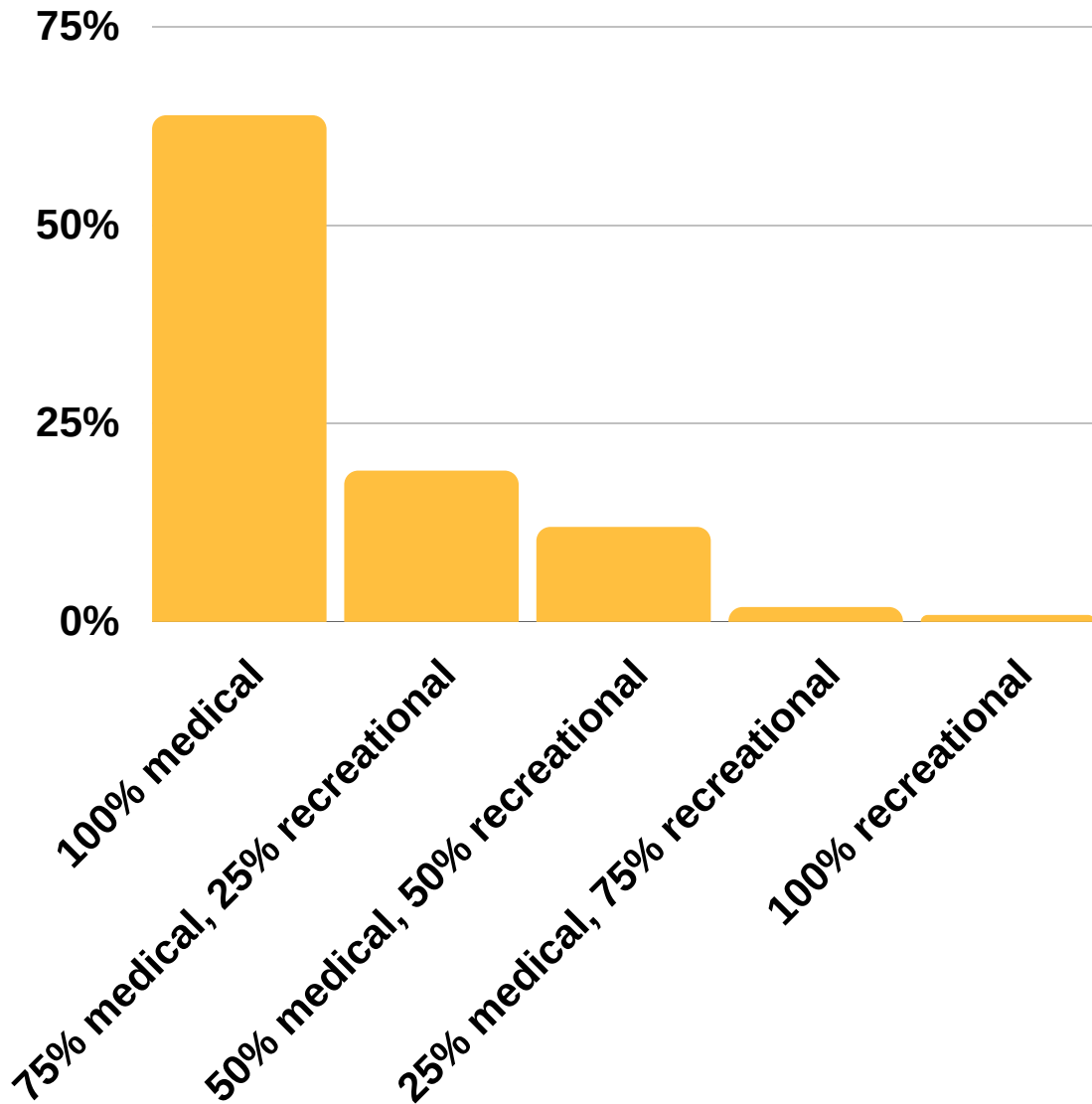
Table 11 shows the distribution of nonmedical cannabis use across qualifying conditions. Greater amounts of recreational cannabis consumption were found in individuals who mainly consume cannabis to treat cachexia or wasting syndrome (20%), severe nausea (19%), and other conditions (18%). In those reporting cannabis consumption only for medical purposes, the most commonly reported conditions for use included severe or persistent muscle spasms (74%), epileptic seizures (72%), PTSD (68%), severe or chronic pain (68%), and anorexia (65%).

Table 11. Percent of Cannabis Consumption for Medical vs. Recreational Purposes Grouped By Condition

Condition	100% medical	75% medical	50% or less medical
Severe or persistent muscle spasms	74%	13%	12%
Epileptic seizures	72%	17%	11%
Severe or chronic pain	68%	19%	13%
PTSD	68%	19%	13%
Anorexia	65%	22%	14%
Other chronic condition	61%	21%	18%
Severe nausea	55%	27%	19%
Cachexia or wasting syndrome	50%	30%	20%

3.2. Polysubstance Use

Participants were asked to report on their overall substance use frequency in the month preceding the survey. Nearly three-quarters (73.1%) of respondents reported using two or more substances in the past month. On average, cannabis was consumed 21.3 days, tobacco and alcohol were each consumed 4.9 days, and benzodiazepines, stimulants,

73.1%

Figure 10. Participants Who Reported Using Two or More Substances in the Past Month

opioids, and psychedelics were each consumed one or fewer days. Cannabis was consumed at a much higher frequency compared to the other substances, as 45.1% of the sample reported consuming cannabis every day, compared to 13% for tobacco and about 2% for alcohol, benzodiazepines, stimulants, and opioids. These findings as a whole may indicate a need for additional resources to support individuals in reducing their substance use.

Figure 11. Past Month Polysubstance Use Frequency in the MMCPS Sample

One	Two	Three	Four	Five or more
25.1%	49.1%	19%	3.9%	1.3%

Number of substances used in past month
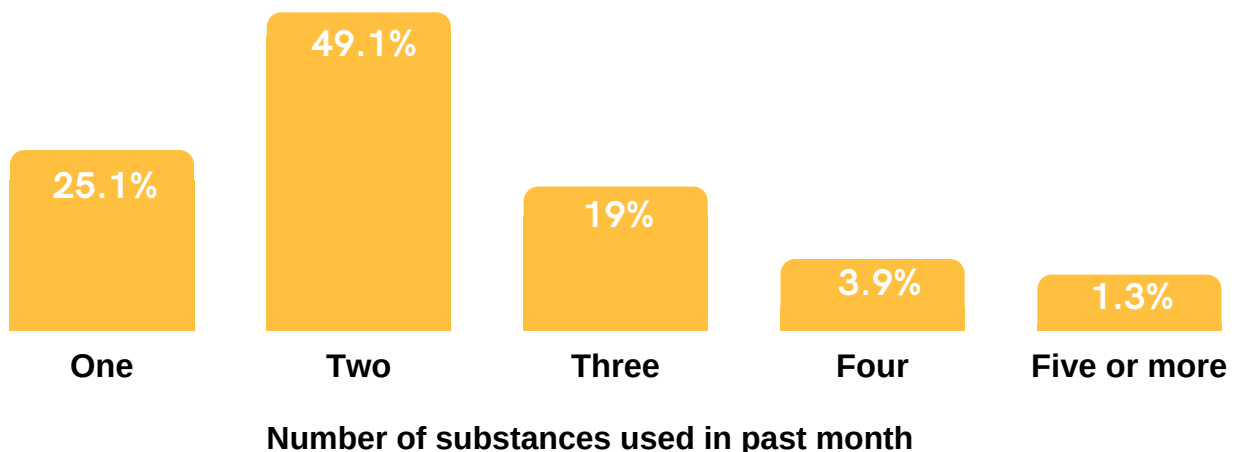
Figure 11 illustrates prevalence of substance use in the 106 respondents who were pregnant and/or breastfeeding at the time of the survey. Among them, 64 (60.4%) individuals reported using cannabis or other substance(s) in the past month, and 27 (25.5%) individuals used two or more substances. Among those who reported past-month substance use, 92% consumed cannabis, 31% consumed alcohol, 13% consumed tobacco, 11% consumed benzodiazepines, and 3% consumed opioids, stimulants, or psychedelics. As previously mentioned, substance use, including cannabis use, during pregnancy and breastfeeding is contraindicated in the existing literature and should be avoided.

Figure 12. Prevalence of Substance Use Among Pregnant and/or Breastfeeding Respondents Who Consumed One or More Substances in the Past Month
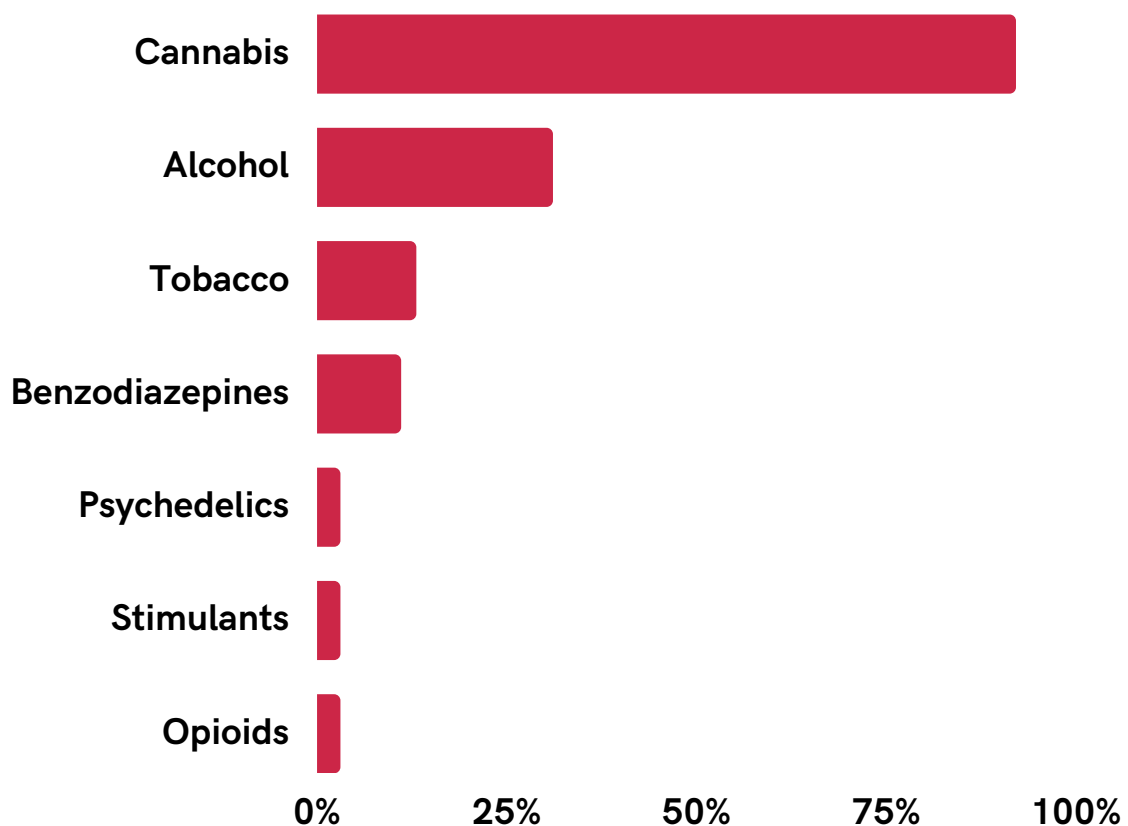
3.2.1. Replacement for Opioids or Benzodiazepines

A total of 12% of respondents reported using cannabis to stop or replace their opioid use (e.g., Vicodin, OxyContin, Percocet), and 13% said the same for benzodiazepines (e.g., Valium, Xanax, Ativan). Of the 106 individuals who were currently breastfeeding and/or pregnant, 4 (3.8%) reported using cannabis to reduce (1/0.9%), replace (2/1.9%), or stop (1/0.9%) opioid use; and 22 (20.8%) reported using cannabis to reduce (8/7.5%), replace (10/9.4%), or stop (4/3.8%) use of benzodiazepines.

Notably, women and those who did not identify as either male or female were more likely to report using cannabis to stop or replace their benzodiazepine use, but no gender differences were found for using cannabis to replace or stop opioid use. White participants and participants reporting two or more races were more likely to use cannabis to replace or stop benzodiazepines, but no such differences were found for opioids. No clinically significant differences in age were found for using cannabis to replace or stop opioids or benzodiazepines. Those who indicated Hispanic ethnicity were significantly more likely to report using cannabis to replace or stop using opioids, but not for benzodiazepines.

3.3. Problematic Cannabis Use and Public Health and Safety

To identify problematic use, which is characteristic of cannabis use disorder (CUD), the MMCPS-22 used a modified version of the Cannabis Use Disorder Identification Test-Short Form (CUDIT-SF).[12]

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[12] Bonn-Miller, M. O., Heinz, A. J., Smith, E. V., Bruno, R., & Adamson, S. (2016). Preliminary development of a brief cannabis use disorder screening tool: The cannabis use disorder identification test short-form. *Cannabis and Cannabinoid Research, 1*(1), 252–261. https://doi.org/10.1089/can.2016.0022

Please note, due to the modifications made to the CUDIT-SF, data from the MMCPS-22 should not be directly compared to other data collected using the traditional CUDIT-SF.

For the current study, problematic use was assessed by survey respondent reports of the frequency with which they experience the following three conditions: 1) they had a problem with memory or concentration after using cannabis; 2) they devoted a great deal of time to getting, using, or recovering from cannabis; and 3) they felt out of control of their cannabis consumption or could not reduce their cannabis consumption when desired. Respondents answered each question on a scale of 0 (never) to 4 (always), and a sum of scores of 2 or more was suggestive of problematic cannabis use. Most respondents (59.7%) indicated 0, or "never," on all three of the problematic use questions, suggestive of a low proportion of problematic cannabis use behaviors in this sample.

> **Due to the discrepancies in prevalence of CUD and problematic use between MMCPS-22 and similar studies, further investigation may be warranted into the interpretation of findings resulting from modifications of the CUDIT-SF.**

Table 12 shows how various characteristics differ between those who did and did not exhibit signs of problematic use. For example, those who exhibited signs of problematic cannabis use (i.e., showing a sum of scores of 2 or more, 14.2%) were slightly younger and reported lower income but showed no differences in educational attainment.

Table 12. Characteristics of Those Who Did and Did Not Exhibit Signs of Problematic Cannabis Use

	Age	Annual family Income	DUIC days in past month	Interest in reducing cannabis use, 1 to 10 scale
Problematic use	41.1	$62,500	1.3	3.25
No problematic use	47.7	$62,500	0.6	1.4

Those who exhibited signs of problematic use drove within 3 hours of consuming cannabis or under the influence of cannabis (DUIC) twice as many days per month, on average, compared to those who did not exhibit signs. Hospitalization related to cannabis in the past year was not related to having problematic cannabis use. On a question assessing participants' interest in reducing or cutting back on their cannabis consumption on a scale of 1 (not interested at all) to 10 (very interested), 68% of those who met criteria for problematic cannabis use said they were ready to change their use. This suggests that many individuals who showed signs of problematic use may be aware of their problematic cannabis use behaviors. Given this, medical cannabis consumers may be interested in support to help change their use, and it may be important to provide relevant available resources to medical cannabis patients in Maryland.

Data from a different but similar study of Maryland medical patients, which used the original (unmodified) CUDIT-SF, showed a significantly higher prevalence of CUD compared to findings in the present study. Further research is needed to better understand the discrepancy between these findings. The MMCPS-23 will likely use the unmodified CUDIT-SF questionnaire to assess CUD in the medical population.

3.4. Dose

3.4.1. The mg/THC Dose Measure and Descriptive Findings

As required by Maryland statute (HB 837), the MMCPS-22 aimed to collect baseline data about cannabis dose in the medical patient population.[13] To our knowledge, this study marks the first time that cannabis dose has been measured and insights on patterns and impacts of dose have been reported in the Maryland medical cannabis patient population. This is an accomplishment, as cannabis dose is a burgeoning area of scientific research, and therefore dose-related evidence that is applicable to cannabis consumers, dispensaries, and policymakers is limited. The dearth of evidence is due in part to the complexity of measuring dose in self-report surveys, such as the MMCPS-22, and a best practice is not yet recognized.

For the MMCPS-22, the researchers selected an emerging approach where dose is derived from a combination of the potency and quantity of a consumed cannabis product. The derived dose is then standardized to milligrams of THC (mg/THC) to allow for comparisons across different product types. This can be challenging for consumers to conceptualize and accurately report on a survey, especially when they consume products diverse in method and potency (e.g., smoke 20% THC flower on Tuesday and ingest 10 mg THC edible on Saturday). Therefore, in this study, participants were asked to think about past-month cannabis consumption from their primary method, and then they were asked to report the THC potency and the quantity of cannabis that they typically consumed per sitting. See an example of these questions in Figure 13 for those whose primary method is vaping cannabis. The researchers used these two data points to compute a typical dose of THC per sitting for each individual.

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[13] H.B. 837, Ch. 26, 2022 Laws of Maryland. (2022). https://mgaleg.maryland.gov/2022RS/chapters_noln/Ch_26_hb0837E.pdf

Figure 13. Example of Questions Used in the MMCPS-22 to Measure Dose for Those Who Primarily Vape Cannabis
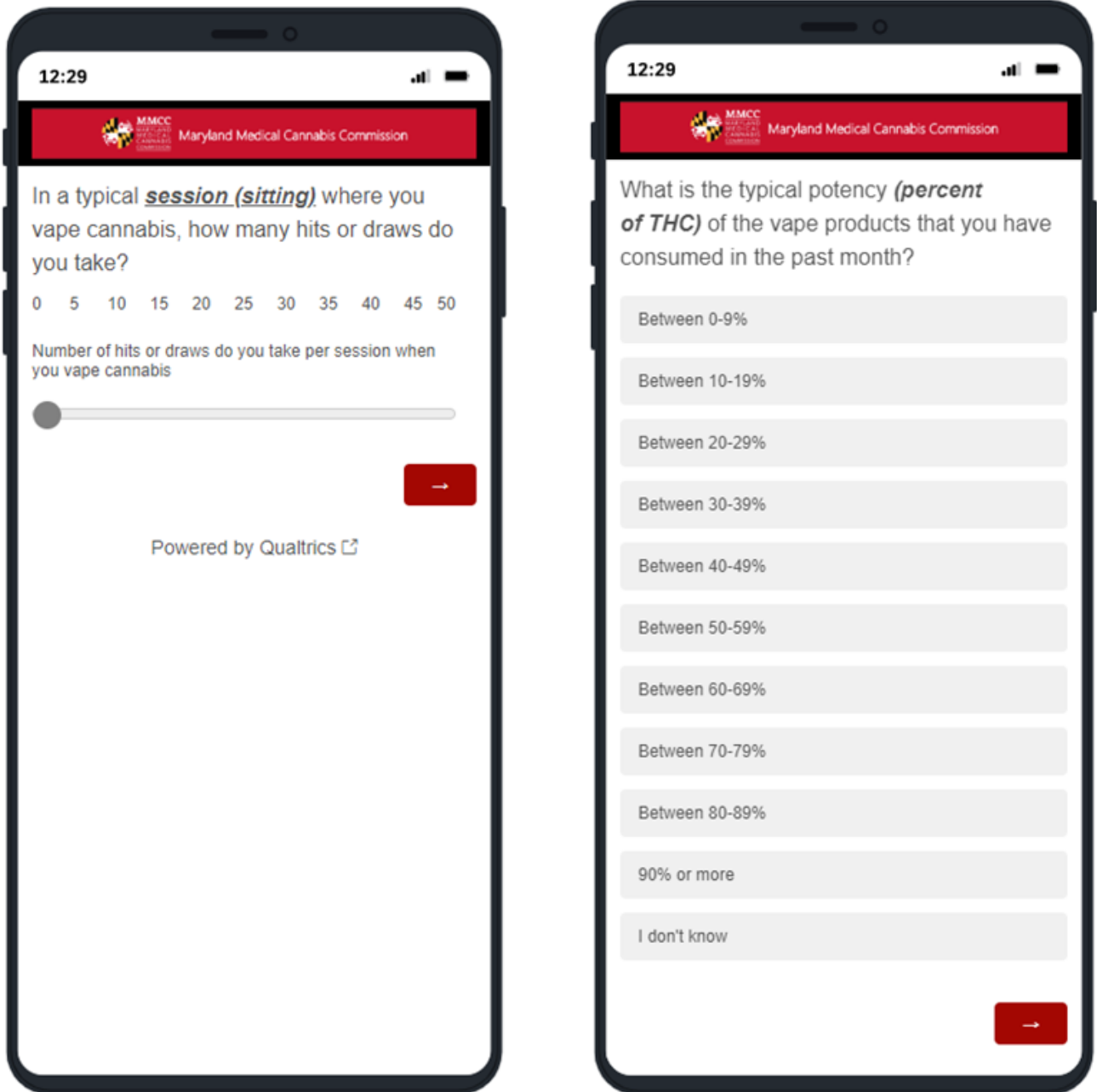
The MMCPS-22 measured typical dose of THC per sitting for participants whose primary method of cannabis administration was flower, edible, vape, or concentrate, which accounted for 92% of the sample. The median dose per sitting across all four primary methods was 27.6 mg/THC.

Cannabis researchers and federal agencies such as National Institute on Drug Abuse (NIDA) are recognizing the importance of a standard dose of THC for promoting safer cannabis consumption. Currently, the scientific literature suggests a standard dose of 5 mg/THC may be adequate for producing the desired effects with low risk of adverse side effects.[14,15,16] Provided this, participants in this survey may be consuming higher doses of THC than is necessary, but appropriate dose may depend on several factors, including the patient's specific medical condition and personal tolerance. Additionally, the effects of cannabis may vary as a result of method of administration, due to differences in metabolism and bioavailability of the product; therefore, more research is needed to establish a standard dose that is equivalent across all cannabis products. Dose findings that emerge in the scientific literature should be closely monitored to evaluate whether the median dose of 27.6 mg/THC is reason for concern.

Table 13 presents the median dose of THC (in milligrams) per sitting by method of consumption. Findings showed concentrates (42.3 mg) and flower products (45 mg) accompanied the highest dose of THC per session. Edible (8 mg) and vape (19 mg) products accompanied the lowest dose of THC per session. Concentrates and flower were associated with over 5 times as many milligrams of THC per session as edible products, and over two times that of vape products.

[14] Volkow, N. D., & Weiss, S. R. B. (2020). Importance of a standard unit dose for cannabis research. *Addiction, 115*(7), 1219–1221. https://doi.org/10.1111/add.14984
[15] Volkow, N. D., & Sharpless, N. E. (2021, May 10). *Establishing 5mg of THC as the standard unit for research.* Nora's Blog, National Institute on Drug Abuse. https://nida.nih.gov/about-nida/noras-blog/2021/05/establishing-5mg-thc-standard-unit-research
[16] Freeman, T. P., & Lorenzetti, V. (2020). 'Standard THC units': A proposal to standardize dose across all cannabis products and methods of administration. *Addiction, 115*(7), 1207–1216. https://doi.org/10.1111/add.14842

Table 13. Estimated Milligrams (mg) of THC by Method of Consumption

Method of Consumption	mg/THC per Sitting (mdn)
Flower	45
Edible	8
Vape	19
Concentrate	42.3

Table 14. Estimated Milligrams (mg) of THC by Gender Identity

Gender Identity	mg/THC per Sitting (mdn)
Male	33.8
Female	26.6
Transgender Female	23
Transgender Male	40.5
Non-binary	27
Other Option Not Provided	33.8

Table 15. Estimated Milligrams (mg) of THC by Age

Age	mg/THC per Sitting (mdn)
≤30 years	45
>30 years	27

Table 16. Estimated Milligrams (mg) of THC by Pregnant and Breastfeeding

Pregnant and Breastfeeding	mg/THC per Sitting (mdn)
Currently pregnant	27
Currently breastfeeding	27
Currently pregnant and breastfeeding	32.6
Not currently, but was pregnant and/or breastfeeding in the past year	36
N/A, neither	26.6
Prefer not to answer	34.9

Note on Table 16: This dose estimate represents a very small sample size (n=6) for past month cannabis use among currently pregnant and/or breastfeeding respondents.

3.4.2. Initial Validation of the mg/THC Dose Measure

A major accomplishment of the MMCPS-22 was that it provided initial validation for the selected approach to measuring cannabis dose (i.e., combining quantity and potency of cannabis consumed in a typical sitting and converting that value to mg/THC). Statistical analyses from the survey data showed the mg/THC dose measure was a more sensitive measure of problematic outcomes than either of its derivative variables—potency or quantity—alone. These findings demonstrate that dose in mg/THC should continue to be measured and evaluated among cannabis consumers, rather than potency or quantity alone.

Many studies have explored the associations of cannabis potency or quantity separately with adverse outcomes.[17] However, cannabis dose is functionally a combination of the two measures and should be studied as such. The dose concept may be better understood by following the logic of other substances. For example, alcohol dose is measured in alcohol (i.e., potency) by volume (i.e., quantity); for example, a 5 oz. glass of wine that contains 12% alcohol. If cannabis consumers understood cannabis in the "alcohol by volume" context, it would allow them to better monitor their own use.

> **Dose is more sensitive for measuring problematic outcomes than either potency or quantity alone, which provides strong support for the validity of the dose measurement in this study.**

Furthermore, since this measure of cannabis dose combines two measures into one, it may simplify dissemination of dose-related information to the public. Policymakers and cannabis consumers have expressed a need for information about dose, as seen in the statutory requirement for the Maryland Cannabis Use Baseline Study in Health-General §13-4401, as well as in survey respondents' placing dose at a high rank among educational topics for adult (nonmedical) cannabis use. It is important to note that additional research is needed to fully validate the mg/THC dose measure and to determine causal relationships between dose and public health outcomes.

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[17] Prince, M. A., & Conner, B. T. (2019). Examining links between cannabis potency and mental and physical health outcomes. *Behaviour Research and Therapy, 115*, 111–120. https://doi.org/10.1016/j.brat.2018.11.008; Barrowclough, C., Gregg, L., Lobban, F., Bucci, S., & Emsley, R. (2015). The impact of cannabis use on clinical outcomes in recent onset psychosis. *Schizophrenia Bulletin, 41*(2), 382–390. https://doi.org/10.1093/schbul/sbu095

3.4.3. Harm Reduction Opportunities

This study reveals new insights about patterns of use with edible products. This study showed that those who reported using edibles as their primary method consumed cannabis less frequently, in lower amounts and lower potencies, and were less likely to demonstrate problematic cannabis use or DUIC than those who reported smoking, vaping, or concentrates as their primary method.

Public messaging and other educational approaches that differentially emphasize dose portions could be beneficial in educating current and potential consumers. The median dose across all respondents was 27.6 mg/THC, which may be higher than is therapeutically necessary given that at least half of respondents reported using cannabis daily or almost daily.

Section 4.

Characteristics of MMCPS-22 Respondents' Program Interactions

This study demonstrates the success that **MMCC has had in engaging with the Maryland patient population and in becoming a trusted authority on medical cannabis.** The number of survey responses collected for this study is unprecedented, indicating that medical cannabis patients in Maryland are committed to and engaged with Maryland's medical cannabis program.

9%
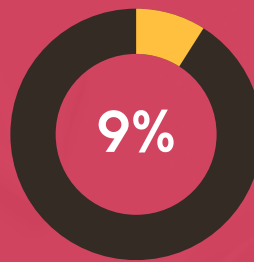
Relatively few respondents (9%) reported an intent to shift from the regulated medical to a regulated adult-use market.

Cost was the greatest barrier to respondents, as 36% of the sample reported medical cannabis was too expensive for them.

COST

Respondents reporting burdensome paperwork associated with the medical program have a four times greater likelihood of intending to switch to the adult-use program once it is implemented.

Respondents ranked mental health and dose as the two most important public education topics regarding cannabis consumption.

Respondents overwhelmingly reported sourcing information regarding cannabis from medical cannabis dispensaries above any other source.

4.1. Barriers and Intentions to Stay in Medical Market

Respondents were asked to report barriers they had experienced in the past year in obtaining cannabis for medical purposes. Cost was the greatest barrier, wherein 36% of the sample reported medical cannabis was too expensive for them. Further, among those who reported intent to leave the medical program should adult-use cannabis become legal (9%), the overwhelmingly most common reason was cost.

This survey was conducted 6 weeks prior to the ballot referendum where Maryland voters approved legalization of adult use.

Figure 14. Intent to Remain in Medical Cannabis Program

"If adult use is legalized, would you remain in the medical cannabis program by renewing your certification?"

No	Yes	I Don't Know
8.7%	**61.7%**	**29.6%**

Table.17 Barriers to Obtaining Cannabis for Medical Purposes

36%
cannabis is too expensive for me

17%
a lack of stock/ inventory at the dispensary

14%
not enough information on medical cannabis

8%
the nearest licensed dispensary is too far from my home/residence

8%
other

5%
transportation

4.1.1. Key Predictors of Intent to Leave the Medical Cannabis Program

Logistic regression models were used to determine whether intent to leave the Maryland medical cannabis program could be predicted from program concerns, problematic cannabis use, recreational cannabis use, and demographic variables. Findings are presented in Appendix B. Each of the factors included on their own, and also when modeled together, were found to be statistically significant predictors of intent to leave the program.

Only 9% of respondents reported a definitive intent to leave the medical program for the adult-use program.

Key Predictors of Intent to Leave the Medical Program

1. Respondent considers amount of paperwork in medical program to be overly burdensome

A respondent who considers the amount of paperwork and administration in the medical program to be overly burdensome is 260% more likely to leave the medical program compared to a respondent that does not consider administrative requirements to be overly burdensome.

2. More than half of the respondent's cannabis consumption is for recreational purposes

A respondent whose current cannabis consumption is more often for recreational than medical purposes is 100% more likely to leave the medical program compared to a respondent whose cannabis consumption is more often for medical purposes.

3. Respondent considers cost of medical cannabis products to be too expensive

A patient who considers cost of medical cannabis products to be too expensive is 50% more likely to leave the medical program compared to a patient who does not consider product costs to be too expensive.

4. Respondent exhibits problematic cannabis use

A patient who exhibits problematic cannabis use is 30% more likely to leave the medical program compared to a patient who does not exhibit problematic use.

5. Patient has concern over purchasing or possessing a firearm (this is currently prohibited for medical cannabis patients)

A patient who has concern over purchasing or possessing a firearm is 20% more likely to leave the medical program compared to a patient who does not have the same firearm concerns.

4.1.2. Planning for the Adult-Use Market/Public Education for Adult Use

Since the completion of the MMCPS-22, Maryland voters approved a ballot referendum to legalize adult use cannabis in the state. Survey respondents reported issues associated with the future adult-use market that they felt were important. In particular, respondents reported that cannabis products being regulated and sold from licensed retailers was very or extremely important. This finding, along with the findings throughout this report, suggest that medical cannabis patients should be considered a primary stakeholder for engagement and outreach in the development of the adult-use cannabis program.
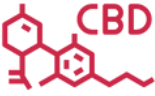
Figure 15. Issues Participants Cited as 'Extremely' or 'Very' Important for an Adult-Use Market

88%

Products Regulated and Tested

80%

Products Sold Only Through Licensed Retailers

62%

Sales Restricted to Age 21+

60%

Illicit Market Will Be Reduced

51%

Sales Will Provide Tax Revenue to Maryland
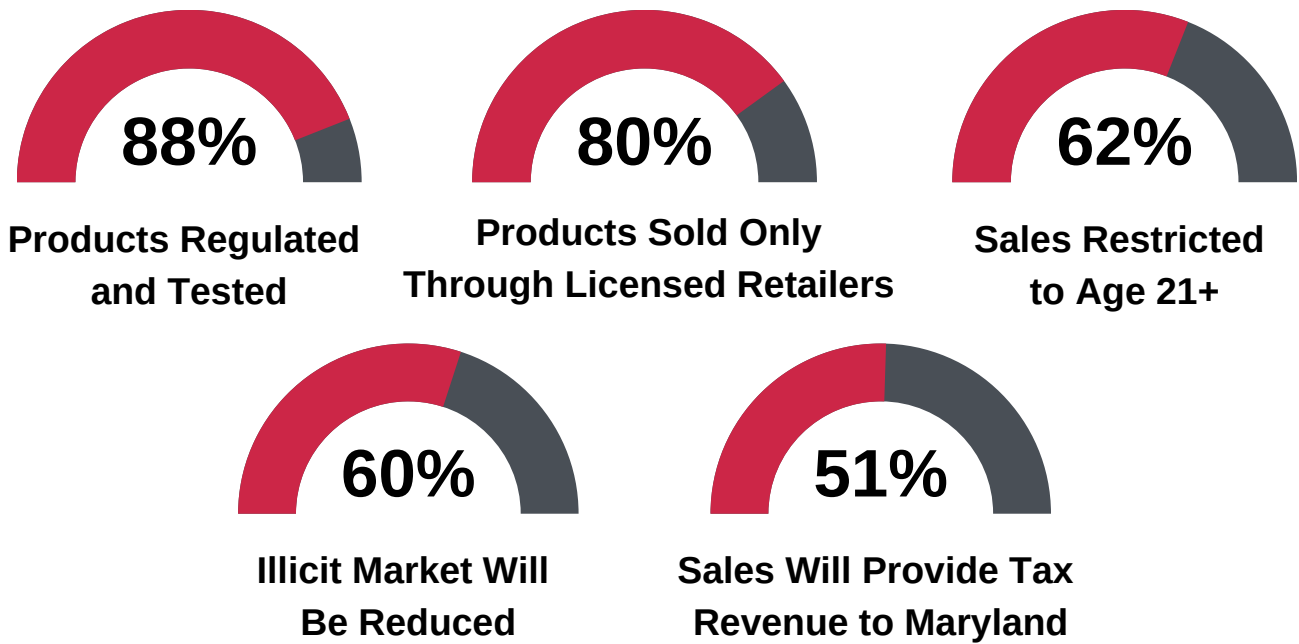
Respondents ranked 12 cannabis-related public education topics, with "1" indicating that this topic is the "most important" and "12" indicating that this topic is the "least important." As shown in Figure 16, respondents ranked mental health and dose as the two most important public education topics regarding cannabis consumption. Education on public use in shared spaces and Delta-8 products were ranked as the least important. Perhaps Delta-8 was ranked as least important because respondents currently have access to Delta-9 products and/or they do not know about Delta-8 products.

Figure 16. Public Education Topics Ranked by Importance

1 Mental Health	**2** Dose	**3** Legal issues
4 Driving	**5** Differences between THC and CBD	**6** Youth cannabis use
7 Mixing cannabis with other substances (e.g., Rx)	**8** Addiction	**9** Poisoning / Accidental exposure
10 Cannabis consumption during pregnancy	**11** Public use / use in shared spaces	**12** Delta 8 THC / Hemp products

4.1.3. Where MMCPS-22 Respondents Go for Medical Cannabis Information

Respondents overwhelmingly reported sourcing information regarding cannabis from medical cannabis dispensaries above any other source. This finding supports efforts to rigorously train dispensary agents and staff. However, respondents also reported diversifying their sources, most notably between dispensaries and friends and family. Very few respondents used social media as a means for gathering information regarding cannabis. Similarly, few respondents reported engaging with a Clinical Director for the purposes of gathering information. The current medical cannabis program requires a Clinical Director to be available to medical cannabis patients during each dispensary's hours of operation. Based on this finding, it can be deduced that Clinical Directors are not being used as a resource for information exclusively.

Interestingly, at least 40% of respondents said they interacted with a Clinical Director throughout the course of being a medical cannabis patient. These two findings suggest that Clinical Directors may be of value for patients, or at the least are being used for a specific purpose other than as a primary source of information.

Figure 17. Main Sources of Respondents' Information on Cannabis

Dispensary: 85.7%

Friends/Family: 19.5%

Clinical Director: 10.7%

Social Media: 3.4%

4.2. Interaction with Clinical Directors

Clinical Directors are a unique aspect of the Maryland Medical Cannabis Program. By Maryland law, medical cannabis dispensaries are required to have Clinical Directors available (in person or virtually) to assist patients with questions related to consumption and use of medical cannabis products, including interactions with prescription medications and contraindications.

Figure 18 shows that fewer than half of respondents have met with a Clinical Director at least once, either in person or virtually. Nearly 30% reported being unaware that Clinical Directors were available to them. This finding suggests a potential opportunity to educate new and existing medical cannabis patients about the availability of Clinical Directors.

Figure 18. Percent of Respondents' Interaction with Clinical Directors

41.8%

Met with Clinical Director
in person at least once

48.9%
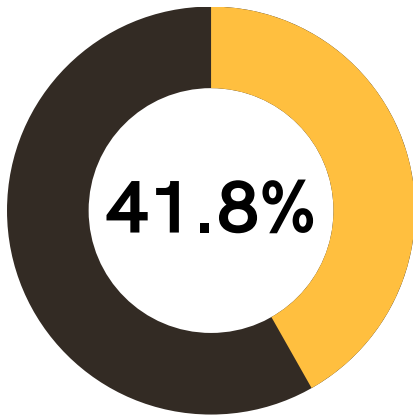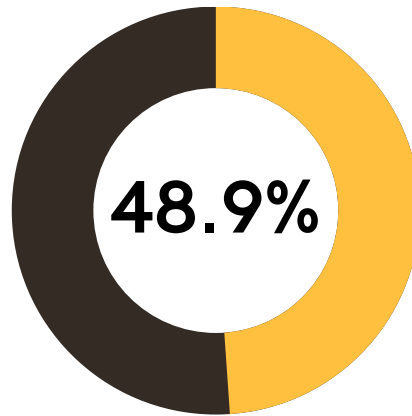
Met with Clinical Director
virtually at least once
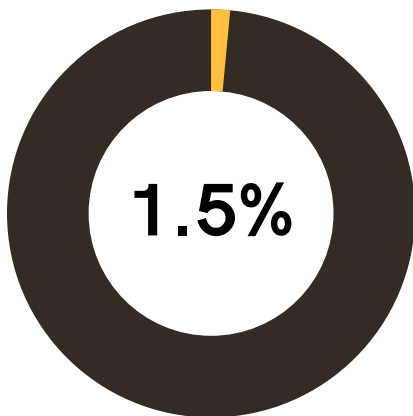
1.5%

Tried to meet with a
Clinical Director, but none
were available

29.8%
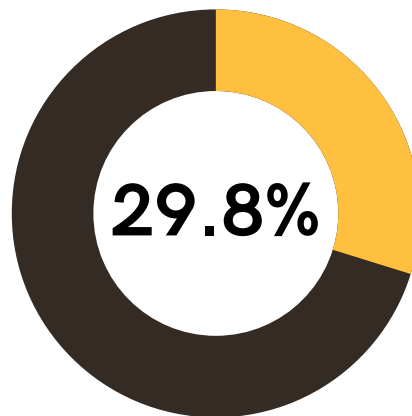
I was not aware Clinical
Directors existed

4.3. Medical Program Enhancements

Even though a vast majority of respondents reported that they will stay in the medical cannabis program if adult use is implemented, respondents reporting burdensome paperwork associated with the medical program have a four times greater likelihood of intending to switch to the adult-use program once it is implemented. This finding highlights the importance of simplifying paperwork processes for potential and existing medical cannabis patients.

Figure 19. Percent of MMCPS-22 Respondents Reporting Barrier to Dispensary by County
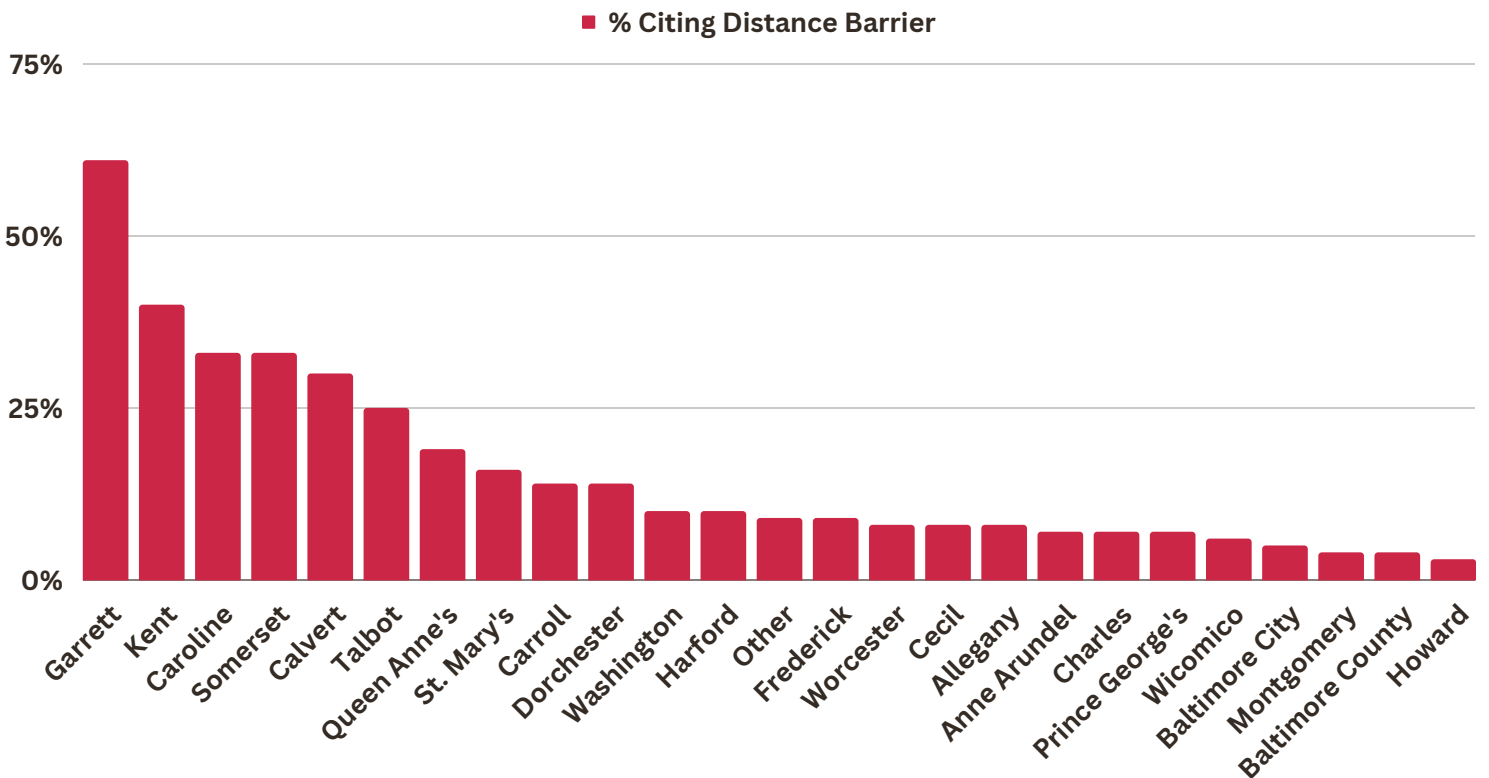
The price of cannabis has been continuously recognized as the most important factor driving cannabis consumption behavior. Approximately 36% of the sample reported that medical cannabis is too expensive. Notably, policy solutions to bring down price are challenging to identify. However, since the second leading barrier to staying in the program was lack of inventory (17% of respondents), there may be a justification to expand program supply as a lever to encourage lower costs while meeting inventory demands of medical cannabis patients. A supply and demand assessment would be required to investigate this opportunity further; however, these two barriers may be associated.

Figure 19 shows that although only 8% of respondents indicated that geographic proximity to medical cannabis dispensaries was a barrier to accessing medical cannabis across the state, there were notable differences between counties. For example, over 50% of respondents in Garrett County indicated such a barrier, whereas only 3% in Howard County reported this barrier. Overall, there were six counties (Garrett, Kent, Caroline, Somerset, Calvert, and Talbot) wherein at least 25% of respondents reported geographic proximity to medical cannabis dispensaries as a barrier to accessing medical cannabis.

Section 5.

Future Research Considerations

The MMCPS-22 focused on a broad range of cannabis-related topics, including patterns of use, perceptions of risk and harm, and intentions for future cannabis consumption. MMCC is dedicated to improving the medical cannabis program by conducting research and providing evidence-based education to the patient population. It is important to note that because the MMCPS-22 is a single, descriptive cross-sectional study, further research is required to validate the findings, and further research is required to identify the correct content, modality, and audience for future cannabis-focused educational campaigns. This section of the report provides an overview of ways that future research, including the second round of the survey (MMCPS-23), might build upon the findings of this study. This section also highlights ways that MMCC could focus future research efforts to inform public educational materials.

Several questions in the MMCPS-22 revealed areas that require additional research. For example, mental health was ranked as the most important cannabis-related public education topic by survey respondents, and two-thirds of respondents that selected "other" as their qualifying condition reported treating anxiety and/or depression with medical cannabis. It is clear that medical cannabis patients would greatly benefit from education on mental health, but we did not ask any additional questions related to mental health in the survey, and thus we do not know which area(s) of mental health are of interest. Future research should work to uncover which aspects of mental health education are important to the patient population, so that future educational materials are designed to meet those needs.

In another example, regarding the survey questions assessing whether participants have used cannabis to reduce, stop, or replace use of opioids or benzodiazepines, several participants emailed MMCC after completing the survey to provide comments that they use cannabis to replace alcohol. This may be an important response option to include in MMCPS-23.

Future research and public education may benefit from using the existing, validated CUDIT-SF questions to assess problematic use. This approach will facilitate more accurate benchmarking comparisons to other states and to Maryland's medical patient population and cannabis consumer population moving forward. If the validated CUDIT-SF is used, data can be used to assess CUD in the sample instead of the more general assessment of problematic use, which was done in the current study. This could better inform MMCC and policymakers on the state's need for CUD treatment and cannabis cessation assistance.

Future research should consider administering a Timeline Followback assessment method, which uses a retrospective calendar-based approach to improve respondents' recall and reporting of recent cannabis use activity (amount, potency, frequency, product type). [18] This approach will provide more comprehensive dose data per participant. Moreover, the Timeline Followback approach may corroborate the finding that edible use among medical cannabis patients may be a protective factor against harmful outcomes. These represent two important findings from the current study that, with the needed additional validation, could inform important public education materials.

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[18] Rygaard Hjorthøj, C., Rygaard Hjorthøj, A., Nordentoft, M. (2012). Validity of Timeline Follow-Back for self-reported use of cannabis and other illicit substances — Systematic review and meta-analysis. *Addictive Behaviors, 37*(3), 225–233. https://doi.org/10.1016/j.addbeh.2011.11.025

Additionally, surveying both 1) medical cannabis patients and 2) residents who use cannabis but are not certified medical patients in Maryland may be beneficial for future research. This will be especially critical to understanding what factors empirically lead to medical cannabis patients leaving the medical program and will help identify specific barriers, and even locations where barriers are more prominent, to inform policy actions. With this additional information, public education materials can be designed to address specific challenges and experiences in the medical and nonmedical cannabis consumer groups. For example, we found through the MMCPS-22 that many individuals find the paperwork associated with the medical program to be a major challenge in registering as a medical cannabis patient, and this was a significant reason for respondents to leave the medical program. Educational materials could provide a centralized resource for future and existing patients who need additional information about the required paperwork.

Appendix A. Descriptive Statistics Tables for All Survey Questions

Table 1. Participant Demographics

Variable	Frequency	Percent
Age		
18 to 20	206	1.6
21 to 25	676	5.2
26 to 35	2674	20.6
36 to 45	3140	24.1
46 to 55	2245	17.3
56 to 65	2207	17.0
66 to 75	1665	12.8
76 to 85	181	1.4
86+	16	0.1
Gender identity		
Male	5684	43.7
Female	6994	53.8
Transgender female	25	0.2
Transgender male	35	0.3
Non-binary	161	1.2
Not included above	12	0.1
Prefer not to answer	100	0.8
Pregnant and breastfeeding		
I am neither pregnant nor breastfeeding	6857	52.7
I am not currently, but was pregnant or breastfeeding in the last year	184	1.4
I am currently breastfeeding	34	0.3
I am currently pregnant	62	0.5
I am currently pregnant and breastfeeding	10	0.1
I prefer not to answer	151	1.2
Does anyone under the age of 18 live with you?		
No one under 18 lives with me	9440	72.6
Yes, one or more children ages 16-17	818	6.3
Yes, one or more children ages 11-15	1569	12.1
Yes, one or more children ages 6-10	1629	12.5
Yes, one or more children under age 5	1391	10.7
Race		
White or Caucasian	10181	78.2
Black or African American	1778	13.7
Asian	153	1.2
Native Hawaiian or Other Pacific Islander	19	0.1
American Indian or Alaskan Native	69	0.5
Not included above	376	2.9
More than one race	330	2.5
Ethnicity		
Hispanic or Latino	813	6.2
Not Hispanic or Latino	12185	93.7
Education, highest level		
Less than high school	165	1.3
High school diploma or equivalent	2159	16.6
Trade school certificate/diploma	743	5.7

Some college, or associates degree	4177	32.1
Bachelor's degree	3241	24.9
Master's degree, PhD, or other postgrad degree	2524	19.4

Medicaid enrollee

No	10311	79.2
Yes	2187	16.8
Prefer not to answer	196	1.5

Employment status

Working full-time	7285	56.0
Working part-time	1078	8.3
Student	234	1.8
Stay-at-home parent or homemaker	594	4.6
Not working	689	5.3
Not working, seeking employment	370	2.8
Retired	2350	18.1
Selected more than one employment option	387	3.0

Annual household income

No income	222	1.7
Less than $14,000	567	4.4
$14,000 to $29,999	1086	8.3
$30,000 - $49,999	1786	13.7
$50,000 - $74,999	2000	15.4
$75,000 - $99,999	1612	12.4
$100,000 to $149,999	2176	16.7
$150,000 - $199,999	1099	8.4
$200,000 or more	987	7.6
I prefer not to answer	1227	9.4

County of residence

Allegany County	198	1.5
Anne Arundel County	1481	11.4
Baltimore City	1203	9.2
Baltimore County	2304	17.7
Calvert County	240	1.8
Caroline County	109	0.8
Carroll County	532	4.1
Cecil County	280	2.2
Charles County	244	1.9
Dorchester County	114	0.9
Frederick County	801	6.2
Garrett County	60	0.5
Harford County	809	6.2
Howard County	702	5.4
Kent County	42	0.3
Montgomery County	1654	12.7
Prince George's County	742	5.7
Queen Anne's County	166	1.3
St. Mary's County	218	1.7
Somerset County	46	0.4
Talbot County	114	0.9
Washington County	391	3.0

Wicomico County	328	2.5
Worcester County	213	1.6
Other	11	0.1
Sensory and physical disabilities		
I have serious difficulty hearing	761	5.8
I have serious difficulty seeing, even when wearing glasses	645	5.0
I have serious difficulty concentrating or making decisions due to a physical, mental, or emotional condition	2312	17.8
I have serious difficulty walking or climbing stairs	1730	13.3
I have serious difficulty bathing or dressing	384	3.0
I have serious difficulty doing errands alone (shopping, going to doctor's appointments)	1257	9.7
Has served in the Armed Forces, Reserves, or National Guard		
No	11760	90.4
Yes	1168	9.0
Prefer not to answer	82	0.6
Primary language		
English	12938	99.4
Spanish	35	0.3
French	4	0.0
Chinese (Mandarin)	2	0.0
Not included above	31	0.2

Table 2. General Cannabis Questions

Variable	Frequency	Percent
Days in the past month using each substance (drug)		
Cannabis		
0 days	521	4.0
1-4 days	1134	8.7
5-10 days	1216	9.3
11-19 days	1652	12.7
20-29 days	2602	20.0
All 30 days	5866	45.1
Tobacco		
0 days	10095	77.6
1-4 days	430	3.3
5-10 days	231	1.8
11-19 days	233	1.8
20-29 days	252	1.9
All 30 days	1693	13.0
Alcohol		
0 days	5207	40.0
1-4 days	3784	29.1
5-10 days	1975	15.2
11-19 days	1168	9.0
20-29 days	569	4.4

All 30 days	259	2.0
Psychedelics		
0 days	12453	95.7
1-4 days	409	3.1
5-10 days	30	0.2
11-19 days	10	0.1
20-29 days	3	0.0
All 30 days	27	0.2
Benzodiazepines		
0 days	11774	90.5
1-4 days	526	4.0
5-10 days	176	1.4
11-19 days	77	0.6
20-29 days	66	0.5
All 30 days	313	2.4
Stimulants		
0 days	12178	93.6
1-4 days	168	1.3
5-10 days	85	0.7
11-19 days	74	0.6
20-29 days	130	1.0
All 30 days	295	2.3
Opioids		
0 days	12306	94.6
1-4 days	175	1.3
5-10 days	67	0.5
11-19 days	48	0.4
20-29 days	42	0.3
All 30 days	284	2.2
Has used each method of cannabis administration in the past month		
Flower or smoked, dried herb	9375	72.1
Cartridge/vaporizer	7978	61.3
Concentrate (wax, shatter)	2294	17.6
Edibles (gummies, mints)	8630	66.3
Capsules or tablets	1575	12.1
Tinctures or oral sprays (elixirs)	1597	12.3
Topicals (balm, lotion, cream)	2879	22.1
Transdermal (patch)	177	1.4
Rectal/vaginal suppositories	64	0.5
Days in the past month consuming cannabis from each method		
Smoked from glassware, bowl, bong, joint, etc.		
0 days	3089	23.7
1-4 days	1714	13.2
5-10 days	1330	10.2
11-20 days	1448	11.1
21-30 days	4883	37.5
Consumed edibles		
0 days	3829	29.4
1-4 days	3428	26.3
5-10 days	2185	16.8

11-20 days	1388	10.7
21-30 days	1629	12.5
Vaped cannabis		
0 days	4331	33.3
1-4 days	2093	16.1
5-10 days	1742	13.4
11-20 days	1623	12.5
21-30 days	2662	20.5
Dabbing, oil, wax, shatter, butter		
0 days	10149	78.0
1-4 days	771	5.9
5-10 days	519	4.0
11-20 days	371	2.9
21-30 days	633	4.9
Capsules or tablets		
0 days	10875	83.6
1-4 days	817	6.3
5-10 days	365	2.8
11-20 days	160	1.2
21-30 days	213	1.6
Tinctures or oral sprays (elixirs)		
0 days	10929	84.0
1-4 days	771	5.9
5-10 days	360	2.8
11-20 days	166	1.3
21-30 days	209	1.6
Topicals (balm, lotion, cream)		
0 days	9713	74.7
1-4 days	1190	9.1
5-10 days	802	6.2
11-20 days	411	3.2
21-30 days	313	2.4
Transdermal (patch)		
0 days	12220	93.9
1-4 days	112	0.9
5-10 days	31	0.2
11-20 days	19	0.1
21-30 days	28	0.2
Rectal/vaginal suppositories		
0 days	12348	94.9
1-4 days	40	0.3
5-10 days	10	0.1
11-20 days	5	0.0
21-30 days	10	0.1
Cannabis consumption in the 12 months prior to getting a Maryland medical cannabis patient card		
Not in the year before	2655	20.4
Once or twice in the year before	1035	8.0
Once or twice a month	1135	8.7
Once or twice a week	2059	15.8

Daily consumption	4808	37.0
Prefer not to answer	1244	9.6

Number of years with Maryland medical cannabis patient certification

1 year	3721	28.6
2 years	3397	26.1
3 years	3233	24.8
4 years	1630	12.5
5 years	893	6.9

Experienced each barrier obtaining medical cannabis in the past year

The nearest licensed dispensary is too far from my home/residence	1043	8.0
Transportation is a problem for me or my caregiver	668	5.1
There is not enough information on medical cannabis	1786	13.7
There is often a lack of stock/inventory at the dispensary	2215	17.0
Cannabis is too expensive for me	4713	36.2
Other	873	6.7

Number of times in the past month driving a motor vehicle under the influence of cannabis (DUIC) and/or within three hours of consuming cannabis

0 times	10382	79.8
1 time	482	3.7
2-3 times	835	6.4
4-5 times	226	1.7
6 or more times	831	6.4
I did not use cannabis in the past 30 days	158	1.2

Past year frequency of each of the following activities

I smoked cannabis inside my house

Never	5145	39.5
Sometimes	2260	17.4
About half the time	589	4.5
Most of the time	1994	15.3
Always	2969	22.8

I vaped cannabis inside my house

Never	4514	34.7
Sometimes	3310	25.4
About half the time	835	6.4
Most of the time	1966	15.1
Always	2340	18.0

I stored cannabis in a locked, safe location

Never	2400	18.4
Sometimes	809	6.2
About half the time	234	1.8
Most of the time	1459	11.2
Always	8070	62.0

Method most commonly used to consume cannabis in the past month

Smoking dried flower from glassware, pipe, bowl, bong, pre-roll, joint, etc.	6101	46.9
Ingesting edibles	2622	20.2
Vaping cannabis	2737	21.0
Dabbing, oil, wax, shatter, butter concentrates	467	3.6

	Frequency	Percent
Tinctures or oral sprays (elixirs)	178	1.4
Capsules or tablets	128	1.0
Topicals (balm, lotion, cream)	176	1.4
Transdermal (patch)	5	0.0
Rectal/vaginal suppositories	10	0.1

Table 3. Medical Cannabis Questions

Variable	Frequency	Percent
Percentage of cannabis consumed for medical vs. recreational purposes in the past month		
I didn't use cannabis in the past month	271	2.1
100% medical use	8298	63.8
75% medical, 25% recreational	2474	19
50% medical, 50% recreational	1547	11.9
25% medical, 75% recreational	231	1.8
100% recreational	100	0.8
Medical condition or symptom you most commonly use cannabis to treat		
Anorexia	131	1
Severe or Persistent Muscle Spasms	387	3
Epileptic Seizures	85	0.7
Severe or Chronic Pain	5980	46
Cachexia or wasting syndrome	20	0.2
Post-Traumatic Stress Disorder (PTSD)	1622	12.5
Severe nausea	334	2.6
Other chronic condition	4343	33.4
Perceived efficacy of cannabis for treating that condition or symptom		
Not effective at all	70	0.5
Slightly effective	447	3.4
Moderately effective	2782	21.4
Very effective	5981	46
Extremely effective	3648	28
Level of confidence that cannabis purchased at a licensed dispensary is safe and uncontaminated		
I have not purchased cannabis at a MD dispensary	32	0.2
Very low confidence	49	0.4
Low confidence	92	0.7
Neutral	572	4.4
Somewhat high confidence	1983	15.2
Very high confidence	10212	78.5
Experience with dispensary Clinical Directors		
I met with a Clinical Director in person at least once		
I don't know	1255	9.6
No	6174	47.5
Yes	5439	41.8
I met with a Clinical Director by phone or video chat at least once		
I don't know	868	6.7
No	5638	43.3

Yes	6361	48.9
I tried to meet with a Clinical Director, but none were available.		
I don't know	890	6.8
No	11715	90
Yes	195	1.5
I was not aware Clinical Directors exist		
I don't know	992	7.6
No	7936	61
Yes	3873	29.8

Intent to remain in the medical cannabis program if adult use is legalized (note: this survey was conducted the month before adult use was legalized)

No	1130	8.7
Yes	8026	61.7

Would the following factors result in you staying in the medical cannabis program if an adult use (recreational) cannabis law is passed in Maryland?

Safety (example: products are tested for potential contaminants)	1317	10.1
No	11509	88.5
Yes		
Wider availability of products and strains		
No	1513	11.6
Yes	11312	86.9
Higher potency of products		
No	2852	21.9
Yes	9947	76.5
Tax benefit (no taxes)		
No	2037	15.7
Yes	10771	82.8
Education (Clinical Directors)		
No	5325	40.9
Yes	7434	57.1
Higher possession/purchase limits		
No	4246	32.6
Yes	8510	65.4
Lower age restrictions		
No	9759	75
Yes	2972	22.8
Stronger legal protections		
No	2279	17.5
Yes	10507	80.8
Other		
No	7699	59.2
Yes	2853	21.9

Would the following factors result in you leaving the medical cannabis program if an adult use law (recreational) is passed in Maryland?

Higher cost of medical cannabis products		
No	3968	30.5
Yes	8845	68

Cost of annual recertification from a certifying healthcare provider		
No	5158	39.6
Yes	7655	58.8
The amount of paperwork/administration in the medical program		
No	7114	54.7
Yes	5679	43.6
Lack of licensed medical dispensaries near me		
No	8411	64.6
Yes	4390	33.7
Concern over purchasing/possessing a firearm		
No	8329	64
Yes	4462	34.3

Effect of cannabis on health and social outcomes

Physical health		
Improved	9359	71.9
Neither	3444	26.5
Worsened	127	1
Mood or mental health		
Improved	11527	88.6
Neither	1338	10.3
Worsened	64	0.5
Memory or concentration		
Improved	4817	37
Neither	7109	54.6
Worsened	998	7.7
Social relationships (family, friends, neighbors, etc.)		
Improved	7064	54.3
Neither	5758	44.3
Worsened	107	0.8

Perceived level of importance of factors associated with adult use (recreational) cannabis

Cannabis products are regulated and tested		
Not at all important	165	1.3
Slightly important	246	1.9
Moderately important	1058	8.1
Very important	4226	32.5
Extremely important	7218	55.5
Cannabis products are sold at licensed retailers		
Not at all important	402	3.1
Slightly important	473	3.6
Moderately important	1662	12.8
Very important	4252	32.7
Extremely important	6132	47.1
Cannabis sales provide tax revenue to the State of Maryland		
Not at all important	2150	16.5
Slightly important	1209	9.3

Moderately important	2887	22.2
Very important	2883	22.2
Extremely important	3776	29
Cannabis use is restricted to those 21 and older		
Not at all important	1517	11.7
Slightly important	1099	8.4
Moderately important	2204	16.9
Very important	3243	24.9
Extremely important	4848	37.3
Illicit/illegal sales of cannabis will be reduced		
Not at all important	1670	12.8
Slightly important	1046	8
Moderately important	2398	18.4
Very important	3109	23.9
Extremely important	4679	36

Comfort level telling the following people that you consume cannabis

Family		
Definitely not comfortable	627	4.8
Probably not comfortable	580	4.5
Might or might not feel comfortable	1629	12.5
Somewhat comfortable	2488	19.1
Very comfortable	7598	58.4
Friends		
Definitely not comfortable	277	2.1
Probably not comfortable	294	2.3
Might or might not feel comfortable	1356	10.4
Somewhat comfortable	2300	17.7
Very comfortable	8686	66.8
My primary care provider		
Definitely not comfortable	527	4.1
Probably not comfortable	635	4.9
Might or might not feel comfortable	1295	10
Somewhat comfortable	2391	18.4
Very comfortable	8069	62
Other healthcare providers		
Definitely not comfortable	597	4.6
Probably not comfortable	807	6.2
Might or might not feel comfortable	1871	14.4
Somewhat comfortable	2500	19.2
Very comfortable	7145	54.9

Frequency experiencing the following conditions when consuming cannabis in the past year

Anxiety		
Never	8965	68.9
Once	1995	15.3
About monthly	1122	8.6
About weekly	473	3.6
About daily	352	2.7

	Frequency	Percent
Panic		
Never	10784	82.9
Once	1270	9.8
About monthly	527	4.1
About weekly	184	1.4
About daily	143	1.1
Psychotic or paranoid feelings		
Never	11238	86.4
Once	1044	8
About monthly	433	3.3
About weekly	119	0.9
About daily	74	0.6
Suicidal thoughts or ideation		
Never	12538	96.4
Once	168	1.3
About monthly	116	0.9
About weekly	45	0.3
About daily	40	0.3
Breathing problems		
Never	11593	89.1
Once	691	5.3
About monthly	397	3.1
About weekly	146	1.1
About daily	73	0.6
Nausea/vomiting		
Never	11726	90.1
Once	740	5.7
About monthly	255	2
About weekly	102	0.8
About daily	71	0.5

Table 4. Cannabis Public Health Questions

Variable	Frequency	Percent
Effect of the COVID-19 pandemic on your cannabis consumption		
Decreased it	424	3.3
It stayed the same	8579	65.9
Increased it	3922	30.1
Past year prevalence of consuming cannabis to replace, reduce or stop consumption of opioids and benzodiazepines		
Opioids (such as oxycodone, codeine, Vicodin, OxyContin, methadone)		
No, N/A	11414	87.7
To reduce	488	3.8
To replace	625	4.8
To stop use	384	3
Benzodiazepines (such as Valium, Ativan, Xanax, clonazepam)		
No, N/A	11270	86.6

To reduce	683	5.2
To replace	653	5
To stop use	298	2.3

Respondents that use the following sources to gather general information about cannabis, i.e., how to select cannabis products and/or how to consume them

Licensed dispensary	11155	85.7
Clinical Director at a licensed dispensary	1398	10.7
Friends or family	2539	19.5
Social media	443	3.4
Website	1781	13.7
Other	779	6

Respondents ranked educational topics about adult use cannabis in order of importance where the most important topic is #1.

Addiction

Ranked 1st	858	6.6
Ranked 2nd	899	6.9
Ranked 3rd	822	6.3
Ranked 4th	847	6.5
Ranked 5th	845	6.5
Ranked 6th	916	7
Ranked 7th	933	7.2
Ranked 8th	1002	7.7
Ranked 9th	996	7.7
Ranked 10th	1115	8.6
Ranked 11th	1287	9.9
Ranked 12th	1756	13.5

Mental health

Ranked 1st	2249	17.3
Ranked 2nd	1424	10.9
Ranked 3rd	1330	10.2
Ranked 4th	1174	9
Ranked 5th	1114	8.6
Ranked 6th	1082	8.3
Ranked 7th	901	6.9
Ranked 8th	829	6.4
Ranked 9th	722	5.5
Ranked 10th	595	4.6
Ranked 11th	503	3.9
Ranked 12th	353	2.7

Driving

Ranked 1st	1286	9.9
Ranked 2nd	1229	9.4
Ranked 3rd	1177	9
Ranked 4th	1148	8.8
Ranked 5th	1229	9.4
Ranked 6th	1164	8.9
Ranked 7th	1097	8.4
Ranked 8th	981	7.5

Ranked 9th	899	6.9
Ranked 10th	804	6.2
Ranked 11th	706	5.4
Ranked 12th	556	4.3
Poisoning/accidental exposure		
Ranked 1st	551	4.2
Ranked 2nd	678	5.2
Ranked 3rd	766	5.9
Ranked 4th	808	6.2
Ranked 5th	873	6.7
Ranked 6th	959	7.4
Ranked 7th	1059	8.1
Ranked 8th	1121	8.6
Ranked 9th	1167	9
Ranked 10th	1315	10.1
Ranked 11th	1479	11.4
Ranked 12th	1500	11.5
Delta-8 THC/Hemp products		
Ranked 1st	190	1.5
Ranked 2nd	402	3.1
Ranked 3rd	537	4.1
Ranked 4th	536	4.1
Ranked 5th	647	5
Ranked 6th	755	5.8
Ranked 7th	899	6.9
Ranked 8th	1060	8.1
Ranked 9th	1297	10
Ranked 10th	1558	12
Ranked 11th	1810	13.9
Ranked 12th	2585	19.9
Public use/use in shared spaces		
Ranked 1st	468	3.6
Ranked 2nd	614	4.7
Ranked 3rd	771	5.9
Ranked 4th	915	7
Ranked 5th	1002	7.7
Ranked 6th	1053	8.1
Ranked 7th	1156	8.9
Ranked 8th	1162	8.9
Ranked 9th	1290	9.9
Ranked 10th	1255	9.6
Ranked 11th	1341	10.3
Ranked 12th	1249	9.6
Youth cannabis use		
Ranked 1st	1113	8.6
Ranked 2nd	1110	8.5
Ranked 3rd	1104	8.5
Ranked 4th	1104	8.5

Ranked 5th	1082	8.3
Ranked 6th	1025	7.9
Ranked 7th	1044	8
Ranked 8th	1085	8.3
Ranked 9th	1026	7.9
Ranked 10th	984	7.6
Ranked 11th	873	6.7
Ranked 12th	726	5.6
Cannabis use during pregnancy		
Ranked 1st	505	3.9
Ranked 2nd	832	6.4
Ranked 3rd	955	7.3
Ranked 4th	1051	8.1
Ranked 5th	1154	8.9
Ranked 6th	1169	9
Ranked 7th	1170	9
Ranked 8th	1174	9
Ranked 9th	1159	8.9
Ranked 10th	1169	9
Ranked 11th	992	7.6
Ranked 12th	946	7.3
Mixing cannabis with other substances		
Ranked 1st	923	7.1
Ranked 2nd	1311	10.1
Ranked 3rd	1338	10.3
Ranked 4th	1412	10.9
Ranked 5th	1332	10.2
Ranked 6th	1135	8.7
Ranked 7th	1121	8.6
Ranked 8th	954	7.3
Ranked 9th	885	6.8
Ranked 10th	732	5.6
Ranked 11th	637	4.9
Ranked 12th	496	3.8
Potency, dosage, and delayed onset of products		
Ranked 1st	1580	12.1
Ranked 2nd	1559	12
Ranked 3rd	1400	10.8
Ranked 4th	1286	9.9
Ranked 5th	1099	8.4
Ranked 6th	954	7.3
Ranked 7th	934	7.2
Ranked 8th	873	6.7
Ranked 9th	792	6.1
Ranked 10th	750	5.8
Ranked 11th	594	4.6
Ranked 12th	455	3.5
Differences between THC and CBD		

Ranked 1st	1169	9
Ranked 2nd	1265	9.7
Ranked 3rd	1129	8.7
Ranked 4th	1053	8.1
Ranked 5th	935	7.2
Ranked 6th	995	7.6
Ranked 7th	938	7.2
Ranked 8th	985	7.6
Ranked 9th	996	7.7
Ranked 10th	1003	7.7
Ranked 11th	1054	8.1
Ranked 12th	754	5.8
Legal issues		
Ranked 1st	1384	10.6
Ranked 2nd	953	7.3
Ranked 3rd	947	7.3
Ranked 4th	944	7.3
Ranked 5th	965	7.4
Ranked 6th	1070	8.2
Ranked 7th	1024	7.9
Ranked 8th	1051	8.1
Ranked 9th	1047	8
Ranked 10th	996	7.7
Ranked 11th	1000	7.7
Ranked 12th	895	6.9

Number of times in the past year utilizing emergency room or urgent care services due to or related to cannabis consumption

Never	12784	98.3
Once	96	0.7
Twice	27	0.2
Three times	10	0.1
More than three times	9	0.1

Number of times in past year admitted to the hospital for any reason

Never	11003	84.6
Once	1431	11
Twice	328	2.5
Three times	76	0.6
More than three times	77	0.6

Frequency experiencing each of the following problematic cannabis use symptoms in the past 6 months

Had a problem with your memory or concentration after using cannabis

Never	8473	65.1
Sometimes	3818	29.3
About half the time	348	2.7
Most of the time	205	1.6
Always	65	0.5

Devoted a great deal of your time to getting, using, or recovering from cannabis

Never	11362	87.3
Sometimes	1241	9.5
About half the time	172	1.3
Most of the time	86	0.7
Always	39	0.3
Felt like you were not in control of your cannabis consumption or could not reduce your consumption even when you wanted to		
Never	11880	91.3
Sometimes	712	5.5
About half the time	110	0.8
Most of the time	85	0.7
Always	91	0.7

Average dollars spent per purchase on medical cannabis in the past year
    Mean = $122.19
    Standard Deviation = $86.85

Interest level in reducing or cutting back on your cannabis consumption on a scale of 1 (not interested at all) to 10 (very interested)
    Mean = 1.69
    Standard Deviation = 2.19

Table 5. Flower Primary Method - Quantity and Potency Questions

Variable	Frequency	Percent
Average amount (grams) of flower consumed per week in the past month		
Mean = 12.46		
Standard deviation = 11.52		
Average amount (grams) of flower consumed per sitting/session in the past week		
Mean = 0.92		
Standard deviation = 0.86		
Typical THC potency of cannabis flower consumed in the past month		
Less than 10%	45	0.3
Between 10-15%	89	0.7
Between 15-20%	457	3.5
Between 20-25%	2024	15.6
Between 25-35%	2701	20.8
Between 35-50%	197	1.5
Between 50-60%	54	0.4
Between 60-80%	152	1.2
Greater than 80%	63	0.5
Typical CBD potency of cannabis flower consumed in the past month		
Less than 10%	2550	19.6
Between 10-15%	595	4.6
Between 15-20%	371	2.9
Between 20-25%	458	3.5
Between 25-35%	466	3.6
Between 35-50%	105	0.8
Between 50-60%	38	0.3

Between 60-80%	37	0.3
Greater than 80%	36	0.3

Average dollars spent on cannabis flower per week

Mean = $71.22

Standard deviation = $53.16

Typical CBD to THC ratio of cannabis flower consumed in the past month

Higher in THC	5077	39
Higher in CBD	71	0.5
Contains roughly the same amounts of each	499	3.8
I don't know	453	3.5

Table 6. Edible Primary Method - Quantity and Potency Questions

Variable	Frequency	Percent
Number of each type of edible cannabis (THC) product consumed in the past week		
Gummy or jelly candy		
0 edibles	260	2
1 edible	324	2.5
2 edibles	378	2.9
3-5 edibles	726	5.6
6-9 edibles	440	3.4
10-15 edibles	201	1.5
16 or more edibles	285	2.2
Hard candy		
0 edibles	2366	18.2
1 edible	70	0.5
2 edibles	48	0.4
3-5 edibles	48	0.4
6-9 edibles	9	0.1
10-15 edibles	11	0.1
16 or more edibles	7	0.1
Mints or gum		
0 edibles	2273	17.5
1 edible	80	0.6
2 edibles	66	0.5
3-5 edibles	78	0.6
6-9 edibles	25	0.2
10-15 edibles	17	0.1
16 or more edibles	24	0.2
Baked goods or chocolate		
0 edibles	2008	15.4
1 edible	135	1
2 edibles	119	0.9
3-5 edibles	131	1
6-9 edibles	70	0.5
10-15 edibles	49	0.4

16 or more edibles	54	0.4
Other		
0 edibles	2229	17.1
1 edible	32	0.2
2 edibles	24	0.2
3-5 edibles	46	0.4
6-9 edibles	27	0.2
10-15 edibles	14	0.1
16 or more edibles	38	0.3

Typical milligrams of THC in the cannabis edibles consumed per sitting

5 mg or less of THC	703	5.4
6-10 mg of THC	988	7.6
11-15 mg of THC	208	1.6
16-20 mg of THC	173	1.3
21-30 mg of THC	209	1.6
31-40 mg of THC	152	1.2
41-50 mg of THC	40	0.3
51-60 mg THC	14	0.1
61 or more mgs of THC	39	0.3

Average dollars spent on cannabis edibles per week

Mean = $36.78

Standard deviation = $33.78

Typical CBD to THC ratio of cannabis edibles consumed in the past month

Higher in THC	1344	10.3
Higher in CBD	220	1.7
Contains roughly the same amounts of each	858	6.6
I don't know	198	1.5

Table 7. Vape Primary Method - Quantity and Potency Questions

Variable	Frequency	Percent
Number of hits or draws taken in a typical session (sitting) where you vape cannabis		

Mean = 5.49

Standard deviation = 5.04

Typical number of sessions (sittings) vaping cannabis per day on a day where you vape cannabis

	Frequency	Percent
0 sessions	5	0
1 session	728	5.6
2 sessions	676	5.2
3 sessions	487	3.7
4 sessions	268	2.1
5 sessions	229	1.8
6 sessions	93	0.7
7 sessions	33	0.3
8 sessions	61	0.5
9 sessions	8	0.1
10 sessions	46	0.4
11 or more sessions	99	0.8

Number of grams of cannabis vape products consumed per week in the past month

Less than one gram	1144	8.8
1-2 grams	690	5.3
3-4 grams	232	1.8
5-10 grams	132	1
11-15 grams	32	0.2
16-20 grams	18	0.1
21-30 grams	12	0.1
More than 30 grams	4	0

Typical THC potency of cannabis vape products consumed in the past month

Between 0-9%	31	0.2
Between 10-19%	69	0.5
Between 20-29%	267	2.1
Between 30-39%	78	0.6
Between 40-49%	44	0.3
Between 50-59%	53	0.4
Between 60-69%	72	0.6
Between 70-79%	860	6.6
Between 80-89%	761	5.8
90% or more	46	0.4

Typical CBD potency of cannabis vape products consumed in the past month

Between 0-9%	919	7.1
Between 10-19%	271	2.1
Between 20-29%	172	1.3
Between 30-39%	91	0.7
Between 40-49%	69	0.5
Between 50-59%	91	0.7
Between 60-69%	15	0.1
Between 70-79%	39	0.3
Between 80-89%	28	0.2
90% or more	8	0.1

Average dollars spent on cannabis vape products per week

Mean = $46.66
Standard deviation = $41.903

Typical CBD to THC ratio of cannabis vape products consumed in the past month

Higher in THC	2138	16.4
Higher in CBD	65	0.5
Contains roughly the same amounts of each	325	2.5
I don't know	209	1.6

Table 8. Concentrate Primary Method - Quantity and Potency Questions

Variable	Frequency	Percent
Number of hits or draws taken in a typical session (sitting) where you consume cannabis concentrates		

Mean = 4.17
Standard deviation = 4.922

Typical number of sessions (sittings) consuming cannabis concentrates per day on a day where you consume cannabis concentrates

1	37	0.3
2	79	0.6
3	93	0.7
4	75	0.6
5	60	0.5
6	31	0.2
7	12	0.1
8	16	0.1
9	2	0
10	8	0.1
11 or more	22	0.2

Typical THC potency of cannabis concentrates consumed in the past month

Between 0-9%	1	0
Between 10-19%	4	0
Between 20-29%	18	0.1
Between 30-39%	4	0
Between 40-49%	2	0
Between 50-59%	4	0
Between 60-69%	11	0.1
Between 70-79%	187	1.4
Between 80-89%	198	1.5
90% or more	14	0.1

Typical CBD potency of cannabis concentrates consumed in the past month

Between 0-9%	236	1.8
Between 10-19%	44	0.3
Between 20-29%	18	0.1
Between 30-39%	12	0.1
Between 40-49%	10	0.1
Between 50-59%	4	0
Between 60-69%	3	0
Between 70-79%	8	0.1
Between 80-89%	9	0.1
90% or more	6	0

Average dollars spent on cannabis concentrates per week

Mean = $95.50
Standard deviation = $59.74

Typical CBD to THC ratio of cannabis concentrates consumed in the past month

Higher in THC	427	3.3
Higher in CBD	0	0
Contains roughly the same amounts of each	22	0.2
I don't know	18	0.1

Appendix B. Logistic Regression Models

Table B1. Key Predictors of Intent to Leave the Medical Program	Odds Ratio
Patient considers cost of medical cannabis products to be too expensive	1.5
Patient considers amount of paperwork in medical program to be overly burdensome	3.6
Patient has concern over purchasing or possessing a firearm (this is currently prohibited for medical cannabis patients)	1.2
At least half of the patient's cannabis consumption is for recreational purposes	2.0
The patient exhibits problematic cannabis use	1.3

Model included age and annual household income as covariates. Race was left out of the model because there was not enough occurrence of the event across all race categories.
Odds ratios are statistically significant at $p = .003$.

Addendum to the 2022 Maryland Medical Cannabis Patient Survey (MMCPS-22)
Revisions And Updates to the Formulas Used to Estimate THC Dose
January 2024

Cannabis dose is complex to measure, particularly in self-report survey formats. Since the original publication of the MMCPS-22, cannabis dose for several product types (flower, vape, concentrate) has been recalculated to reflect refinements informed by emerging literature and research. Details are below.

1. Flower, vape, and concentrate formula revision:

The flower, vape, and concentrate dose formulas were updated to account for THC loss due to method of administration. Multiple factors contribute to THC loss, such as side-stream smoke that is emitted into the surrounding air but not inhaled by the consumer or the use of filters.[1] We accounted for THC loss by including the following multipliers in the dose formulas: flower dose estimates were multiplied by 0.3 and vape and concentrate dose estimates were multiplied by 0.5. These multipliers were derived from a recently published article in the scientific literature, wherein Budney et al. averaged clinical findings on THC loss due to method of administration from six different laboratory studies. Edible dose estimates do not include an equivalent multiplier for THC loss since those products are not subject to comparable THC loss during administration. Future research may include additions to the dose formulas that account for other aspects of THC loss, such as bioavailability.

2.   Concentrate formula revision:

The concentrate dose formula was updated to adjust for a missing component. The MMCPS dose questionnaire omitted a measure of quantity for concentrates, which contributed to skewed concentrate dose estimates in the 2022 report. The updated concentrate dose formulas include 0.4 grams as a constant quantity of concentrates consumed in a typical sitting. The 0.4 grams constant was a median estimate derived from a separate question in the MMCPS-23, wherein a subset of respondents who had consumed concentrates in the past week reported the amount of concentrates they typically use per sitting. Note that a different subset of respondents answered this specific concentrate question compared to those who completed the full dose questionnaire. While this approach improved the quality of the current concentrate dose estimates, calculations that include respondents' individual reports of quantity are needed for further refinement of concentrate dose estimates. Future dose surveillance should ensure that measures of quantity and potency are included for all product types.

3. Vape formula revision:

The vape dose formula was revised to remove an extra component that contributed to reduced dose estimates in the 2022 report. Specifically, the dose estimates were previously divided by respondents' reports of the number of hits they take from their vape cartridge in a typical sitting. Therefore, the 2022 estimates reported dose per hit, rather than the intended dose per occasion (in this case, an 'occasion' means a sitting or session where an individual consumes cannabis, which would typically include multiple hits or repeated uses of cannabis). The 'hits per sitting' division was removed in the updated formula, enabling comparison with the other methods of administration (flower, edibles, and concentrates).

[1] Budney, A. J., Borodovsky, J. T., Struble, C. A., Habib, M. I., Shmulewitz, D., Livne, O., Aharonovich, E., Walsh, C., Cuttler, C., & Hasin, D. S. (2022). Estimating THC Consumption from Smoked and Vaped Cannabis Products in an Online Survey of Adults Who Use Cannabis. Cannabis and Cannabinoid Research, can.2022.0238. https://doi.org/10.1089/can.2022.0238