Cannabis Control Commission
COMMONWEALTH OF MASSACHUSETTS

# Cannabis Use Trends in Massachusetts, Findings from the International Cannabis Policy Study, 2019 and 2020

## A Legislative Report and Considerations

July 2022


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## Purpose

This report has been prepared in response to Massachusetts General Law Chapter 94G, Section 17(a) to assess multiple items on the Cannabis Control Commission (Commission)'s research agenda. This legislation section states that: "*The commission shall develop a research agenda in order to understand the social and economic trends of marijuana ("cannabis") in the commonwealth, to inform future decisions that would aid in the closure of the illicit marketplace and to inform the commission on the public health impacts of marijuana*." [G. L. c. 94G, § 17a]

The research agenda priority items this report addresses include:

1. patterns of use, methods of consumption, sources of purchase and general perceptions of marijuana among minors, among college and university students, and among adults [G. L. c. 94G, § 17a (i) (partially)];
2. incidents of impaired driving, hospitalization, and use of other health care services related to marijuana use, including a report of the state of the science around identifying a quantifiable level of marijuana-induced impairment of motor vehicle operation and a report on the financial impacts on the state healthcare system of hospitalizations related to marijuana [G. L. c. 94G, § 17a (ii) (partially)];
3. a market analysis examining the expansion or contraction of the illicit marketplace and the expansion or contraction of the legal marketplace, including estimates and comparisons of pricing and product availability in both markets [G. L. c. 94G, § 17a (v) (partially)]; and
4. a compilation of data on the number of civil penalties, arrests, prosecutions, incarcerations, and sanctions imposed for violations of chapter 94C for possession, distribution, or trafficking of marijuana or marijuana products, including the age, race, gender, country of origin, state geographic region, and average sanctions of the persons charged [G. L. c. 94G, § 17a (vii) (partially)].

Additionally, Massachusetts General Law Chapter 94G, Section 17(a) asserts that the Commission shall incorporate available data, annually report on the results of its research, and make recommendations for further research or policy changes.

## Main Findings

### International Cannabis Policy Study, Massachusetts 2019-2020

- Approximately 35% of Massachusetts residents in 2019 and 2020 report using cannabis in the past year, with 13% reporting daily or near daily use.
- Among cannabis users, respondents report flower/dried herb (73%), edibles (61%), and vaporized oils (40%) as the most frequent methods of cannabis consumption.
- Cannabis users most frequently reported sourcing their cannabis from a family member or friend (65%), a licensed dispensary (47%), or an unlicensed dealer (28%).
- 65% of respondents support legalized adult-use cannabis.
- Approximately 14% of cannabis users report driving or operating a vehicle within 2 hours of using cannabis in the year prior to the survey.
- Approximately 12% of cannabis users report using cannabis at work in the past 30 days.
- Reports of cannabis co-use with another substance were common. In total, 45% of cannabis users report using cannabis with alcohol, 35% with cigarettes, 9% with an e-cigarette, and 10% with any other illicit substance.
- Approximately 5% of cannabis users report seeking medical treatment for a cannabis-use reason. Many cannabis users also report using cannabis to improve or manage either mental health (46%) or physical health (39%) symptoms.

# I. Introduction

## Brief History of Cannabis Laws

### International

Worldwide, cannabis has been used for religious, recreational, and therapeutic purposes for thousands of years, although it has been predominantly illegal since the 1961 United Nations (UN) Single Convention on Narcotic Drugs.

### National: United States

In the United States (US), cannabis cultivation and use were legal under federal and state laws throughout most of modern American history. In 1611, American cultivators produced hemp for its fiber and seed. Irish physician, William Brooke O'Shaughnessy, introduced human therapeutic use of cannabis into Western medicine in 1839. Cannabis' therapeutic potential was recognized by some US physicians in the 1840s. From 1850 to 1941, cannabis was included in the *United States Pharmacopeia,* an official list of public standards for recognized medicinal drugs. The use of medicinal cannabis decreased as the development of other pharmaceuticals increased (e.g., aspirin, morphine, and other opium-derived drugs).[1]

Social reform policies in the 20th century aimed to reduce recreational use of many substances, including cannabis. Increased cannabis use between 1910-1920 led 29 states, including Massachusetts, to pass laws prohibiting the possession or sale of cannabis. In the 1940s, state-level changes in cannabis policy led to amendments to two federal policies: The Uniform Narcotic Drug Act of 1932 and the Marihuana Tax Act of 1937. The Marihuana Tax Act of 1937 moved toward federal criminalization through exorbitant fines for cannabis use, possession, and cultivation.[1]

The Federal Controlled Substance Act (CSA) of 1970 replaced the Marihuana Tax Act and made it illegal under federal law for physicians to prescribe cannabis medicinally. Despite the increasing stringency of federal cannabis policies over time, cannabis consumption continued.

In 1971, President Richard Nixon declared a "War on Drugs," proclaiming: "America's public enemy number one in the United States is drug abuse. In order to fight and defeat this enemy, it is necessary to wage a new, all-out offensive." Nixon's policies were positioned as efforts to combat the supply chain of illegal drugs that contributed to substance use disorders. However, a disproportionate number of these policies focused on criminal justice enforcement and punishment for drug offenses and created systematic changes in the criminal justice system that to this day disproportionality impact people of color. These policies contributed to the "Law and Order" (i.e., politicization of crime) and "Crime and Punishment" (i.e., a culmination of fear of street crime that created a "moral and justified" reason for the heavy punitive response to drug crime) phenomena.

Currently under the CSA, the US Drug Enforcement Association (DEA) classifies cannabis as a Schedule 1 drug, the most restrictive ranking ("scheduling") on par with heroin, contending that it has: (1) a high potential for abuse, (2) no current accepted medical use in the US, and (3) a lack of accepted safety for use under medical supervision.[2]

The US Food and Drug Administration (FDA) is responsible for the oversight and implementation of the 1906 Pure Food and Drug Act, which prevents the manufacture, sale, or transportation of adulterated, or misbranded, poisonous, or deleterious foods, drugs, medicines, and liquors. The FDA's role in the regulation of drugs, which includes cannabis and cannabis-derived products [e.g., Marinol (i.e., dronabinol), Cesamet (i.e., nabilone), Syndros (i.e., dronabinol), Epidiolex (i.e., cannabidiol)], includes a review to determine whether proposed drug products are safe and effective for their intended use before products can go to market. The FDA has not approved the cannabis plant for the treatment of any disease, symptom, or condition, except approved medicines that include cannabis extracts and are approved to treat specific medical conditions.[1]

*Post-Prohibition Legalization*

Cannabis legalization has occurred on a state-by-state basis. There are three types of cannabis-use policies enacted at the state or local level in the US that allow for legal use, despite its federal status: 1) decriminalization but not regulation or legalization, 2) medicinal cannabis legalization, and 3) recreational or adult-use cannabis legalization.

The first wave of cannabis reform was decriminalization, which replaced criminal sanctions for possession and small-scale distribution of cannabis with civil fines.[2] Decriminalization did not legalize cannabis; however, the movement served as a critical step toward legalization. Since 1972, 26 states and the District of Columbia (DC) have enacted policies decriminalizing small amounts (less than 1.5 oz) of cannabis.[3] Additionally, a federal bill that recently passed in the US House of Representatives, the Marijuana Opportunity Reinvestment and Expungement Act (MORE), would decriminalize cannabis at the federal level if enacted into law.

Medicinal cannabis policies followed the decriminalization wave, including varying provisions for patients with specified medical diagnoses and symptoms to access legal cannabis as a treatment modality. Since 1996 and as of March 2022, 37 states, four territories, and DC enacted varying policies permitting medicinal cannabis programs.[3]

Non-medical, adult-use legalization policies followed medical-specific policies and permit varying provisions for legal cannabis access for adults. Since 2012 and as of March 2022, 18 states, two territories, and DC put in place varying policies and regulations permitting the sale of cannabis for non-medical adult-use for those 21 years-old or older ("21≤").[3]

It is important to note that cannabis legalization policies (i.e., medicinal and non-medicinal adult-use), have been enacted at the state-level, creating a heterogenous patchwork of policies, provisions, regulation, and enforcement.[4] This study and subsequent report assesses and is limited to data in the Commonwealth of Massachusetts.

*Federal Bills*

As of March 2022, there has been significant movement on the federal level regarding cannabis reform. On April 4, 2022, the US House of Representatives passed the Medical Marijuana Research Act, which if passed, would expand the number of federal cannabis research cultivators and permit researchers to study cannabis produced within legal state markets. This would be a critical step for cannabis research, as researchers would have increased access to cannabis for study purposes, permitting better and more varied products for research to assess issues that are currently understudied, including therapeutics effects for specified illnesses and symptoms and acute impairment relating to driving. As of this writing, the Medical Marijuana Research Act is currently in the Senate. The US Senate passed its own cannabis research bill on March 24, 2022. Currently, researchers can only use cannabis grown at the University of Mississippi and the Senate's bill maintains this stipulation. The bill passed in the House would allow for researchers to access cannabis from private businesses.

Other noteworthy bills introduced at the federal level in the last two years include the Marijuana Opportunity Reinvestment and Expungement Act (MORE Act) and the States Reform Act.

The MORE Act was introduced to the US House of Representatives in May 2021. On April 1, 2022, the bill passed in the House and is now in the US Senate for consideration. The MORE Act seeks to decriminalize and de-schedule cannabis to provide for reinvestment in certain populations adversely impacted by the War on Drugs (i.e., disproportionate prohibition and enforcement of cannabis law) and to provide for expungement of certain federal cannabis offenses.

The States Reform Act was introduced to the House floor in November 2021. As of January 2022, the bill remains before the House Subcommittee on Health. The bill seeks to amend the Controlled Substances Act on marijuana by striking "marihuana" and "Tetrahydrocannabinols, except for tetrahydrocannabinols in hemp […]" from the text. With this change, and other suggested amendments, cannabis would be treated as alcohol is treated at the federal regulatory level.

The Cannabis Administration and Opportunity Act (CAOA) is in draft form. Co-sponsored by Senators Cory Booker (D-NJ), Ronald Wyden (D-OR), and Charles Schumer (D-NY), the CAOA aims to remove cannabis from the federal list of controlled substances and empower states to implement their own cannabis laws. The bill would automatically expunge federal non-violent cannabis crimes and end discrimination in federal public benefits for medical cannabis patients and adult-use consumers. It also creates an "Opportunity Trust Fund" funded by federal cannabis tax revenue to reinvest in the communities most impacted by the War on Drugs.

**Massachusetts**

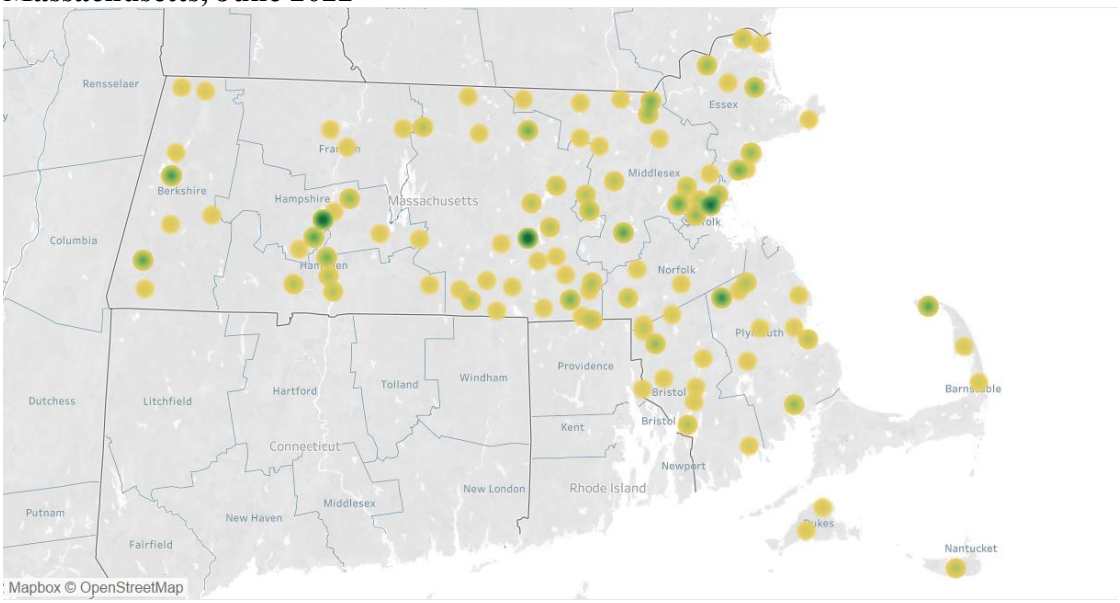
Massachusetts enacted and implemented all three types of cannabis reform in different waves. In all cases, Massachusetts acted via ballot initiatives. The major initiatives are cannabis decriminalization in 2008 with ballot Question 2, "*The Sensible Marijuana Policy Initiative*;" medical cannabis use in 2012 with ballot Question 3, "*An Initiative Petition for a Law for the Humanitarian Medical Use of Marijuana*;" and non-medical adult-use cannabis legalization in 2016 with ballot Question 4, "*Massachusetts Legalization, Regulation and Taxation of Marijuana Initiative*." With the issuance of ballot Question 3, it is important to note that Medical Marijuana Treatment Centers (MTCs) must be vertically integrated, meaning the company has direct ownership over each aspect of cultivation, production, and dispensing to registered patients.

*Legal Market Update*

The first MTC in Massachusetts opened in June 2015; the first non-medical adult-use Marijuana Retailer opened in November 2018. As of June 17, 2022, there are 226 adult-use retail establishments across the Commonwealth and 95 MTCs that have commenced operations. Massachusetts is also home to more than 500 other Marijuana Establishments, including Independent Testing Laboratories, Cultivators, Product Manufacturers, and delivery services. The Commission is also currently in the process of welcoming its first Craft Marijuana Cooperatives, with three establishments currently in possession of provisional licenses.

In total, 22,126 persons ("Agents") were employed by cannabis businesses in Massachusetts in March 2022.

**Figure I. A.1. Adult-Use Market: Licensed, Operational Marijuana Retailers by County, Massachusetts, June 2022**




Notes for Figure I.A.1.:

Visualization of operational Marijuana Retailers by municipality and county. Figure is shaded by density (yellow to green); June 2022. Figure created using the "Adult-Use Marijuana Establishment License and Applications – Approved" dataset from the Commission's Open Data Catalog. Retrieved from https://masscannabiscontrol.com/open-data/data-catalog/.

**Table I.A.1. Adult-Use Market, Massachusetts: License Types With at Least a Provisional License as of June 2022**

| License Type | N | Percent of Total |
|---|---|---|
| Marijuana Retailer | 394 | 40% |
| Marijuana Cultivator | 293 | 30% |
| Marijuana Product Manufacturer | 220 | 22% |
| Marijuana Microbusiness | 22 | 2% |
| Independent Testing Laboratory | 16 | 2% |
| Marijuana Transporter with Other Existing ME License | 5 | <1% |
| Third Party Marijuana Transporter | 4 | <1% |
| Microbusiness Delivery Endorsement | 1 | <1% |
| Marijuana Delivery Operator | 18 | 2% |
| Delivery Courier | 14 | 1% |
| Craft Marijuana Cooperative | 4 | <1% |

Notes for Table I.A.1.:

Legal cannabis businesses in Massachusetts by total number (*N*) and percent of total. Table created using the Adult-Use "Marijuana Establishment License and Applications – Approved" dataset from the Commission's Open Data Catalog. Retrieved from https://masscannabiscontrol.com/open-data/data-catalog/.

*Legislative Research Mandate*

Per the results of ballot Question 4, a legislative effort was enacted to modify the voter initiative. One of those modifications created the enabling legislation, St. 2017, c.55, *An Act to Ensure Safe Access to Marijuana*, which outlined a robust research agenda. The one-time statutes include St. 2017, c.55 [St. 2017, c. 55, § 30(f); St. 2017, c. 55, § 62] and the annual agenda items are outlined in G. L. c. 94G, § 17(a) and G. L. c. 94G, § 17(b).

Massachusetts General Law c. 94G outlines research agenda items and states: "*The [Cannabis Control] commission shall develop a research agenda in order to understand the social and economic trends of marijuana ("cannabis") in the commonwealth, to inform future decisions that would aid in the closure of the illicit marketplace and to inform the commission on the public health impacts of marijuana*" and "*the Commission shall incorporate available data, annually report on the results of its research, and make recommendations for further research or policy changes*."

## Cannabis Use Statistics

### National Cannabis Use Statistics

*Adults*

In 2018, the National Survey on Drug Use and Health (NSDUH) reports that 15.9% of all American respondents reported cannabis use in the past year, but there are notable discrepancies in usage by age group. In the same study, an estimated 34.8% of adults, ages 18-25 years-old, reported use in the previous year, compared to 13.3% of adults ages 26 years or older.[3]

*Youth*

Cannabis is the most frequently used drug among youth regardless of the status of cannabis legalization where the respondents live. The 2018 NSDUH reports 12.5% of adolescents ages 12-17 years used cannabis in the past year.[3] Other surveys estimate higher rates of past year cannabis use among adolescents. The Monitoring the Future (MTF), for example, survey reports 23.9% of adolescents sampled in the Grades 8, 10, and 12 used cannabis in the past year.[4] Similarly, the 2019 Youth Risk Behavior Surveillance System (YRBSS) reports 21.7% of adolescents in a high school student sample used cannabis in the past year.[5] Discrepancies between surveys may be a result of differences in survey design and sampling, for example the YRBSS is a public school based survey, which inherently excludes students who are absent or dropped out of public school, whereas NSDUH is a household interview, capturing youth 12 years or older.

### Massachusetts Cannabis Use Statistics

After alcohol, cannabis is the most widely used intoxicating substance in the US by many estimates[3,4] and there is evidence that these use rates may be comparatively high among Massachusetts residents. The 2016 Behavioral Risk Factor Surveillance System (BRFSS) reported that 12% of Massachusetts-based respondents used non-medical cannabis in the past year. Rates were particularly high among the 18–34-year-old cohort, with 24.5% reporting past-year non-medical cannabis use.[6]

## II. Methods

### International Cannabis Policy Study and Survey

The International Cannabis Policy Study (ICPS) is designed to examine cannabis policy and the public health impacts of cannabis legalization. The study started in 2018 with annual population-based surveys of Canadian and US residents, and now includes Australia and New Zealand. The study is conducted by Dr. David Hammond and colleagues at the University of Waterloo, British Columbia (BC). While the study assesses hundreds of questions, its primary purpose is five research questions about how changes to cannabis policy are reflected in the:

1) Prevalence of cannabis use;
2) Scope of the cannabis retail environment (both legal and illicit);
3) Risk behaviors and high-risk cannabis use;
4) Perceived risks and social norms surrounding cannabis; and
5) Efficacy of implemented regulatory policies.

Since 2019, the Commission has contracted with the University of Waterloo to administer this survey to Massachusetts residents. Although many state and national surveillance data, such as the NSDUH, BFFSS, YRBSS, and MTF, assess macro-level trends in substance use, the ICPS is the most comprehensive survey for cannabis use metrics. Where many other surveys aim to achieve a basic understanding of substance use trends overall, the ICPS explicitly focuses on cannabis. This design permits a more comprehensive assessment in both depth and scope of cannabis use and related trends. Further, the primary goals of the ICPS align well with the research mandate in M. G. L. c. 94G, § 17a.

Data in this report includes combined results from Wave 1 (2019) and Wave 2 (2020) surveys of Massachusetts participants.

### Participants

The ICPS recruited participants ages 16-65 years through the Nielsen Consumer Insights Global Panel. The ICPS uses post-stratification survey weights created using age-by-sex-by-state, education, and age-by-smoking status groups.

A total of 4,683 Massachusetts respondents completed the survey between the two samples included in this study [2,476 in 2019 and 2,207 in 2020]. Their responses allow the Commission to assess cannabis use trends by age group, student status, sex, gender, race, ethnicity, and perceived income adequacy, an indicator to assess socioeconomic status. Examining patterns by demographics helps to establish a holistic understanding of how Massachusetts residents of diverse backgrounds use and perceive cannabis.

Participants ("respondents") are categorized into six age groups based on their age at the time of the survey: 1) 16-20 years, 2) 21-25 years, 3) 26-35 years, 4) 36-45 years, 5) 46-55 years, and 6) 56-65 years old. "Student Status" refers to whether the respondent reports either current school enrollment or school enrollment next term, thus, inclusive of high school or university

attendance. For purposes of this report, analyses compare cannabis use trends between students and non-students.

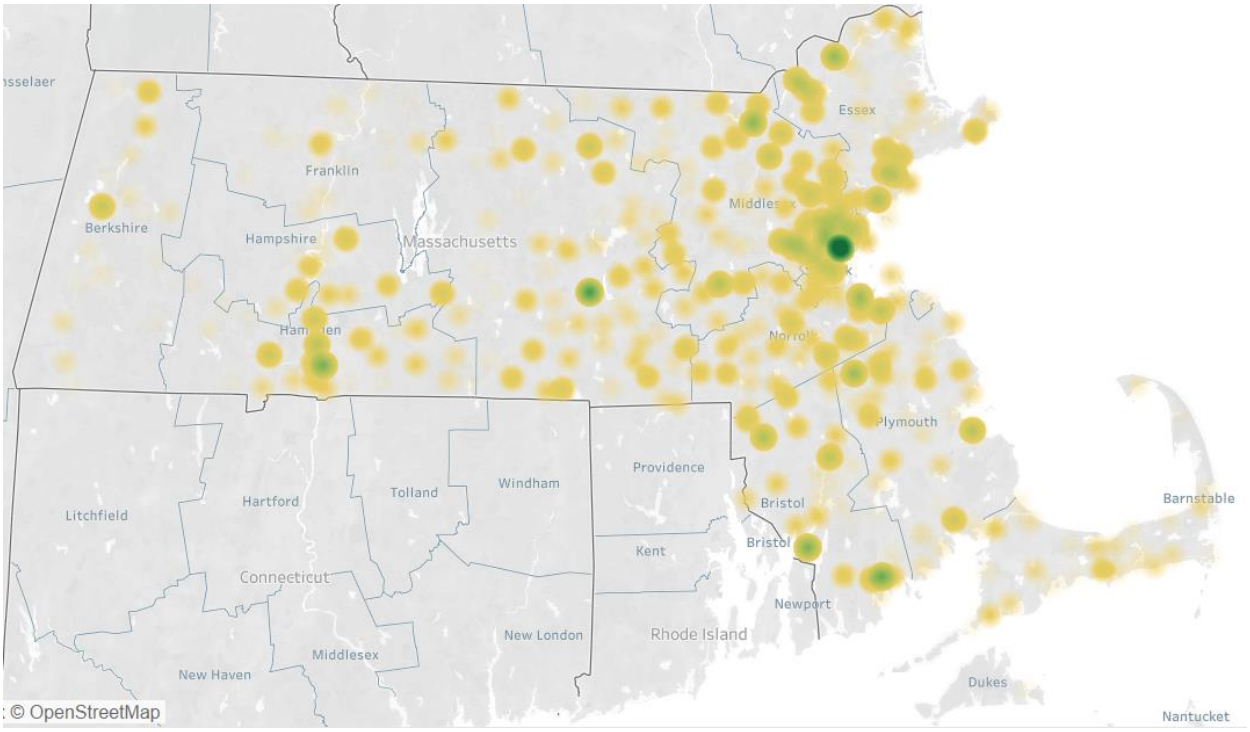
The ICPS includes both Sex and Gender metrics. The "Sex" metric asks respondents to select their sex at birth (limited to male/female), where the "Gender" metric provides "man" and "woman" with an option to select "other" and write in their preferred identity.

The ICPS includes racial and ethnic identity metrics. For race, the ICPS asks respondents whether they belong to one of six different race groups: 1) Asian, 2) American Indian or Alaskan Native, 3) Black, 4) Native Hawaiian or Pacific Islander, 5) White, and 6) Other/2+ Races. For ethnicity, the ICPS asks respondents whether they identify as Hispanic or Latino.

Finally, the ICPS establishes a rough measure of the participants' income by asking them about their income adequacy; or how difficult it is to make ends meet. We chose to use a subjective rather than objective (e.g., measurable income) measure of income due to a considerable degree of heterogeneity in per capita income across Massachusetts.[7]

[For more information about the ICPS, please see: http://cannabisproject.ca/ and *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics and how categorized and coded]

**Figure II.B.1. ICPS Survey: Respondents' locations across the Commonwealth**




Notes for Figure II.B.1.:

The density of responses across Massachusetts represented by color, where dark green represents the highest density and yellow the lowest. Created using respondents' reported city (where available) from the 2019 & 2020 ICPS surveys.

# III. Results

## A. Demographics

The total sample for 2019 and 2020 included 4,683 Massachusetts residents ages 16-65 years. The mean age of the sample is 44 years old (*M* = 43.99).

**Table III.A.1. Sample Demographics: Age**

| Age Group | N | Percent of Total |
|---|---|---|
| 16-20 | 328 | 7% |
| 21-25 | 254 | 5% |
| 26-35 | 898 | 19% |
| 36-45 | 911 | 19% |
| 46-55 | 971 | 21% |
| 56-65 | 1321 | 28% |

**Table III.A.2. Sample Demographics: Student Status (Any)**

| Student Status | N | Percent of Total |
|---|---|---|
| Student | 606 | 13% |
| Non-Student | 3958 | 84% |
| Don't know/refuse to answer | 119 | 2% |

**Table III.A.3. Sample Demographics: Sex**

| Sex | N | Percent of Total |
|---|---|---|
| Female | 3366 | 72% |
| Male | 1317 | 28% |

**Table III.A.4. Sample Demographics: Gender**

| Gender | N | Percent of Total |
|---|---|---|
| Woman | 3312 | 70% |
| Man | 1305 | 28% |
| Unstated / Refuse to Answer | 43 | 1% |
| Other | 23 | <1% |

Notes for Tables III.A.1., III.A.2., III.A.3., III.A.4.:
Table III.A.1.: Distribution of respondents by age; Mean age: 43.99 years (SD = 14.14).
Table III.A.2.: Distribution of respondents by their reported current student status (high school or university).
Table III.A.3.: Distribution of respondents by their reported birth sex.
Table III.A.3.: Distribution of respondents by their reported birth sex.

See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics.

**Table III.A.5. Sample Demographics: Race**

| Race | N | Percent of Total |
|---|---|---|
| White | 3891 | 83% |
| Black or African American | 270 | 6% |
| Other/2+ races/Unstated | 262 | 6% |
| Asian | 222 | 5% |
| Native, Mainland or Islander | 38 | 1% |

**Table III.A.6. Sample Demographics: Ethnicity**

| Race | N | Percent of Total |
|---|---|---|
| Hispanic | 396 | 8% |
| Non-Hispanic | 4225 | 90% |
| Don't know / Refuse to answer | 62 | 1% |

**Table III.A.7. Sample Demographics: Income Adequacy**

| Income Adequacy | N | Percent of Total |
|---|---|---|
| Easy | 1497 | 32% |
| Difficult | 1394 | 30% |
| Neither Easy or Difficult | 1639 | 35% |
| Don't know / refuse | 153 | 3% |

Notes for Tables III.A.5., III.A.6., III.A.7.:
Table III.A.5.: Distribution of respondents by their reported race.
Table III.A.6.: Distribution of respondents by their reported ethnicity.
Table III.A.7.: Distribution of respondents by their reported subjective income adequacy, a metric assessing subjective socioeconomic status ("income").

See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics.

## B. Use Frequency

The ICPS survey asked participants to report on how frequently they use cannabis. Of the Massachusetts residents sampled, 31% report never using cannabis, 34% report use more than 12 months ago, 11% report use within the past 12 months, 6% report use within the past month, 5% report use within the past week, and 13% report use on a daily or almost daily basis. In total, 69% of Massachusetts residents report previous cannabis use over their lifetime and 35% within the past year.

The Commission found notable trends in use frequency by age group. Emerging adults, categorized as respondents ages 16-20 years, were the most likely to have never used cannabis, with over half of this demographic reporting themselves as a "never user." This information is not entirely surprising, as the legal sale of cannabis in Massachusetts is limited to individuals 21 years of age and older. Individuals ages 21-25 years were the most frequent daily users, with 19% of respondents reporting the daily or almost daily use of cannabis. Cannabis use was also highly frequent in respondents ages 26-35 years, with 18% reporting daily use.

Males and females show similar use frequency patterns. Notably, 31% of the members of each sex report never using cannabis. Whereas 13% of each sex report daily cannabis use. Similar trends emerge when results are observed by gender. Approximately 22% of respondents with a gender identity other than man or woman report daily use; however, this sample accounted for a very small proportion of the population (<1%) that participated in Massachusetts.

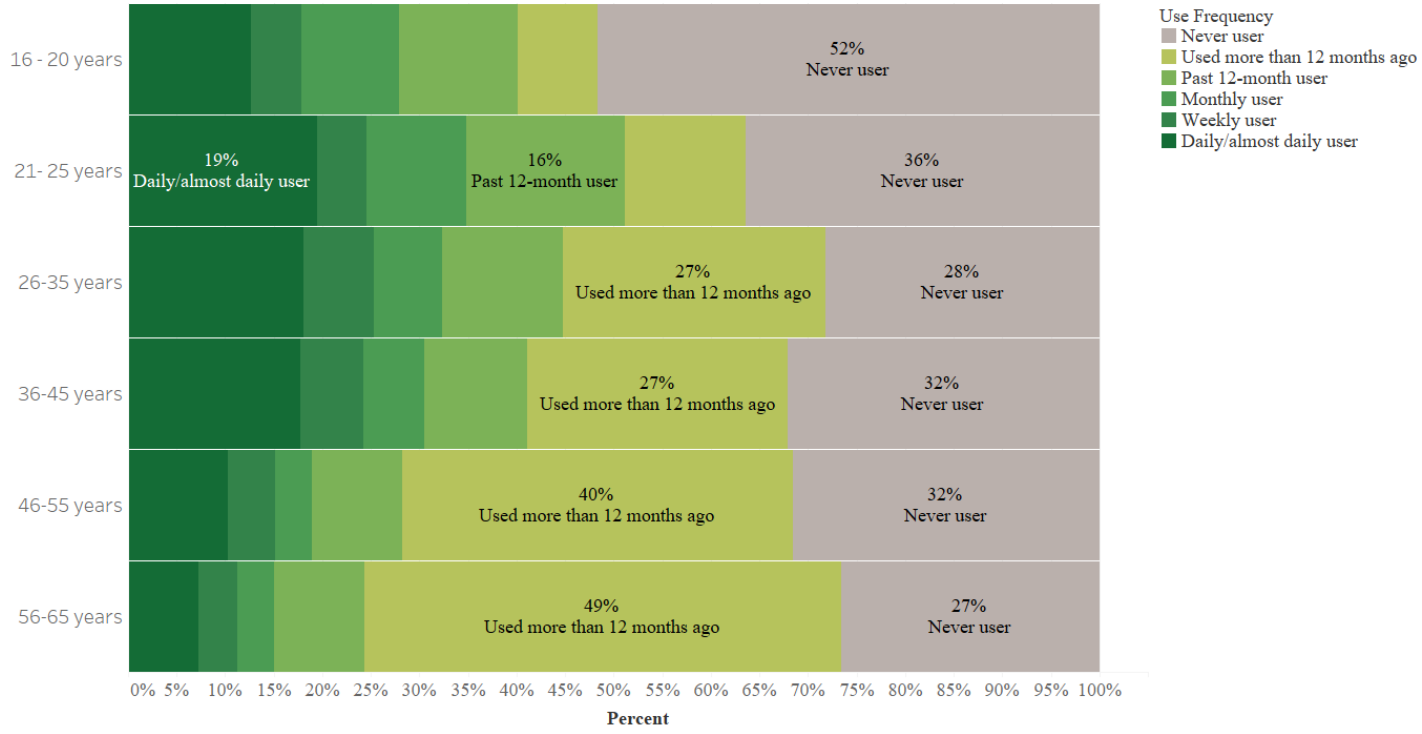
There are notable differences between race groups in cannabis use frequency. For example, Asian respondents report cannabis use at much lower rates than the rest of the population, with 72% reporting never using cannabis and just 2% reporting daily use. When added together, 12% of Asian individuals reported cannabis use *of any kind* in the past year. This reporting contrasts with the reported past-year cannabis use frequencies of respondents identifying as White (35% use/year), Black (45% use/year), Native (36% use/year), or Other/2+ races (39% use/year).

Trends in cannabis use frequency show notable patterns when segmented by the perceived income adequacy, the measure assessing subjective socioeconomic status. Among those reporting "Difficult" income adequacy (30%), 17% are daily users, compared to 14% among those reporting "Neither (easy or difficult)" and 9% reporting "Easy" income adequacy. In a similar fashion, just 23% of the "Difficult" group never used cannabis, compared to 33% and 34% in the "Neither" and "Easy" groups, respectively.

## Table III.B.1. Cannabis Use Frequency: Age

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years |
|---|---|---|---|---|---|---|
| ***N*** | **269** | **313** | **898** | **911** | **971** | **1321** |
| Never user | 52% (139: 269) | 36% (114: 313) | 28% (253: 898) | 32% (292: 911) | 31% (306: 971) | 27% (351: 1321) |
| Used more than 12 months ago | 8% (22: 269) | 12% (39: 313) | 27% (243: 898) | 27% (245: 911) | 40% (391: 971) | 49% (649: 1321) |
| Past 12-month user | 12% (33: 269) | 16% (51: 313) | 12% (12: 898) | 10% (96: 911) | 9% (90: 971) | 9% (123: 1321) |
| Monthly user | 10% (27: 269) | 10% (32: 313) | 7% (63: 898) | 6% (57: 911) | 4% (37: 971) | 4% (49: 1321) |
| Weekly user | 5% (14: 269) | 5% (16: 313) | 7% (65: 898) | 6% (59: 911) | 5% (47: 971) | 4% (54: 1321) |
| Daily/almost daily user | 13% (34: 269) | 19% (61: 313) | 18% (162: 898) | 18% (162: 911) | 10% (100: 971) | 7% (95:1321) |

## Figure III.B.2. Cannabis Use Frequency: Age Cohort




Notes for Table III.B.1 and Figure III.B.2.:

Cannabis use frequency by age cohort. Respondents were asked "How often do you use marijuana?" and given the options between "Never user," "Used more than 12 months ago," "Past 12-month user," "Monthly user," "Weekly user," or "Daily/almost daily user," Respondents could choose only one response option. For table III.B.1., no statistical comparisons were made due to the categorical nature of this variable.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.B.3. Cannabis Use Frequency: Student Status (Any)

| Cannabis use variable | Student | Non-Student | Unstated |
|---|---|---|---|
| ***N*** | 606 | 3958 | 119 |
| Never user | 40% (244: 606) | 30% (1179: 3958) | 27% (32: 119) |
| Used more than 12 months ago | 17% (102: 606) | 37% (1456: 3958) | 26% (31: 119) |
| Past 12-month user | 12% (76: 606) | 10% (413: 3958) | 13% (16: 119) |
| Monthly user | 9% (56; 606) | 5% (203: 3958) | 5% (6: 119) |
| Weekly user | 8% (48: 606) | 8% (198: 3958) | 8% (9: 119) |
| Daily/almost daily user | 13% (80: 606) | 13% (509: 3958) | 21% (25: 119) |

## Table III.B.4. Cannabis Use Frequency: Sex

| Cannabis use variable | Male | Female |
|---|---|---|
| ***N*** | 1317 | 3366 |
| Never user | 31% (413: 1317) | 31% (1042: 3366) |
| Used more than 12 months ago | 35% (467: 1317) | 33% (1122: 3366) |
| Past 12-month user | 9% (114: 1317) | 12% (391: 3366) |
| Monthly user | 5% (68: 1317) | 6% (197: 3366) |
| Weekly user | 6% (82: 1317) | 5% (173: 3366) |
| Daily/almost daily user | 13% (173: 1317) | 13% (441: 3366) |

## Table III.B.5. Cannabis Use Frequency: Gender

| Cannabis use variable | Man | Woman | Other | Unstated |
|---|---|---|---|---|
| ***N*** | 1305 | 3312 | 23 | 43 |
| Never user | 31% (403: 1305) | 31% (1021: 3312) | 35% (8/23) | 54% (23/43) |
| Used more than 12 months ago | 36% (466: 1305) | 34% (1114: 3312) | 17% (4/23) | 12% (5/43) |
| Past 12-month user | 8% (111: 1305) | 12% (389: 3312) | 13% (3/23) | 5% (2/43) |
| Monthly user | 5% (69: 1305) | 6% (195/3312) | 4% (1/23) | 0% (0/43) |
| Weekly user | 6% (82: 1305) | 5% (168/3312) | 9% (2/23) | 7% (3/43) |
| Daily/almost daily user | 13% (174: 1305) | 13% (425/3312) | 22% (5/23) | 23% (10/43) |

Notes for Table III.B.3, III.B.4., and III.B.5.:

Cannabis use frequency: Respondents were asked “How often do you use marijuana?” and given the options between “Never user,” “Used more than 12 months ago,” “Past 12-month user,” “Monthly user,” “Weekly user,” or “Daily/almost daily user,” Respondents could choose only one response option. For table III.B.1., no statistical comparisons were made due to the categorical nature of this variable.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

**Table III.B.6. Cannabis Use Frequency: Race**

| Cannabis use variable | Asian | Black | Native, Mainland or Islander | Other/ 2+ Races | White |
|---|---|---|---|---|---|
| ***N*** | **222** | **270** | **38** | **262** | **3891** |
| Never user | 72% (161: 222) | 34% (92: 270) | 34% (13: 38) | 33% (86: 262) | 28% (1103: 3891) |
| Used more than 12 months ago | 14% (32: 222) | 20% (55: 270) | 29% (11: 38) | 27% (72: 262) | 36% (1419: 3891) |
| Past 12-month user | 4% (10: 222) | 8% (22: 270) | 5% (2: 38) | 9% (24: 262) | 11% (447: 3891) |
| Monthly user | 4% (9: 222) | 8% (22: 270) | 8% (3: 38) | 7% (19: 262) | 5% (212: 3891) |
| Weekly user | 2% (5: 222) | 7% (19: 270) | 10% (4: 38) | 4% (11: 262) | 6% (216: 3891) |
| Daily/almost daily user | 2% (5: 222) | 22% (60: 270) | 13% (5: 38) | 19% (50: 262) | 13% (494: 3891) |

**Table III.B.7. Cannabis Use Frequency: Ethnicity**

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated |
|---|---|---|---|
| ***N*** | **396** | **4255** | **62** |
| Never user | 30% (120: 396) | 31% (1308: 4255) | 44% (27: 62) |
| Used more than 12 months ago | 25% (98: 396) | 35% (1478: 4255) | 21% (13: 62) |
| Past 12-month user | 8% (32: 396) | 11% (464: 4255) | 14% (9: 62) |
| Monthly user | 8% (30: 396) | 5% (233: 4255) | 3% (2: 62) |
| Weekly user | 7% (29: 396) | 5% (219: 4255) | 11% (7: 62) |
| Daily/almost daily user | 22% (87: 396) | 12% (523: 4255) | 6% (4: 62) |

Notes for Table III.B.6. and III.B.7.:

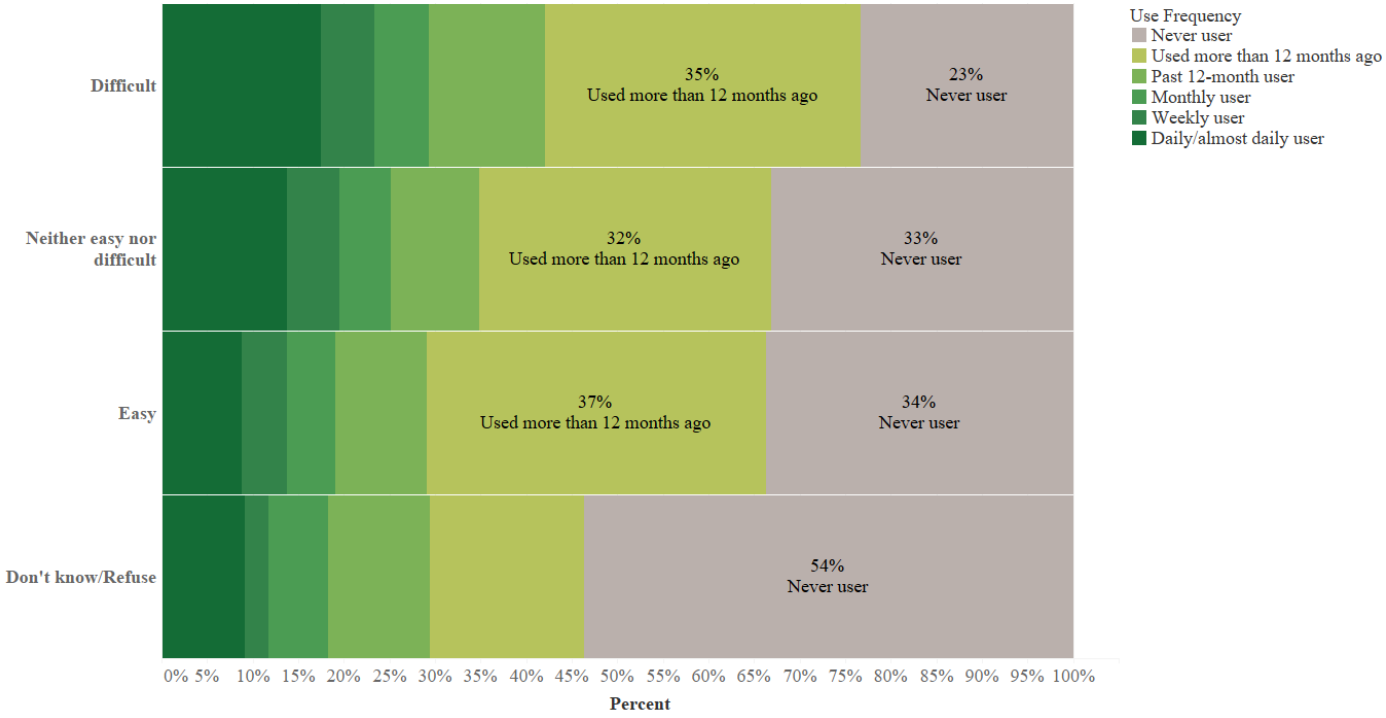
Cannabis use frequency: Respondents were asked "How often do you use marijuana?" and given the options between "Never user," "Used more than 12 months ago," "Past 12-month user," "Monthly user," "Weekly user," or "Daily/almost daily user," Respondents could choose only one response option. For table III.B.1., no statistical comparisons were made due to the categorical nature of this variable.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.B.8. Cannabis Use Frequency: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Unstated |
|---|---|---|---|---|
| ***N*** | 1394 | 1639 | 1497 | 153 |
| Never user | 23% (325: 1394) | 33% (543: 1639) | 34% (505: 1497) | 54% (82: 153) |
| Used more than 12 months ago | 35% (482: 1394) | 32% (524: 1639) | 37% (557: 1497) | 17% (26: 153) |
| Past 12-month user | 13% (179: 1394) | 10% (160: 1639) | 10% (149: 1497) | 11% (17: 153) |
| Monthly user | 6% (82: 1394) | 6% (93: 1639) | 5% (80: 1497) | 6% (10: 153) |
| Weekly user | 6% (83: 1394) | 6% (93: 1639) | 5% (75: 1497) | 3% (4: 153) |
| Daily/almost daily user | 17% (243: 1394) | 14% (226: 1639) | 9% (131: 1497) | 9% (14: 153) |

## Figure III.B.9. Cannabis Use Frequency: Income Adequacy




Notes for Table III.B.8. and Figure III.B.9.:

Cannabis use frequency: Respondents were asked "How often do you use marijuana?" and given the options between "Never user", "Used more than 12 months ago", "Past 12-month user", "Monthly user", "Weekly user", or "Daily/almost daily user". Respondents could choose only one response option. No statistical comparisons were made due to the categorical nature of this variable. Respondents could choose only one response option.
For Table III.B.7., no statistical comparisons were made due to the categorical nature of this variable. Income adequacy refers to metric assessing subjective socioeconomic status.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## C. Age of Cannabis Initiation

For respondents who report cannabis use, the ICPS asks the age when respondents first consumed cannabis ("age of cannabis initiation"). The mean age of first-time cannabis use among the 3,228 individuals in the sample was 19 years-old (SD=7.91). Adults ages 21-25 report a mean age of initiation of 17 years old and respondents ages 16-20 report a mean of under 16 years. Students enrolled at either a high school or university are more likely to initiate their cannabis use at an earlier age, when compared to their non-student counterparts. There are no significant differences in the age of initiation by sex, gender, race, ethnicity, or income adequacy demographics.

**Table III.C.1. Age of Cannabis Use Initiation: Age**

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years |
|---|---|---|---|---|---|---|
| ***N*** | **130** | **199** | **645** | **619** | **665** | **970** |
| Age | 15.9 | 17.4 | 18.5 | 20.1 | 19.5 | 19 |

**Table III.C.2. Age of Cannabis Use Initiation: Student Status (Any)**

| Cannabis use variable | Student | Non-Student | Don't know/ refuse |
|---|---|---|---|
| ***N*** | **362** | **2779** | **87** |
| Age | 18.1 | 19.2 | 17.6 |

**Table III.C.3. Age of Cannabis Use Initiation: Sex**

| Cannabis use variable | Female | Male |
|---|---|---|
| ***N*** | **2324** | **904** |
| Age | 18.9 | 19.3 |

Notes for Table III.C.1, III.C.2, and III.C.3.:

Respondents reported on the age when they first used cannabis. Respondents were asked "How old were you when you first used marijuana? (Enter age in years)";
Table III.C.1.: $p < .001$
Table III.C.2.: $p = .012$
Table III.C.3.: $p = 176$

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

### Table III.C.4 Age of Cannabis Use Initiation: Gender

| Cannabis use variable | Man | Woman | Other | Unstated |
|---|---|---|---|---|
| ***N*** | **902** | **2291** | **15** | **20** |
| Age | 19.3 | 18.9 | 17 | 18.5 |

### Table III.C.5 Age of Cannabis Use Initiation: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | White | Other |
|---|---|---|---|---|---|
| ***N*** | **61** | **178** | **25** | **2788** | **176** |
| Age | 20.8 | 19.5 | 18.4 | 19 | 18.5 |

### Table III.C.6 Age of Cannabis Use Initiation: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Don't Know/Refuse |
|---|---|---|---|
| ***N*** | **276** | **2917** | **35** |
| Age | 19.1 | 19 | 20.9 |

### Table III.C.7 Age of Cannabis Use Initiation: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Unstated |
|---|---|---|---|---|
| ***N*** | **777** | **679** | **611** | **49** |
| Age | 18.6 | 18.4 | 18.9 | 19.2 |

Notes for Table III.C.4, III.C.5. III.C.6, and III.C.7.:

Respondents reported on the age when they first used cannabis. Respondents were asked "How old were you when you first used marijuana? (Enter age in years)"; Income adequacy refers to metric assessing subjective socioeconomic status ("income").

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## D. Methods of Consumption

The ICPS survey asks participants that report previous cannabis use which methods of consumption they preferred. Across the entire two-year sample, the three most frequently reported methods of consumption are flower/dried herb (73%), edibles (61%), and vaporized oils (40%). Products such as concentrates, hash/kief, and vaporized oils are more popular with respondents 25 or younger (ages 16-20 and 21-25) than their older counterparts (ages 56-65). THC-infused drinks, hash/kief, and vaporized oils are more popular with the student than non-student population.

**Table III.D.1 Methods of Consumption: Age**

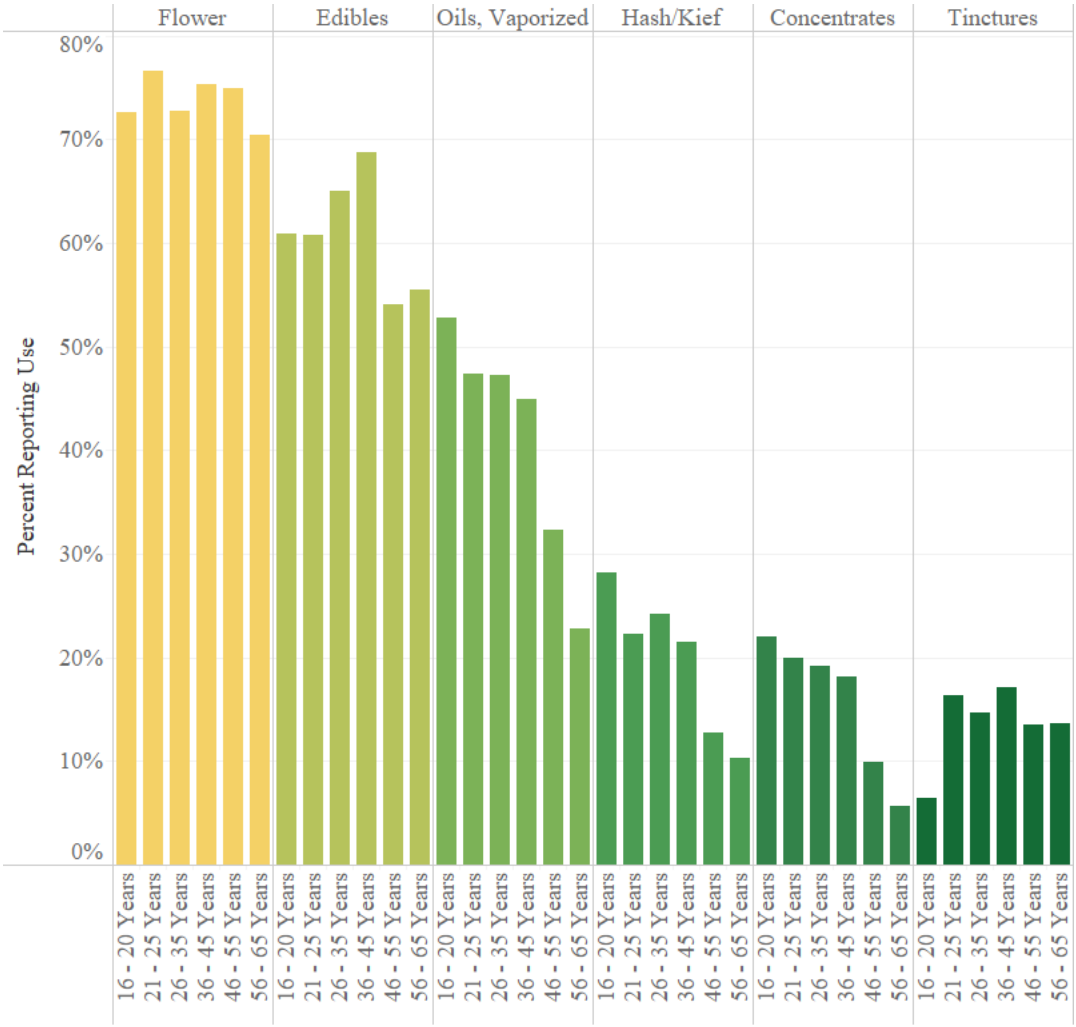
| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | **128** | **137** | **398** | **372** | **274** | **321** | |
| Concentrates | 22% (28: 127) | 20% (27: 135) | 19% (76: 395) | 18% (67: 369) | 10% (27: 274) | 6% (18: 320) | <.001 |
| Drinks | 16% (20: 127) | 12% (16: 136) | 15% (58: 396) | 16% (60: 372) | 8% (21: 273) | 3% (11: 321) | <.001 |
| Edibles | 61% (78: 128) | 61% (82: 135) | 65% (258: 397) | 69% (255: 371) | 54% (148: 274) | 55% (178: 321) | <.001 |
| Flower | 73% (90: 124) | 77% (105: 137) | 73% (289: 397) | 75% (278: 369) | 75% (203: 271) | 70% (226: 321) | .648 |
| Hash / Kief | 28% (35: 124) | 22% (30: 135) | 24% (96: 397) | 21% (79: 367) | 13% (35: 274) | 10% (33: 319) | <.001 |
| Oils, Oral | 21% (27: 126) | 24% (33: 135) | 27% (106: 397) | 30% (113: 371) | 22% (61: 272) | 24% (77: 321) | .160 |
| Oils, Vaporized | 53% (67: 127) | 47% (64: 135) | 47% (188: 398) | 45% (167: 372) | 32% (88: 272) | 23% (73: 321) | <.001 |
| Tinctures | 6% (8: 125) | 16% (22: 135) | 15% (58: 395) | 17% (63: 367) | 13% (37: 274) | 14% (44: 321) | .091 |
| Topicals | 20% (25: 125) | 18% (24: 132) | 24% (94: 396) | 27% (97: 369) | 17% (48: 274) | 24% (76: 320) | .093 |

Notes for Table III.D.1.:

Modes of cannabis use. Respondents were asked “Have you used marijuana in any of the following ways?” and given the options: “concentrates”, “drinks”, “edibles”, “flower”, “hash/kief”, “oils, oral”, “oils/vaporized”, “tinctures”, and/or “topicals”. Response items were presented individually.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

**Figure III.D.2. Methods of Consumption, by Age Cohort**




Notes for Figure III.D.2.:

Percent of respondents reporting modes of cannabis consumption, by age group. Array of colors represents the different methods of consumption reported on.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.D.3. Methods of Consumption: Student Status (Any)

| Cannabis use variable | Student | Non-student | Don't know/ Refuse | *p* |
|---|---|---|---|---|
| ***N*** | **254** | **1316** | **55** | |
| Concentrates | 18% (46: 253) | 14% (184: 1312) | 24% (13: 55) | .061 |
| Drinks | 18% (46: 255) | 10% (132: 1315) | 15% (9: 55) | .001 |
| Edibles | 60% (152: 254) | 61% (803: 1317) | 75% (41: 55) | .123 |
| Flower | 72% (183: 254) | 74% (969: 1310) | 76% (42: 55) | .691 |
| Hash / Kief | 23% (58: 252) | 18% (236: 1310) | 30% (16: 54) | .021 |
| Oils, Oral | 27% (69: 254) | 25% (328: 1313) | 31% (17: 55) | .540 |
| Oils, Vaporized | 48% (122: 254) | 37% (487: 1316) | 56% (31: 55) | <.001 |
| Tinctures | 13% (33: 252) | 15% (197: 1311) | 9% (5: 54) | .488 |
| Topicals | 23% (57: 250) | 22% (289: 1312) | 26% (14: 54) | .820 |

## Table III.D.4. Methods of Consumption: Sex

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| ***N*** | **431** | **1194** | |
| Concentrates | 18% (79: 430) | 14% (164: 1190) | <.001 |
| Drinks | 14% (61: 431) | 10% (125: 1194) | <.001 |
| Edibles | 61% (262: 429) | 62% (737: 1197) | <.001 |
| Flower | 74% (321: 432) | 73% (870: 1187) | .187 |
| Hash / Kief | 20% (87: 430) | 19% (221: 1186) | <.001 |
| Oils, Oral | 25% (106: 428) | 26% (311: 1194) | <.001 |
| Oils, Vaporized | 36% (154: 431) | 41% (493: 1194) | <.001 |
| Tinctures | 13% (57: 429) | 15% (175: 1188) | <.001 |
| Topicals | 15% (65: 429) | 25% (299: 1187) | <.001 |

Notes for Tables III.D.4. and III.D.5.:

Methods of cannabis consumption. Respondents were asked "Have you used marijuana in any of the following ways?" Response items were presented individually.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.D.5. Methods of Consumption: Gender

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | **430** | **1170** | **11** | **15** | |
| Concentrates | 19% (81: 429) | 13% (151: 1165) | 27% (3: 11) | 40% (6: 15) | .001 |
| Drinks | 14% (60: 430) | 10% (117: 1170) | 0% (0: 11) | 43% (6:14) | <.001 |
| Edibles | 61% (261: 428) | 61% (715: 1172) | 64% (7/: 11) | 67% (10: 15) | .977 |
| Flower | 75% (323: 431) | 73% (849: 1163) | 73% (8: 11) | 64% (9: 14) | .809 |
| Hash / Kief | 21% (90: 429) | 18% (209: 1162) | 18% (2: 11) | 36% (5: 14) | .320 |
| Oils, Oral | 25% (107: 427) | 26% (304: 1170) | 27% (3: 11) | 21% (3: 14) | .940 |
| Oils, Vaporized | 36% (155: 430) | 41% (480: 1170) | 45% (5: 11) | 57% (8: 14) | .139 |
| Tinctures | 13% (56: 428) | 15% (175: 1163) | 27% (3: 11) | 13% (2: 15) | .481 |
| Topicals | 16% (69: 429) | 25% (290: 1161) | 36% (4: 11) | 27% (4: 15) | .001 |

## Table III.D.6. Methods of Consumption: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | White | Other | *p* |
|---|---|---|---|---|---|---|
| ***N*** | **27** | **122** | **13** | **1361** | **103** | |
| Concentrates | 11% (3/27) | 16% (20: 122) | 25% (3/12) | 15% (203: 1356) | 18% (19: 103) | .632 |
| Drinks | 10% (3/29) | 21% (26: 121) | 25% (3/12) | 10% (136: 1361) | 16% (16: 102) | .001 |
| Edibles | 66% (19/29) | 59% (71: 121) | 64% (7/11) | 61% (831: 1362) | 70% (72: 103) | .424 |
| Flower | 75% (21/28) | 74% (90: 121) | 77% (10/13) | 73% (991: 1357) | 79% (79: 100) | .778 |
| Hash / Kief | 15% (4/26) | 19% (23: 121) | 38% (5/13) | 19% (257: 1354) | 22% (22: 102) | .421 |
| Oils, Oral | 25% (7/28) | 20% (24: 121) | 23% (3/13) | 27% (367: 1360) | 17% (17: 100) | .124 |
| Oils, Vaporized | 55% (16/29) | 40% (48: 121) | 54% (7/13) | 39% (531: 1361) | 39% (39: 101) | .399 |
| Tinctures | 7% (2/27) | 10% (12: 121) | 31% (4/13) | 15% (203: 1353) | 9% (9: 103) | .056 |
| Topicals | 22% (6/27) | 16% (19: 120) | 8% (1/12) | 23% (312: 1355) | 21% (21: 102) | .261 |

Notes for Tables III.D.5 and III.D.6.:

Methods of cannabis consumption. Respondents were asked “Have you used marijuana in any of the following ways?” Response items were presented individually.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.D.7. Methods of Consumption: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Don't know/Refuse | *p* |
|---|---|---|---|---|
| ***N*** | **174** | **1426** | **20** | |
| Concentrates | 23% (40: 174) | 14% (200: 1426) | 5% (1: 20) | .004 |
| Drinks | 18% (31: 172) | 11% (158: 1433) | 15% (3: 20) | .014 |
| Edibles | 59% (103: 174) | 62% (889: 1433 | 58% (11: 19) | .767 |
| Flower | 77% (132: 172) | 74% (1057: 1428) | 47% (9: 19) | .022 |
| Hash / Kief | 25% (43: 173) | 18% (256: 1424) | 11% (2: 19) | .083 |
| Oils, Oral | 28% (49: 173) | 26% (372: 1430) | 21% (4: 19) | .735 |
| Oils, Vaporized | 46% (79: 172) | 39% (559: 1434) | 53% (10: 19) | .107 |
| Tinctures | 17% (30: 174) | 14% (199: 1423) | 0% (0: 20) | .102 |
| Topicals | 24% (41: 173) | 22% (313: 1424) | 16% (3: 19) | .729 |

## Table III.D.8. Methods of Consumption: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | **583** | **566** | **435** | **43** | |
| Concentrates | 17% (99/580) | 16% (88/565) | 11% (50/433) | 14% (6/42) | .104 |
| Drinks | 10% (60/583) | 11% (65/566) | 13% (55/435) | 15% (6/41) | .617 |
| Edibles | 62% (360/583) | 59% (337/566) | 64% (279/434) | 53% (23/43) | .319 |
| Flower | 78% (450/579) | 75% (422/564) | 68% (294/435) | 61% (25/41) | <.001 |
| Hash / Kief | 23% (134/580) | 19% (109/563) | 14% (59/433) | 15% (6/40) | .002 |
| Oils, Oral | 26% (153/582) | 24% (135/564) | 28% (122/435) | 17% (7/41) | .276 |
| Oils, Vaporized | 43% (250/583) | 40% (225/565) | 36% (155/434) | 39% (17/43) | .149 |
| Tinctures | 16% (93/578) | 13% (72/564) | 15% (64/433) | 7% (3/42) | .220 |
| Topicals | 24% (138/580) | 20% (114/562) | 24% (104/433) | 19% (8/41) | .405 |

Notes for Tables III.D.7. and III.D.8.:

Methods of cannabis consumption. Respondents were asked "Have you used marijuana in any of the following ways?" Response items were presented individually. For Table III.D.8., Income adequacy refers to metric assessing subjective socioeconomic status ("income").

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## E. Sources of Cannabis

### 1. Source of Cannabis Access

The ICPS asks participants to report where they source their products. The three most popular sources of cannabis in the Massachusetts samples are from a family member/friend (65%), licensed dispensary (47%), and an unlicensed dealer through the illicit market (28%). Notably, 48% of 16-20-year-olds and 41% of 21-25-year-olds reported purchasing their products from an unlicensed dealer. When comparing students to non-students of any age, we observe that 38% of students report buying from an unlicensed dealer, compared to 26% of non-students. Students are also less likely to purchase from a licensed retailer (35%) when compared to non-students (50%).

**Table III.E.1.1. Source of Cannabis Access: Age**

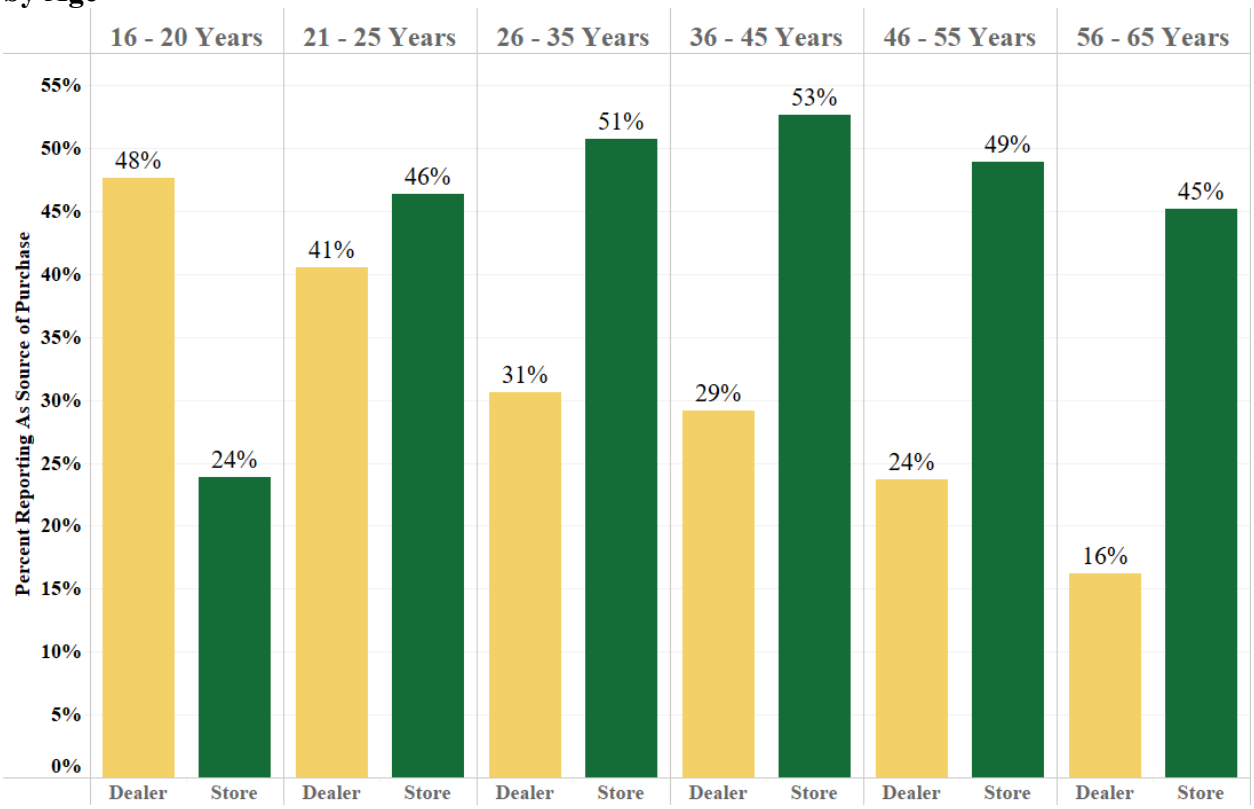
| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | **130** | **138** | **402** | **374** | **274** | **321** | |
| Dealer | 48% (62: 130) | 41% (56: 138) | 31% (109: 402) | 29% (109: 374) | 24% (109: 274) | 16% (52: 321) | <.001 |
| Delivery service | 5% (7: 130) | 7% (10: 138) | 7% (28: 402) | 6% (21: 374) | 4% (11: 274) | 6% (20: 321) | .671 |
| Family or friend | 71% (92: 130) | 61% (84: 138) | 62% (250: 402) | 67% (250: 374) | 61% (168: 274) | 67% (215: 321) | .226 |
| Self-grown | 3% (4: 130) | 7% (10: 138) | 8% (34: 402) | 14% (51: 374) | 8% (23: 274) | 12% (37: 321) | .005 |
| Licensed store | 24% (31: 130) | 46% (64: 138) | 51% (204: 402) | 53% (197: 374) | 49% (134: 274) | 45% (145: 321) | <.001 |

Notes for Table III.E.1.:

Respondents were asked: "In the past 12 months, have you gotten any type of marijuana from the following sources? (select all that apply). Licensed Delivery for the nonmedical adult-use market was not operational yet in Massachusetts during time of ICPS data collection, thus, this metric likely captures both illicit market and medical market delivery services.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

**Figure III.E.1.2. Source of Cannabis Access: Percent Reporting Dealer or Licensed Store by Age**




Notes for Figure III.E.1.2.:

Figure represents the percent of individuals from each group reporting sourcing cannabis from either an unlicensed dealer (yellow) or licensed entity (green).

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.E.1.3. Source of Cannabis Access: Student Status (Any)

| Cannabis use variable | Student | Non-student | Don't know/ Refuse | *p* |
|---|---|---|---|---|
| ***N*** | **260** | **1323** | **56** | |
| Dealer | 38% (99: 260) | 26% (344: 1323) | 43% (24: 56) | <.001 |
| Delivery service | 7% (19: 260) | 6% (75: 1323) | 5% (3: 56) | .583 |
| Family or friend | 63% (165: 260) | 65% (856: 1323) | 68% (38: 56) | .814 |
| Self-grown | 9% (23: 260) | 10% (130: 1323) | 11% (6: 56) | .858 |
| Licensed store | 35% (90: 260) | 50% (655: 1323) | 54% (30: 56) | <.001 |

## Table III.E.1.4. Source of Cannabis Access: Sex

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| ***N*** | **437** | **1202** | |
| Dealer | 30% (133: 437) | 28% (334: 1202) | .294 |
| Delivery service | 6% (27: 437) | 6% (70: 1202) | .788 |
| Family or friend | 59% (257: 437) | 67% (802: 1202) | .003 |
| Self-grown | 13% (58: 437) | 8% (101: 1202) | .003 |
| Licensed store | 49% (213: 437) | 47% (562: 1202) | .477 |

## Table III.E.1.5 Source of Cannabis Access: Gender

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | **436** | **1177** | **11** | **15** | |
| Dealer | 31% (134/436) | 28% (325:1177) | 27% (3:11) | 33% (5:15) | .637 |
| Delivery service | 6% (26/436) | 6% (69:1177) | 18% (2:11) | 0% (0:15) | .270 |
| Family or friend | 59% (258:436) | 67% (787:1177) | 73% (8:11) | 40% (6:15) | .006 |
| Self-grown | 13% (59:436) | 8% (100:1177) | 0% (0:11) | 0% (0:15) | .007 |
| Licensed store | 49% (212:436) | 47% (554:1177) | 45% (5:11) | 27% (4:15) | .406 |

Notes for Tables III.E.1.3., III.E.1.4., and III.E.1.5.:

Respondents were asked: "In the past 12 months, have you gotten any type of marijuana from the following sources? (select all that apply). Licensed Delivery for the nonmedical adult-use market was not operational yet in Massachusetts during time of ICPS data collection, thus, this metric likely captures both illicit market and medical market delivery services.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.E.1.6. Source of Cannabis Access: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | White | Other | *p* |
|---|---|---|---|---|---|---|
| ***N*** | **29** | **123** | **14** | **1369** | **104** | |
| Dealer | 24% (7: 29) | 47% (58: 123) | 64% (9: 14) | 27% (370: 1369) | 29% (30: 104) | <.001 |
| Delivery service | 14% (4: 29) | 9% (11: 123) | 14% (2: 14) | 5% (68: 1369) | 5% (5: 104) | .102 |
| Family or friend | 72% (21: 29) | 59% (73: 123) | 71% (10: 14) | 65% (890: 1369) | 59% (61: 104) | .287 |
| Self-grown | 0% (0: 29) | 7% (9: 123) | 7% (1: 14) | 10% (137: 1369) | 12% (13: 104) | .284 |
| Licensed store | 41% (12: 29) | 40% (49: 123) | 50% (7: 14) | 48% (657: 1369) | 42% (44: 104) | .294 |

## Table III.E.1.7. Source of Cannabis Access: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Don't know/Refuse | *p* |
|---|---|---|---|---|
| ***N*** | **178** | **1439** | **22** | |
| Dealer | 42% (75: 178) | 27% (389: 1439) | 14% (3: 22) | <.001 |
| Delivery service | 6% (14: 178) | 6% (86: 1439) | 0% (0: 22) | .484 |
| Family or friend | 61% (109: 178) | 65% (935: 1439) | 41% (9: 22) | .060 |
| Self-grown | 12% (21: 178) | 9% (129: 1439) | 14% (3: 22) | .485 |
| Licensed store | 42% (75: 178) | 48% (691: 1439) | 41% (9: 22) | .217 |

## Table III.E.1.8. Source of Cannabis Access: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | **587** | **572** | **435** | **45** | |
| Dealer | 31% (185: 587) | 28% (159: 572) | 26% (114: 435) | 20% (9: 45) | .140 |
| Delivery service | 6% (37: 587) | 6% (35: 572) | 5% (24: 435) | 2% (1: 45) | .700 |
| Family or friend | 70% (410: 587) | 63% (363: 572) | 60% (263: 435) | 51% (23: 45) | .003 |
| Self-grown | 9% (56: 587) | 9% (54: 572) | 11% (46: 435) | 7% (3: 5) | .822 |
| Licensed store | 43% (251: 587) | 51% (294: 572) | 50% (219: 435) | 24% (11/45) | <.001 |

Notes for Tables III.E.1.6., III.E.1.7., and III.E.1.8.:

Respondents were asked: "In the past 12 months, have you gotten any type of marijuana from the following sources? (Select all that apply). Licensed Delivery for the nonmedical adult-use market was not operational yet in Massachusetts during time of ICPS data collection, thus, this metric likely captures both illicit market and medical market delivery services.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## 2. Legal vs. Illicit Market Sourcing

a) Legal Market Sourcing

The ICPS asks respondents to estimate what percentage of cannabis they purchased in the past year was derived from legal sources. According to the responses, approximately 64% of all cannabis products were sourced from the legal markets.

**Table III.E.2. a.1. Percent of Cannabis Purchased Legally**

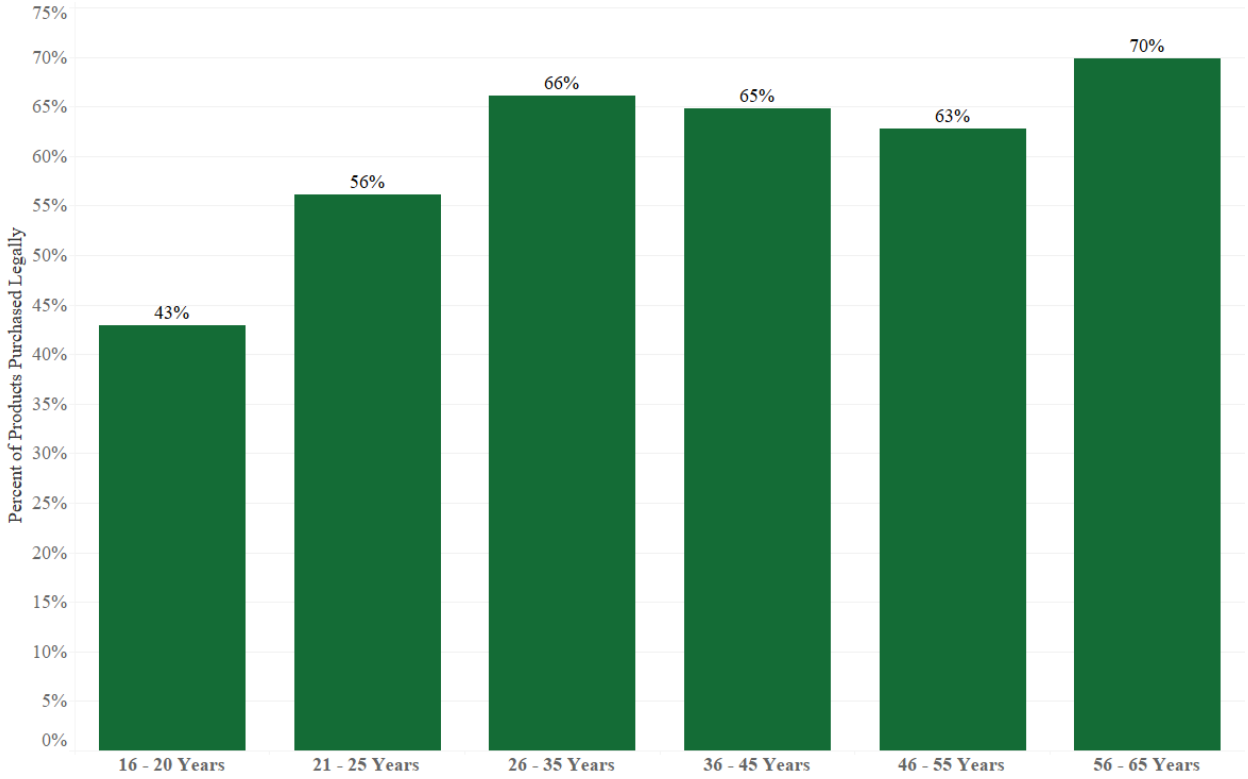
| Cannabis use variable | *N* | Percent Obtained Legally |
|---|---|---|
| Flower | 896 | 52% |
| Edibles | 703 | 66% |
| Oils, Vaporized | 462 | 61% |
| Topicals | 247 | 86% |
| Oils, Oral | 203 | 83% |
| Tinctures | 159 | 77% |
| Concentrate | 137 | 58% |
| **Drinks** | 99 | 62% |

Notes for Table III.E.2.a.1:

Percentages represent cannabis obtained legally by *mode of consumption*. Respondents were asked "Overall, about what percentage (%) of the [mode of consumption] that you used in the past 12 months came from [legal, authorized] sources?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

**Figure III.E.2. a.2. Percent of Cannabis Purchased Legally, by Age Cohort**




Notes for Figure III.E.2.a.2:

Percentages represent cannabis overall obtained legally by *age cohort*. Respondents were asked "Overall, about what percentage (%) of the [mode of consumption] that you used in the past 12 months came from [legal, authorized] sources?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

a) Reasons for Avoiding Legal Purchase

The ICPS asks respondents about reasons for purchases from licensed versus unlicensed sources. Respondents reported high prices (34%), less convenience (20%), and the licensed retailer being too far from them (23%) as reasons for using unlicensed sources for cannabis.

**Table III.E.2.b.1. Reasons for Avoiding Legal Cannabis Purchase: Age**

| Cannabis use variable | 16-20 year | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | **111** | **107** | **298** | **260** | **186** | **220** | |
| High Prices | 27% (30: 111) | 32% (34: 107) | 37% (111: 298) | 39% (101: 260) | 30% (55: 186) | 34% (74: 220) | .140 |
| Less Convenient | 13% (15: 111) | 25% (27: 107) | 19% (57: 298) | 24% (62: 260) | 20% (38: 186) | 18% (39: 220) | .160 |
| Too Far | 13% (15: 111) | 15% (16: 107) | 13% (38: 298) | 15% (38: 260) | 9% (17: 186) | 12% (27: 220) | .616 |
| Dealer Loyalty | 17% (19: 111) | 22% (24: 107) | 13% (39: 298) | 11% (28: 260) | 8% (15: 186) | 8% (17: 220) | <.001 |
| Not Anonymous | 17% (19: 111) | 10% (11: 107) | 9% (27: 298) | 14% (36: 260) | 10% (18: 186) | 9% (20: 220) | .122 |
| Requires ID | 25% (28: 111) | 7% (8: 107) | 5% (14: 298) | 7% (18: 260) | 2% (4: 186) | 4% (10: 220) | <.001 |
| Product not offered legally | 4% (4: 111) | 10% (11: 107) | 5% (15: 298) | 5% (13: 260) | 3% (6: 186) | 3% (6: 220) | .056 |
| Cannot buy legally | 15% (17: 111) | 6% (6: 107) | 3% (9: 298) | 3% (7: 260) | 2% (4: 186) | 1% (3: 220) | <.001 |
| Low quality in legal market | 4% (5: 111) | 6% (7: 107) | 3% (9: 298) | 5% (12: 260) | 2% (4: 186) | 4% (9: 220) | .465 |
| Low supply in legal market | 4% (5: 111) | 7% (8: 107) | 4% (13: 298) | 7% (18: 260) | 2% (3: 186) | 2% (5: 220) | .033 |

Notes for Table III.E.2.b.1:

Percentages represent cannabis overall obtained legally by *age cohort*. Respondents were asked "Overall, about what percentage (%) of the [mode of consumption] that you used in the past 12 months came from [legal, authorized] sources?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.E.2.b.2. Reasons for Avoiding Legal Cannabis Purchase: Student Status (Any)

| Cannabis use variable | Non-Student | Student | Unstated | *p* |
|---|---|---|---|---|
| ***N*** | **931** | **203** | **48** | |
| High Prices | 35% (331: 931) | 28% (57: 203) | 35% (17: 48) | .125 |
| Less Convenient | 21% (198: 931) | 15% (30: 203) | 21% (10: 48) | .112 |
| Too Far | 12% (115: 931) | 13% (27: 203) | 19% (9: 48) | .420 |
| Dealer Loyalty | 12% (111: 931) | 12% (24: 203) | 15% (7: 48) | .855 |
| Not Anonymous | 10% (90: 931) | 17% (34: 203) | 15% (7: 48) | .010 |
| Requires ID | 5% (44: 931) | 18% (37: 203) | 2% (1: 48) | <.001 |
| Product not offered legally | 4% (37: 931) | 7% (14: 203) | 8% (4: 48) | .094 |
| Cannot buy legally | 3% (24: 931) | 9% (19: 203) | 6% (3: 48) | <.001 |
| Low quality in legal market | 4% (34: 931) | 4% (9: 203) | 6% (3: 48) | .602 |
| Low supply in legal market | 4% (37: 931) | 5% (11: 203) | 8% (4: 48) | .264 |

## Table III.E.2.b.3. Reasons for Avoiding Legal Cannabis Purchase: Sex

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| ***N*** | **309** | **873** | |
| High Prices | 36% (110: 309) | 34% (295: 873) | .565 |
| Less Convenient | 17% (53: 309) | 21% (185: 873) | .128 |
| Too Far | 12% (37: 309) | 13% (114: 873) | .624 |
| Dealer Loyalty | 14% (42: 309) | 11% (100: 873) | .321 |
| Not Anonymous | 13% (41: 309) | 10% (90: 873) | .155 |
| Requires ID | 6% (19: 309) | 7% (63: 873) | .526 |
| Product not offered legally | 7% (19: 309) | 4% (34: 873) | .037 |
| Cannot buy legally | 4% (38: 873) | 3% (8: 309) | .169 |
| Low quality in legal market | 5% (16: 309) | 3% (30: 873) | .174 |
| Low supply in legal market | 5% (15: 309) | 4% (37: 873) | .650 |

Notes for Table III.E.2.b.2 and III.E.2.b.3.:

Respondents were asked “What were the main reasons you bought from illegal/unauthorized sources instead of legal/authorized sources? (please select all that apply).” Percent represents proportion of respondents answering “Yes.”

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.E.2.b.4. Reasons for Avoiding Legal Cannabis Purchase: Gender

| Cannabis use variable | Man | Other | Unstated | Woman | p |
|---|---|---|---|---|---|
| ***N*** | **308** | **6** | **14** | **854** | |
| High Prices | 36% (111: 308) | 50% (3: 6) | 21% (3: 14) | 34% (288: 854) | .528 |
| Less Convenient | 17% (53: 308) | 33% (2: 6) | 7% (1: 14) | 21% (182: 854) | .213 |
| Too Far | 12% (37: 308) | 33% (2: 6) | 7% (1: 14) | 13% (111: 854) | .412 |
| Dealer Loyalty | 14% (43: 308) | 50% (3: 6) | 7% (1: 14) | 11% (95: 854) | .016 |
| Not Anonymous | 13% (40: 308) | 0% (0: 6) | 0% (0: 14) | 11% (91: 854) | .286 |
| Requires ID | 6% (19: 308) | 33% (2: 6) | 0% (0: 14) | 7% (61: 854) | .049 |
| Product not offered legally | 7% (22: 308) | 0% (0: 6) | 0% (0: 14) | 4% (33: 854) | .091 |
| Cannot buy legally | 3% (8: 308) | 17% (1: 6) | 7% (1: 14) | 4% (36: 854) | .201 |
| Low quality in legal market | 5% (16: 308) | 0% (0: 6) | 0% (0: 14) | 3% (30: 854) | .470 |
| Low supply in legal market | 5% (15: 308) | 0% (0: 6) | 0% (0: 14) | 4% (37: 854) | .780 |

## Table III.E.2.b.5. Reasons for Avoiding Legal Cannabis Purchase: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Islander | Other/ 2+ Races | White | *p* |
|---|---|---|---|---|---|---|
| ***N*** | **20** | **101** | **14** | **84** | **963** | |
| High Prices | 40% (8: 20) | 29% (29: 101) | 43% (6: 14) | 27% (23: 84) | 35% (339: 963) | .371 |
| Less Convenient | 30% (6: 20) | 24% (24: 101) | 21% (3: 14) | 18% (15: 84) | 20% (190: 963) | .660 |
| Too Far | 10% (2: 20) | 18% (18: 101) | 14% (2: 14) | 17% (14: 84) | 12% (115: 963) | .378 |
| Dealer Loyalty | 15% (3: 20) | 23% (23: 101) | 14% (2: 14) | 11% (9: 84) | 11% (105: 963) | .013 |
| Not Anonymous | 20% (4: 20) | 18% (18: 101) | 14% (2: 14) | 13% (11: 84) | 10% (96: 963) | .092 |
| Requires ID | 15% (3: 20) | 11% (11: 101) | 7% (1: 14) | 11% (9: 84) | 6% (58: 963) | .109 |
| Product not offered legally | 10% (1: 20) | 9% (9: 101) | 0% (0: 14) | 8% (7: 84) | 4% (37: 963) | .040 |
| Cannot buy legally | 5% (1: 20) | 12% (12: 101) | 0% (0: 14) | 1% (1: 84) | 3% (32: 963) | .001 |
| Low quality in legal market | 5% (1: 20) | 5% (5: 101) | 0% (0: 14) | 6% (5: 84) | 4% (35: 963) | .726 |
| Low supply in legal market | 0% (0: 20) | 9% (9: 101) | 7% (1: 14) | 3% (2: 84) | 4% (40: 963) | .135 |

Notes: Respondents were asked “What were the main reasons you bought from illegal/unauthorized sources instead

Notes for Table III.E.2.b.4 and III.E.2.b.5.:

Respondents were asked “What were the main reasons you bought from illegal/unauthorized sources instead of legal/authorized sources? (please select all that apply).” Percent represents proportion of respondents answering “Yes.”

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.E.2.b.6. Reasons for Avoiding Legal Cannabis Purchase: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| ***N*** | **148** | **1015** | **19** | |
| High Prices | 35% (52: 148) | 35% (353: 1015) | 0% (0: 19) | .006 |
| Less Convenient | 20% (29: 148) | 21% (209: 1015) | 0% (0: 19) | .084 |
| Too Far | 12% (18: 148) | 13% (132: 1015) | 5% (1: 19) | .589 |
| Dealer Loyalty | 16% (24: 148) | 12% (118: 1015) | 0% (0: 19) | .074 |
| Not Anonymous | 29% (28: 148) | 10% (103: 1015) | 0% (0: 19) | .002 |
| Requires ID | 9% (13: 148) | 7% (67: 1015) | 10% (2: 19) | .513 |
| Product not offered legally | 9% (13: 148) | 4% (41: 1015) | 5% (1: 19) | .037 |
| Cannot buy legally | 7% (10: 148) | 3% (36: 1015) | 0% (0: 19) | .114 |
| Low quality in legal market | 6% (9: 148) | 3% (36: 1015) | 5% (1: 19) | .315 |
| Low supply in legal market | 5% (7: 148) | 4% (44: 1015) | 5% (1: 19) | .960 |

## Table III.E.2.b.7. Reasons for Avoiding Legal Cannabis Purchase: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Don't know | *p* |
|---|---|---|---|---|---|
| ***N*** | **450** | **400** | **296** | **36** | |
| High Prices | 39% (176: 450) | 33% (133: 400) | 31% (92: 296) | 11% (4: 36) | .002 |
| Less Convenient | 21% (95: 450) | 18% (74: 400) | 22% (66: 296) | 8% (3: 36) | .180 |
| Too Far | 15% (70: 450) | 10% (42: 400) | 13% (39: 296) | 0% (0: 36) | .016 |
| Dealer Loyalty | 14% (63: 450) | 10% (40: 400) | 12% (37: 296) | 5% (2: 36) | .195 |
| Not Anonymous | 10% (45: 450) | 11% (45: 400) | 13% (38: 296) | 8% (3: 36) | .627 |
| Requires ID | 7% (34: 450) | 7% (30: 400) | 6% (17: 296) | 3% (1: 36) | .557 |
| Product not offered legally | 5% (21: 450) | 4% (15: 400) | 6% (18: 296) | 3% (1: 36) | .498 |
| Cannot buy legally | 3% (14: 450) | 4% (17: 400) | 5% (14: 296) | 3% (1: 36) | .673 |
| Low quality in legal market | 4% (20: 450) | 3% (13: 296) | 3% (13: 296) | 0% (0: 36) | .483 |
| Low supply in legal market | 5% (22: 450) | 4% (15: 400) | 4% (13: 296) | 5% (2: 36) | .857 |

Notes for Table III.E.2.b.6 and III.E.2.b.7.:

Respondents were asked "What were the main reasons you bought from illegal/unauthorized sources instead of legal/authorized sources? (please select all that apply)." Percent represents proportion of respondents answering "Yes."

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## F. Cannabis Knowledge and Social Norms

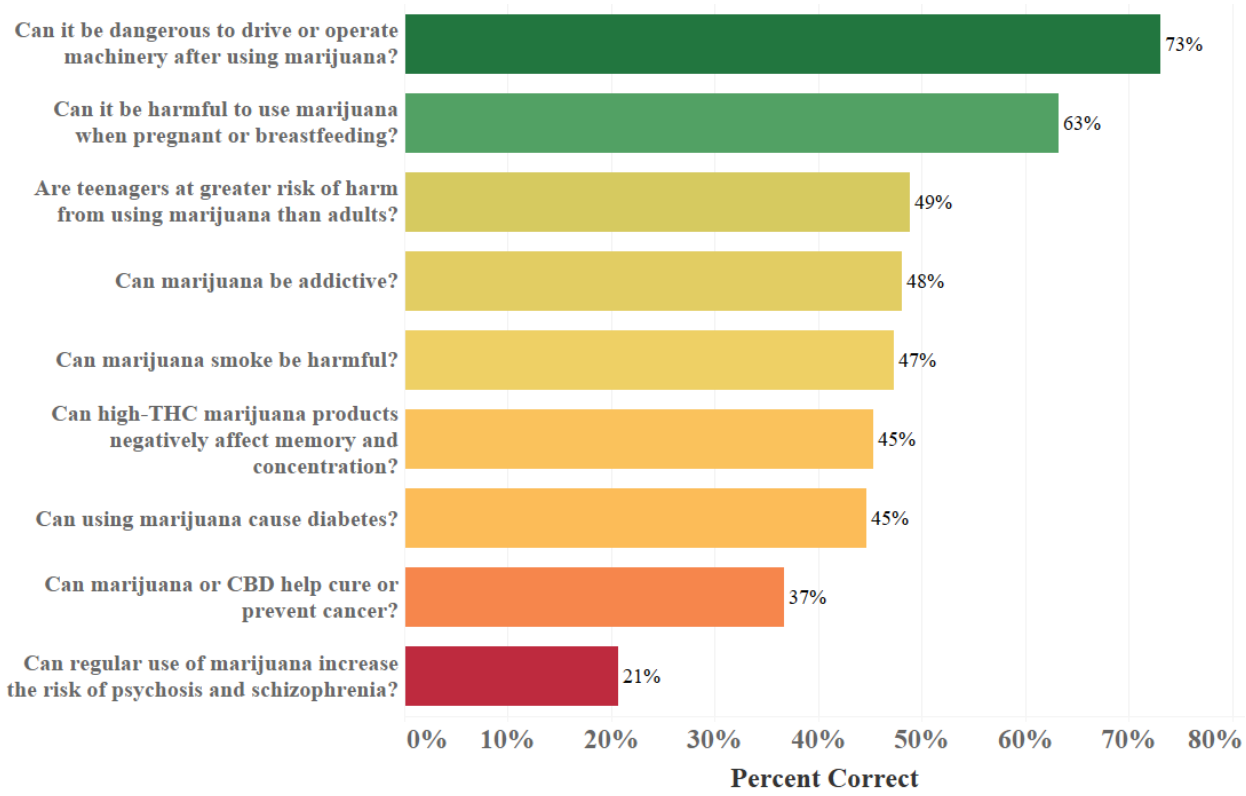
### 1. Cannabis Knowledge

The survey assessed general knowledge and social norms of Massachusetts residents surrounding cannabis, including respondents' favorability of legal cannabis, knowledge of the health effects, and how many of their closest five friends use cannabis. The survey asks participants whether they felt cannabis should be legal and participants could answer: "Legal," "Illegal," "Refuse to Answer," or "Don't Know." It should be noted that Massachusetts has already enacted medical and adult-use cannabis regulations, so this question serves to gauge the public's support for current policies. For the purposes of this question, we report the percentage of respondents who answered that cannabis should be "Legal." Residents overall approve of cannabis, with 65% (2527: 3888) in favor of legal non-medical adult-use cannabis. Subjective approval for legal cannabis notably varied as a function of race. Both white individuals, and those who reported belonging to two or more races, more often approved of legalization, with two thirds of each group (66%) reporting in favor of cannabis legalization. Additionally, just over half of Asian individuals (52%) reported they were in favor of legal cannabis. We observe no significant differences in any other demographic.

The survey also asked participants a series of nine questions about the side effects of cannabis as generally understood by North American researchers. The Commission used these nine questions to form one "cannabis knowledge" variable represented by the percent of cannabis health questions answered correctly. Knowledge of generally accepted side effects was low regardless of demographic group. Participants answered 47% of this set of questions correctly.

However, almost three quarters (73%) of respondents showed knowledge about cannabis' intoxicating effects that make driving or operating machinery dangerous. Conversely, 21% of respondents demonstrated knowledge that regularly using cannabis could increase the risk of psychosis and schizophrenia.

**Figure III.F.1 Questions about Side Effects: Percent Correct by Question**




See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics

## 2. Social Norms

To assess social norms, the ICPS survey asks respondents their five closest friends' cannabis use. On average, respondents report between two to three out of five friends using cannabis.

**Table III.F.1. Cannabis Knowledge and Social Norms: Age**

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | **266** | **250** | **896** | **910** | **971** | **1321** | |
| Should cannabis be legal? | 61% (126: 207) | 70% (175: 250) | 67% (506: 751) | 64% (486: 764) | 64% (521: 809) | 64% (713: 1107) | .213 |
| Questions about side effects | 47% (266) | 41% (312) | 43% (896) | 46% (910) | 50% (971) | 51% (1321) | <.001 |
| Friends Using (Of Top 5) | 3.03 (185) | 2.92 (239) | 2.93 (648) | 2.83 (577) | 2.63 (549) | 2.55 (674) | <.001 |

**Table III.F.2. Cannabis Knowledge and Social Norms: Student Status (Any)**

| Cannabis use variable | Student | Non-Student | Don't Know/Refuse | *p* |
|---|---|---|---|---|
| ***N*** | **487** | **3310** | **91** | |
| Should cannabis be legal? | 65% (319: 487) | 65% (2148: 3310) | 66% (60: 91) | .949 |
| Questions about side effects | 46% (604) | 48% (3954) | 41% (118) | .582 |
| Friends Using (Of Top 5) | 2.92 (430) | 2.73 (2365) | 3.18 (77) | .001 |

Notes for Tables III.F.1 and III.F.2:

Summary of questions ("metrics") included in tables:

1. **Should cannabis be legal?**: "Should the use of recreational (non-medical) marijuana be (legal/illegal)?" Response represents percent reporting "Legal."
2. **Questions about side effects:** The percent of questions about cannabis answered correctly. Respondents were asked nine questions about the health effects of cannabis with scientifically supported correct answers.
3. **Friends Using (Of Top 5)**: "How many of your five closest friends use marijuana?" Represents the average.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.F.3. Cannabis Knowledge and Social Norms: Sex

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| ***N*** | **1142** | **2746** | |
| Should cannabis be legal? | 67% (767: 1142) | 64% (1760: 2746) | .068 |
| Questions about side effects | 46% (1315) | 48% (3361) | .091 |
| Friends Using (Of Top 5) | 2.76 (783) | 2.78 (2089) | .735 |

## Table III.F.4. Cannabis Knowledge and Social Norms: Gender

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | **1139** | **2715** | **23** | **11** | |
| Should cannabis be legal? | 67% (766: 1139) | 64% (1735: 2715) | 83% (19: 23) | 64% (7: 11) | .068 |
| Questions about side effects | 47% (1305) | 48% (3310) | 56% (23) | 21% (38) | <.001 |
| Friends Using (Of Top 5) | 2.76 (784) | 2.78 (2050) | 2.50 (22) | 3.06 (16) | .666 |

Notes for Tables III.F.3 and III.F.4:

Summary of questions ("metrics") included in tables:

1. **Should cannabis be legal?**: "Should the use of recreational (non-medical) marijuana be (legal/illegal)?" Response represents percent reporting "Legal."
2. **Questions about side effects:** The percent of questions about cannabis answered correctly. Respondents were asked nine questions about the health effects of cannabis with scientifically supported correct answers.
3. **Friends Using (Of Top 5)**: "How many of your five closest friends use marijuana?" Represents the average.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.F.5. Cannabis Knowledge and Social Norms: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | White | Other | *p* |
|---|---|---|---|---|---|---|
| ***N*** | **221** | **270** | **38** | **3887** | **260** | |
| Should cannabis be legal? | 52% (84: 160) | 63% (135: 213) | 57% (17: 30) | 66% (2165: 3293) | 66% (126: 192) | .011 |
| Questions about side effects | 49% (221) | 42% (270) | 38% (38) | 48% (3887) | 45% (260) | <.001 |
| Friends Using (Of Top 5) | 2.51 (84) | 3.28 (176) | 2.81 (27) | 2.72 (2428) | 3.08 (157) | <.001 |

## Table III.F.6. Cannabis Knowledge and Social Norms: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| ***N*** | **395** | **4222** | **59** | |
| Should cannabis be legal? | 66% (211: 319) | 65% (2293: 3535) | 68% (23: 34) | .854 |
| Questions about side effects | 42% (395) | 48% (4222) | 39% (59) | <.001 |
| Friends Using (Of Top 5) | 3.12 (299) | 2.73 (2552) | 2.52 (21) | <.001 |

## Table III.F.7. Cannabis Knowledge and Social Norms: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | **1394** | **1639** | **1495** | **148** | |
| Should cannabis be legal? | 65% (768: 1177) | 64% (854: 1342) | 66% (862: 1298) | 60% (43: 71) | .411 |
| Questions about side effects | 46% (1394) | 46% (1639) | 51% (1495) | 33% (148) | <.001 |
| Friends Using (Of Top 5) | 2.95 (963) | 2.77 (974) | 2.57 (879) | 2.77 (56) | <.001 |

Notes for Tables III.F.5, III.F.6., and III.F.7.:

Summary of questions ("metrics") included in tables:

1. **Should cannabis be legal?**: "Should the use of recreational (non-medical) marijuana be (legal/illegal)?" Response represents percent reporting "Legal."
2. **Questions about side effects:** The percent of questions about cannabis answered correctly. Respondents were asked nine questions about the health effects of cannabis with scientifically supported correct answers.
3. **Friends Using (Of Top 5)**: "How many of your five closest friends use marijuana?" Represents the average.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## G. Risky Behaviors

### 1. Driving Behaviors

The survey assessed respondents' driving behaviors related to cannabis. Questions included whether they have driven a vehicle within two hours of using cannabis ("Cannabis Driver"), whether they have been a passenger to someone driving a vehicle within two hours of using cannabis ("Passenger to Cannabis Driver"), and if they had created a driving plan (e.g., designated driver, taxi, Uber/Lyft, etc.) to avoid driving after using cannabis ("Driving Plan").

Approximately 14% of participants report driving within two hours of using cannabis in the past year. Twenty percent report having been the passenger to a driver that had used cannabis in the prior two hours. Forty-four percent of respondents report creating a driving plan to avoid having to drive after using cannabis.

## Table III.G.1.1. Driving and Riding: Age

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | 146 | | | | | | |
| Cannabis Driver | 20% (30: 146) | 21% (34: 158) | 18% (113: 613) | 18% (107: 587) | 11% (72: 640) | 7% (71: 945) | <.001 |
| Passenger to Cannabis Driver | 32% (93: 287) | 39% (86: 221) | 28% (227: 818) | 23% (186: 821) | 14% (126: 873) | 12% (140: 1206) | <.001 |
| Driving Plan | 50% (68: 137) | 54% (80: 149) | 54% (314: 581) | 47% (268: 571) | 39% (242: 621) | 36% (327: 907) | <.001 |

## Table III.G.1.2. Driving and Riding: Student Status (Any)

| Cannabis use variable | Student | Non-Student | Unstated | *p* |
|---|---|---|---|---|
| Cannabis Driver | 25% (86: 341) | 12% (331: 2668) | 12% (10: 80) | <.001 |
| Passenger to Cannabis Driver | 34% (184: 545) | 18% (646: 3580) | 28% (28: 101) | <.001 |
| Driving Plan | 50% (162: 322) | 42% (1085: 2568) | 68% (52: 76) | <.001 |

Notes for Tables III.G.1.1. and III.G.1.2.:

Percent represents the proportion of individuals answering "yes" to each of the following questions:

1. **Cannabis Driver**: "Have you ever driven a vehicle (e.g., car, snowmobile, motorboat, or an off-road vehicle (ATV)) within 2 hours of using marijuana?"
2. **Passenger to Cannabis Driver: "**Have you ever been a passenger in a vehicle (e.g., car, snowmobile, motorboat, or an off-road vehicle (ATV) driven by someone who had been using marijuana in the last 2 hours?"
3. **Driving Plan**: "Have you ever planned ahead or decided NOT to drive to avoid driving high?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.G.1.3. Driving and Riding: Sex

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| Cannabis Driver | 18% (156: 861) | 12% (271: 2228) | <.001 |
| Passenger to Cannabis Driver | 19% (222: 1162) | 21% (636: 3064) | <.001 |
| Driving Plan | 41% (348: 838) | 45% (951: 2128) | <.001 |

## Table III.G.1.4. Driving and Riding: Gender

| Cannabis use variable | Man | Woman | Unstated | Other | *p* |
|---|---|---|---|---|---|
| Cannabis Driver | 18% (157: 861) | 12% (266: 2205) | 37% (3: 8) | 7% (1: 15) | <.001 |
| Passenger to Cannabis Driver | 19% (223: 1158) | 21% (623: 3029) | 40% (6: 15) | 25% (6: 24) | .184 |
| Driving Plan | 41% (345: 837) | 45% (942: 2109) | 33% (2: 6) | 71% (10: 14) | .057 |

Notes for Tables III.G.1.3. and III.G.1.4.:

Percent represents the proportion of individuals answering "yes" to each of the following questions:

b) **Cannabis Driver**: "Have you ever driven a vehicle (e.g., car, snowmobile, motorboat, or an off-road vehicle (ATV)) within 2 hours of using marijuana?"
c) **Passenger to Cannabis Driver: "**Have you ever been a passenger in a vehicle (e.g., car, snowmobile, motorboat, or an off-road vehicle (ATV) driven by someone who had been using marijuana in the last 2 hours?"
d) **Driving Plan**: "Have you ever planned ahead or decided NOT to drive to avoid driving high?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.G.1.5. Driving and Riding: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | Other/ 2+ Races | White | *p* |
|---|---|---|---|---|---|---|
| Cannabis Driver | 10% (6: 58) | 25% (41: 165) | 14% (3: 22) | 18% (30: 164) | 13% (347: 2680) | <.001 |
| Passenger to Cannabis Driver | 11% (21: 196) | 34% (81: 240) | 29% (10: 34) | 31% (68: 222) | 19% (678: 3534) | <.001 |
| Driving Plan | 53% (28: 53) | 48% (82: 169) | 38% (9: 24) | 46% (72: 157) | 43% (1108: 2563) | .370 |

## Table III.G.1.6. Driving and Riding: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| Cannabis Driver | 24% (63: 261) | 13% (358: 2799) | 21% (6: 29) | <.001 |
| Passenger to Cannabis Driver | 30% (112: 368) | 19% (737: 3816) | 21% (9: 42) | <.001 |
| Driving Plan | 50% (120: 240) | 43% (1168: 2699) | 41% (11: 27) | .125 |

## Table III.G.1.7. Driving and Riding: Socioeconomic Status/Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Unstated | *p* |
|---|---|---|---|---|---|
| Cannabis Driver | 14% (149: 1028) | 15% (152: 1041) | 41% (383: 926) | 8% (4: 49) | .317 |
| Passenger to Cannabis Driver | 26% (341: 1293) | 20% (301: 1481) | 15% (203: 1355) | 13% (13: 97) | <.001 |
| Driving Plan | 45% (444: 986) | 45% (450: 1009) | 41% (383: 926) | 49% (22: 45) | .311 |

Notes for Tables III.G.1.5., III.G.1.6., and III.G.1.7.:

Percent represents the proportion of individuals answering "yes" to each of the following questions:

**e)** **Cannabis Driver**: "Have you ever driven a vehicle (e.g., car, snowmobile, motorboat, or an off-road vehicle (ATV)) within 2 hours of using marijuana?"

**f)** **Passenger to Cannabis Driver: "**Have you ever been a passenger in a vehicle (e.g., car, snowmobile, motorboat, or an off-road vehicle (ATV) driven by someone who had been using marijuana in the last 2 hours?"

**g)** **Driving Plan**: "Have you ever planned ahead or decided NOT to drive to avoid driving high?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## 2. Cannabis Use at Work

The survey asked respondents, "In the past 30 days, have you used marijuana at work (including breaks) or within 2 hours of starting work?" The tables below show the proportion of respondents who answered "yes." Twelve percent of respondents report using some form of cannabis while at work. Rates of use at work are higher among younger adults (aged 16-20 years, 21-25 years, and 26-35 years) and those identifying as Hispanic.

**Table III.G.2.1. Cannabis Use at Work: Age**

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| Use at work | 14% (14: 102) | 13% (14: 111) | 16% (55: 335) | 12% (39: 316) | 9% (19: 219) | 5% (12: 220) | .002 |

**Table III.G.2.2. Cannabis Use at Work: Student Status (Any)**

| Cannabis use variable | Student | Non-Student | Unstated | *p* |
|---|---|---|---|---|
| Use at work | 11% (24: 211) | 12% (121: 1047) | 18% (8: 45) | .440 |

**Table III.G.2.3. Cannabis Use at Work: Sex**

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| Use at work | 13% (46: 351) | 11% (107: 952) | .354 |

**Table III.G.2.4. Cannabis Use at Work: Gender**

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| Use at work | 13% (47: 353) | 11% (105: 935) | 10% (1: 10) | 0% (0: 5) | .621 |

**Table III.G.2.5. Cannabis Use at Work: Race**

| Cannabis use variable | Asian | Black | Native, Mainland or Island | Other/ 2+ Races | White | *p* |
|---|---|---|---|---|---|---|
| Use at work | 11% (3: 27) | 15% (15: 100) | 27% (3: 11) | 18% (12: 68) | 11% (120: 1097) | .161 |

**Table III.G.2.6. Cannabis Use at Work: Ethnicity**

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| Use at work | 20% (28: 140) | 11% (123: 1105) | 15% (2: 13) | .005 |

**Table III.G.2.7. Cannabis Use at Work: Socioeconomic Status/Income Adequacy**

| Cannabis use variable | Difficult | Neither | Easy | Unstated | *p* |
|---|---|---|---|---|---|
| Use at work | 14% (62: 455) | 11% (5: /448) | 10% (39: 375) | 8% (2/25) | .442 |

### 3. Poly-Substance Use

The ICPS survey asks respondents about whether they used cannabis with other substances. For this survey, "co-use" refers to using cannabis in conjunction with another substance together or within a short time period. The ICPS specifically asks participants to report on which substances they have used "on the same occasion with marijuana in the past 12 months." The ICPS asks those who reported using cannabis to answer whether they had also used alcohol, cigarettes, electronic cigarettes, or varying illicit substances such as opioids, methamphetamines, and ecstasy while consuming cannabis.

Respondents reported using alcohol with cannabis more than other substances. In fact, 45% of participants reporting using the two substances concurrently in the year previous to the survey. Thirty-five percent of participants report cigarette and cannabis co-use. Older persons (aged 36-45, 46-55, 56-65) reporting higher cigarette co-use rates than their younger counterparts (aged 16-20, 21-25, 26-35). Only 9% of sample report electronic cigarette(s) and cannabis co-use, with rates highest in younger populations. Lastly, 10% of respondents report illicit substance and cannabis co-use. In this population, younger respondents and those with lower perceived income adequacy reporter higher co-use than other groups.

Respondents were asked "which substances they had used on the same occasion with marijuana in the past 12 months" and provided multiple categories of substances, including: alcohol, tobacco, and illicit substances. All substances other than cigarettes, e-cigarettes, and alcohol were collapsed into "illicit substances."

## Table III.G.3.1. Poly-Substance Use: Age

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | **121** | **128** | **363** | **355** | **261** | **308** | |
| Use with Alcohol | 44% (53: 121) | 50% (64: 128) | 47% (171: 363) | 45% (161: 355) | 47% (123: 261) | 43% (133: 308) | .791 |
| Use with Cigarettes | 15% (14: 90) | 26% (24: 92) | 32% (97: 304) | 43% (135: 310) | 43% (96: 225) | 33% (87: 260) | <.001 |
| Use with E-Cigarettes | 25% (26: 103) | 23% (21: 90) | 13% (35: 262) | 13% (35: 261) | 7% (13: 173) | 6% (10: 179) | <.001 |
| Use with Illicit Substances | 11% (9: 81) | 12% (9: 72) | 11% (27: 237) | 13% (26: 201) | 9% (14: 147) | 2% (3: 152) | .015 |

## Figure III.G.3.2. Poly-Substance Use, by Age Group

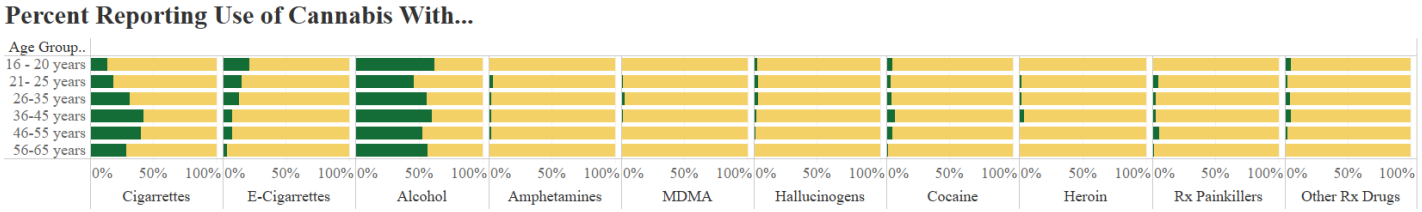


**Table III.G.3.3. Poly-Substance Use: Student Status (Any)**

| Cannabis use variable | Student | Non-student | Don't know | *p* |
|---|---|---|---|---|
| ***N*** | **237** | **1249** | **50** | |
| Use with Alcohol | 40% (95: 237) | 48% (597: 1249) | 26% (13: 50) | .001 |
| Use with Cigarettes | 25% (47: 186) | 36% (383: 1050) | 51% (23: 45) | .001 |
| Use with E-Cigarettes | 22% (40: 184) | 11% (92: 841) | 19% (8: 43) | .001 |
| Use with Illicit Substances | 11% (16: 149) | 9% (62: 705) | 28% (10: 36) | .001 |

**Table III.G.3.4 Poly-Substance Use: Sex**

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| ***N*** | **398** | **1138** | |
| Use with Alcohol | 50% (198: 398) | 45% (507: 1138) | .073 |
| Use with Cigarettes | 41% (126: 308) | 34% (327: 973) | .019 |
| Use with E-Cigarettes | 13% (33: 245) | 13% (107: 823) | .849 |
| Use with Illicit Substances | 13% (24: 191) | 9% (64: 699) | .162 |

**Table III.G.3.5 Poly-Substance Use: Gender**

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | **399** | **1121** | **11** | **5** | |
| Use with Alcohol | 49% (197: 399) | 44% (498: 1121) | 73% (8: 11) | 40% (2: 5) | .103 |
| Use with Cigarettes | 41% (127: 308) | 25% (323: 961) | 25% (2: 8) | 25% (1: 4) | .090 |
| Use with E-Cigarettes | 14% (35: 248) | 13% (103: 810) | 29% (2: 7) | 0% (0: 3) | .523 |
| Use with Illicit Substances | 13% (25: 195) | 9% (63: 686) | 0% (0: 7) | 0% (0: 2) | .355 |

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.G.3.6. Poly-Substance Use: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | White | Other | *p* |
|---|---|---|---|---|---|---|
| ***N*** | **28** | **110** | **13** | **1295** | **90** | |
| Use with Alcohol | 39% (11: 28) | 51% (56: 110) | 38% (5: 13) | 46% (597: 1295) | 40% (36: 90) | .530 |
| Use with Cigarettes | 15% (4: 26) | 33% (29: 89) | 25% (2: 8) | 36% (390: 1082) | 12% (7: 53) | .240 |
| Use with E-Cigarettes | 17% (4: 23) | 5% (4: 72) | 20% (2: 10) | 14% (122: 897) | 12% (8: 66) | .327 |
| Use with Illicit Substances | 0% (0: 19) | 12% (8: 68) | 14% (1: 7) | 10% (72: 743) | 13% (7: 53) | .527 |

## Table III.G.3.7. Poly-Substance Use: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| ***N*** | **156** | **1362** | **18** | |
| Use with Alcohol | 40% (62: 156) | 46% (633: 1362) | 56% (10: 18) | .198 |
| Use with Cigarettes | 33% (43: 130) | 36% (407: 1138) | 23% (3:13) | .540 |
| Use with E-Cigarettes | 18% (21: 117) | 13% (118: 939 | 8% (1: 12) | .236 |
| Use with Illicit Substances | 13% (12: 94) | 9% (75: 785) | 9% (1: 11) | .613 |

## Table III.G.3.8. Poly-Substance Use: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Don't know | *p* |
|---|---|---|---|---|---|
| ***N*** | **562** | **529** | **416** | **29** | |
| Use with Alcohol | 45% (255: 562) | 45% (237: 529) | 49% (202: 416) | 38% (11: 29) | .524 |
| Use with Cigarettes | 43% (216: 497) | 12% (43: 356) | 26% (86: 324) | 26% (5: 19) | <.001 |
| Use with E-Cigarettes | 12% (53: 428) | 12% (43: 356) | 16% (42: 265) | 10% (2: 19) | .497 |
| Use with Illicit Substances | 14% (51: 361) | 7% (22: 298) | 7% (15: 219) | 0% (0: 12) | .005 |

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## H. Health Care Use and Cannabis

The ICPS asks respondents about healthcare use in relation to cannabis, both the use of cannabis to treat physical or mental ailments ("proactive care") and seeking medical treatment due to an adverse outcome from cannabis use ("retroactive care").

### 1. Health Care Use after Cannabis Consumption

Approximately 5% of respondents report seeking medical services to treat adverse health effects that arise following cannabis consumption (i.e., retroactive care or seeking care due to cannabis use).

**Table III.H.1.1. Health Care Use after Cannabis Consumption: Age**

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | 151 | 164 | 617 | 596 | 652 | 959 | |
| Sought health care treatment after cannabis consumption | 4% (5: 125) | 7% (9: 131) | 6% (22: 378) | 6% (23: 362) | 3% (9: 268) | 2% (6: 321) | .039 |

**Table III.H.1.2. Health Care Use after Cannabis Consumption: Student (Any)**

| Cannabis use variable | Student | Non-student | Don't know | *p* |
|---|---|---|---|---|
| ***N*** | 131 | 686 | 54 | |
| Sought health care treatment after cannabis consumption | 4% (5: 131) | 2% (11: 686) | 4% (2: 54) | p<.001 |

**Table III.H.1.3. Health Care Use after Cannabis Consumption: Sex**

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| ***N*** | 417 | 1168 | |
| Sought health care treatment after cannabis consumption | 8% (32: 417) | 4% (42: 1168) | <.001 |

Notes for Tables III.H.1.1., III.H.1.2., III.H1.3.:

Percent represents the proportion of individuals answering "yes" to each of the following question:

1. **Sought Medical Treatment**: "In the past 12 months, did you seek medical help for any adverse or negative health effect(s) caused by using marijuana?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## Table III.H.1.4. Health Care Use after Cannabis Consumption: Gender

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | 417 | 1149 | 11 | 8 | |
| Sought health care treatment after cannabis consumption | 8% (32: 417) | 4% (42: 1149) | 0% (0: 11) | 0% (0: 8) | .007 |

## Table III.H.1.5. Health Care Use after Cannabis Consumption: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | White | Other | *p* |
|---|---|---|---|---|---|---|
| ***N*** | 28 | 118 | 13 | 1331 | 95 | |
| Sought health care treatment after cannabis consumption | 0% (0: 28) | 13% (15: 118) | 23% (3: 13) | 4% (49: 1331) | 7% (7: 95) | <.001 |

## Table III.H.1.6. Health Care Use after Cannabis Consumption: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| ***N*** | 170 | 1396 | 19 | |
| Sought health care treatment after cannabis consumption | 11% (18: 170) | 4% (54: 1396) | 10% (2: 19) | <.001 |

## Table III.H.1.7 Health Care Use after Cannabis Consumption Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Don't know | *p* |
|---|---|---|---|---|---|
| ***N*** | 574 | 553 | 425 | 33 | |
| Sought health care treatment after cannabis consumption | 5% (29: 574) | 4% (22: 553) | 5% (23: 425) | 0% (0: 33) | .404 |

Notes for Tables III.H.1.4, III.H.1.5, III.H.1.6, and III.H.1.7.:

Percent represents the proportion of individuals answering "yes" to each of the following question:

1. **Sought Medical Treatment**: "In the past 12 months, did you seek medical help for any adverse or negative health effect(s) caused by using marijuana?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## 2. Cannabis for Health Treatment

Forty-six percent of cannabis users report using cannabis to assist with mental health ailments and 39% report using cannabis to assist with physical health ailments (i.e., proactive care or using cannabis to assist with a pre-existing mental or physical health symptom or condition). The respondents in this group may not be part of the Massachusetts Medical Use of Marijuana Program. Given the reporting above relative to how respondents source cannabis, they may be reporting medical use without a healthcare professional's recommendation, or with a recommendation but choosing not to use the medical program.

**Table III.H.2.1. Cannabis for Health Treatment: Age**

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| ***N*** | 151 | 164 | 617 | 596 | 652 | 959 | |
| Use to Manage Mental Health | 64% (97: 151) | 63% (103: 164) | 61% (374: 617) | 52% (309: 596) | 29% (185: 647) | 17% (162: 958) | <.001 |
| Use to Manage Physical Health | 58% (86: 148) | 67% (110: 163) | 61% (377: 614) | 56% (333: 594) | 38% (250: 652) | 32% (304: 959) | <.001 |

**Table III.H.2.2. Cannabis for Health Treatment: Student Status (Any)**

| Cannabis use variable | Student | Non-student | Don't know | *p* |
|---|---|---|---|---|
| ***N*** | 346 | 2708 | 82 | |
| Use to Manage Mental Health | 60% (209: 346) | 36% (963: 2705) | 71% (58: 82) | p<.001 |
| Use to Manage Physical Health | 64% (217: 341) | 44% (1187: 2708) | 69% (56: 81) | p<.001 |

Notes for Tables III.H.2.1. and III.H.2.2.:

Percent represents the proportion of individuals answering "yes" to each of the following questions:

1. **Cannabis Use to Manage Mental Health: "**Have you ever used marijuana to improve or manage symptoms for any of the following: (select all that apply)?"
2. **Cannabis Use to Manage Physical Health**: "Have you ever used marijuana to improve or manage symptoms for any of the following: (select all that apply)?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

### Table III.H.2.3. Cannabis for Health Treatment: Sex

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| ***N*** | 865 | 2269 | |
| Use to Manage Mental Health | 35% (299: 864) | 41% (931: 2269) | <.001 |
| Use to Manage Physical Health | 41% (354: 865) | 49% (1106: 2265) | <.001 |

### Table III.H.2.4. Cannabis for Health Treatment: Gender

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| ***N*** | 864 | 2247 | 15 | 10 | |
| Use to Manage Mental Health | 35% (301: 863) | 40% (911: 2247) | 73% (11: 15) | 80% (8: 10) | <.001 |
| Use to Manage Physical Health | 41% (354: 864) | 48% (1086: 2241) | 80% (12: 15) | 80% (8: 10) | <.001 |

### Table III.H.2.5. Cannabis for Health Treatment: Race

| Cannabis use variable | Asian | Black | Native, Mainland or Island | White | Other | *p* |
|---|---|---|---|---|---|---|
| ***N*** | 59 | 169 | 25 | 2717 | 167 | |
| Use to Manage Mental Health | 37% (22: 59) | 59% (100: 169) | 68% (17: 25) | 37% (1010: 2713) | 48% (81: 167) | <.001 |
| Use to Manage Physical Health | 45% (26: 58) | 63% (105: 167) | 78% (18: 23) | 45% (1220: 2717) | 55% (91: 165) | <.001 |

### Table III.H.2.6. Cannabis for Health Treatment: Ethnicity

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| ***N*** | 267 | 2839 | 31 | |
| Use to Manage Mental Health | 61% (161: 265) | 37% (1060: 2839) | 31% (9: 29) | <.001 |
| Use to Manage Physical Health | 64% (172: 267) | 45% (1274: 2832) | 45% (14: 31) | <.001 |

### Table III.H.2.7. Cannabis for Health Treatment: Income Adequacy

| Cannabis use variable | Difficult | Neither | Easy | Don't know | *p* |
|---|---|---|---|---|---|
| ***N*** | 1040 | 1063 | 979 | 52 | |
| Use to Manage Mental Health | 48% (500: 1040) | 39% (411: 1062) | 30% (297: 979) | 42% (22: 52) | <.001 |
| Use to Manage Physical Health | 54% (566: 1040) | 50% (531: 1063) | 35% (344: 975) | 36% (19: 52) | <.001 |

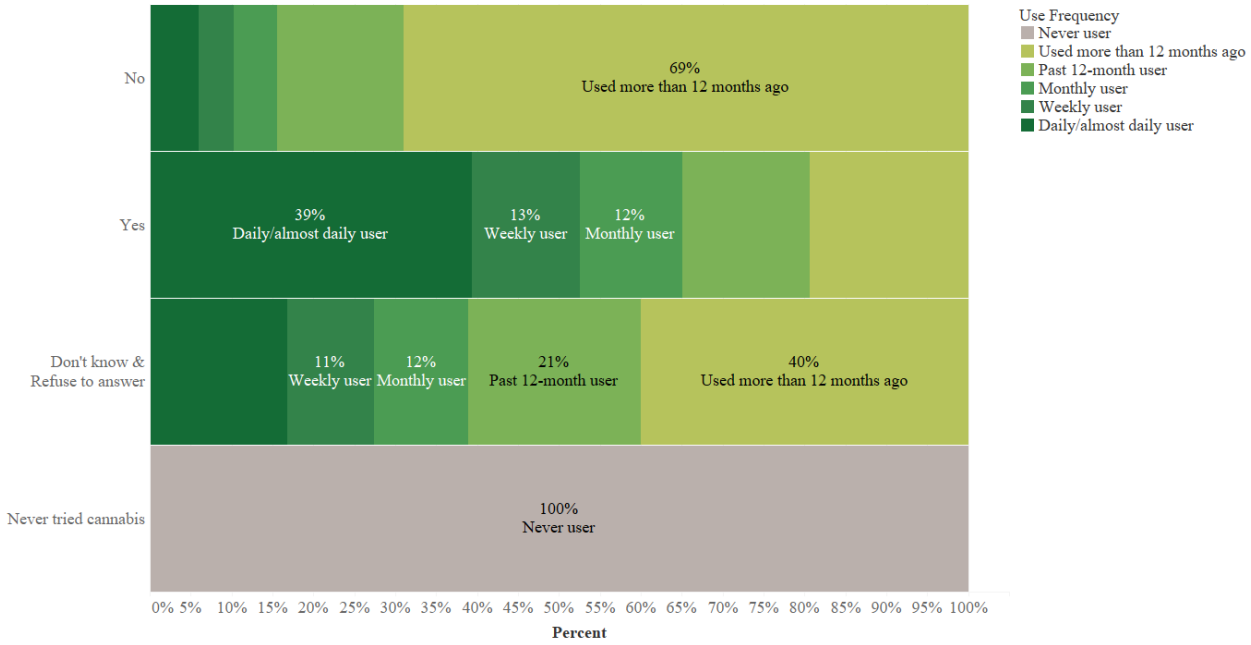
Notes for Table III.H.2.3., III.H.2.4., III.H.2.5., III.H.2.6., III.H.2.7.:

Percent represents the proportion of individuals answering "yes" to each of the following questions:

2. **Cannabis Use to Manage Mental Health: "**Have you ever used marijuana to improve or manage symptoms for any of the following: (select all that apply)?"
3. **Cannabis Use to Manage Physical Health**: "Have you ever used marijuana to improve or manage symptoms for any of the following: (select all that apply)?"

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

**Figure III.H.2.8. Cannabis for Mental Health Treatment, by Use Frequency**




Notes for Figure III.H.2.8.:

Figure represents reported use frequency patterns of individuals by tendency to use cannabis to manage mental health symptoms.

[See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics]

## I. History of Cannabis Arrests

Participants were asked whether they had been arrested for: 1) cannabis possession; and 2) cannabis trafficking, cultivation, or importation. These two variables were aggregated into one variable to indicate whether the individual reported *any* previous arrest (i.e., arrest for possession, distribution, or both). Approximately 4% of respondents report a cannabis arrest. Respondents more likely to report any arrest were younger, male, student, and Black, Hispanic and Native/Mainland or Islander.

**Table III.I.1. History of Cannabis Arrests: Age**

| Cannabis use variable | 16-20 years | 21 – 25 years | 26-35 years | 36-45 years | 46-55 years | 56-65 years | *p* |
|---|---|---|---|---|---|---|---|
| History of Cannabis Arrest | 6% (18: 308) | 5% (12: 243) | 4% (38: 861) | 6% (50: 884) | 4% (36: 955) | 2% (31: 1315) | <.001 |

**Table III.I.2. History of Cannabis Arrests: Student Status (Any)**

| Cannabis use variable | Student | Non- Student | Unstated | *p* |
|---|---|---|---|---|
| History of Cannabis Arrest | 7% (42: 565) | 4% (141: 3891) | 2% (2: 110) | <.001 |

**Table III.I.3. History of Cannabis Arrests: Sex**

| Cannabis use variable | Male | Female | *p* |
|---|---|---|---|
| History of Cannabis Arrest | 7% (91: 1280) | 3% (94: 3286) | <.001 |

**Table III.I.4. History of Cannabis Arrests: Gender**

| Cannabis use variable | Man | Woman | Other | Unstated | *p* |
|---|---|---|---|---|---|
| History of Cannabis Arrest | 7% (89: 1274) | 3% (89: 3249) | 4% (1: 25) | 33% (6: 18) | <.001 |

**Table III.I.5. History of Cannabis Arrests: Race**

| Cannabis use variable | Asian | Black | Native, Mainland or Island | Other | White | *p* |
|---|---|---|---|---|---|---|
| History of Cannabis Arrest | 3% (7: 213) | 10% (26: 256) | 8% (3:36) | 5% (12: 245) | 4% (137: 3816) | <.001 |

**Table III.I.6. History of Cannabis Arrests: Ethnicity**

| Cannabis use variable | Hispanic | Non-Hispanic | Unstated | *p* |
|---|---|---|---|---|
| History of Cannabis Arrest | 8% (29: 376) | 4% (154: 4145) | 4% (2: 45) | <.001 |

**Table III.I.7. History of Cannabis Arrests: Income Adequacy**

| Cannabis use variable | Difficult | Neither | Easy | Unstated | *p* |
|---|---|---|---|---|---|
| History of Cannabis Arrest | 4% (62: 1370) | 3% (56: 1606) | 4% (62: 1468) | 4% (5: 122) | .528 |

See *Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics* for more information on metrics.

## J. Limitations

Given the relative newness of cannabis regulation, there are many research topics and policies to consider in order to understand the landscape. Public health surveillance system surveys most frequently capture lifetime, past-year, or past-month cannabis use. Among people that reply affirmatively to using cannabis in the 2019-2020 ICPS study, there is substantial variation in methods and patterns of use. Understanding this variation is key to defining and making decisions related to cannabis legalization and outcomes from it. For example, given that most respondents in this report showed a preference to use the unregulated market, policymakers and legislators may seek to understand more about this choice, particularly as it relates to tax revenue estimates and safety for medical users. Similarly, the number of respondents seeking medical assistance due to an adverse effect of cannabis use can provide insight into unhealthy cannabis use patterns and alert policymakers where education, prevention mechanisms, or additional healthcare resources may be warranted. With such conclusions, it is important to note, however, that surveys such as the ICPS are limited since they are designed to measure changes at the population level (vs. individual-level change) at a given timepoint.

Another important aspect to consider is the potential influence of municipal level policies that may bias results if multiple jurisdictions in a legalized state do not allow retail stores and/or delivery options. Of the 351 municipalities in Massachusetts, 111 (about 32%) banned retail sale of adult-use cannabis. It is difficult for researchers and regulators to understand and report on how Massachusetts' cannabis policies are associated with illicit market access and/or health impacts, as the association between cannabis use patterns and municipal policy heterogeneity is not understood.

## K. Findings

### Use Frequency

According to the ICPS survey results, about 35% of respondents reported using any form of cannabis in the past year. Although rates of lifetime use are comparable, younger demographics are more likely to engage in more frequent use with 34% of the respondents ages 21-25 years reporting cannabis use in the month prior, compared to 15% of respondents ages 56-65 years.

### Age of Cannabis Initiation

Across our sample, respondents report initiating cannabis use at 19 years old, on average. The age of cannabis initiation is consistent across demographic stratifications. Respondents ages 16-20 years report first using cannabis at a younger age (mean of 15.9 years) than those ages 21-25 (17.4 years).

### Methods of Consumption

The most popular means of consumption among Massachusetts residents are flower, edibles, and vaporized oils; however, methods of consumption show different patterns for different age groups. Concentrates and vaporized oils are more popular with adults under 25 years of age.

By study estimates, among these younger demographics (age groups 16-20 years and 21-25 years) compared to older individuals (age group 56-65 years). These numbers are consistent with other studies that find youth are frequent users of concentrates.[8] Research suggests that youth rates of using concentrated THC may warrant monitoring due to the heightened risk for cannabis-use disorder and other consequences during adolescence.[9,10] Similarly, frequency of concentrate use among young adults warrants monitoring because high-potency cannabis products may put users at a higher risk of developing cannabis dependence[11] or experiencing adverse mental health symptoms.[12] Little research has investigated the impact(s) of concentrates on youth groups specifically.

The percentage of middle and high-schoolers in Colorado who reported concentrate use for non-medical purposes increased from 5.7% to 10.2% from 2015 to 2019.[13] It remains to be seen whether the popularity of concentrates is increasing at comparable rates among Massachusetts youth.

### Sources of Cannabis Access

The regulated market in Massachusetts continues to grow, although neither the medical nor the adult-use market are fully saturated. This study finds, however, that individuals still source their cannabis from the illicit market with trends in the both the types of cannabis products as well as sourcing of cannabis products across different demographic groups.

Approximately 64% of all cannabis products sourced were from the regulated market, however, there are notable discrepancies by product type. Tinctures (77%), liquid drops (83%), and

topicals (86%) are more frequently sourced from the regulated market than other products, such as concentrates (58%) and flower (52%).

Younger adults report greater rates of purchasing cannabis from illicit market dealers (48% of respondents ages 16-20 years and 41% of respondents ages 21-25 years) compared to older adults (24% of respondents ages 46-55 years and 16% of respondents ages 56-65 years). Conversely, older adults report greater rates of purchasing from licensed retailers/stores (49% of respondents ages 46-55 years and 45% of respondents ages 56-65 years) when compared to younger respondents (24% of respondents ages 16-20 years).

Individuals report different reasons for sourcing products from the illicit market. Rationale for illicit market sourcing includes: 1) expense (34%), and 2) location of licensed options being "too far" (23%). This latter rationale could be affected by the licensing of Delivery Couriers and Delivery Operators in Massachusetts in future years.

### Cannabis Knowledge and Social Norms

Data show that residents are in support of legalization regardless of age. Findings showing relatively low understanding of the potential negative side effects of cannabis use are consistent with Goodman and Hammond, who observed a similarly low knowledge of cannabis side effects among Canadian and American participants.[14] This level of knowledge is aligned with the reported risky behaviors summarized below.

### Risky Behaviors

In this survey, three categories of risk-taking behaviors were assessed: 1) driving and riding behaviors, 2) cannabis use at work, and 3) poly-use of cannabis with other substance(s). In total, 12% of our sample report driving under the influence of cannabis in the past year. This reporting appears to be a particular issue for youth and younger adults, with one out of five respondents ages 16-20 years and 21-25 years reporting driving within two hours of cannabis use within the past year. Males were more likely to drive within two hours of cannabis use despite comparable rates of cannabis use among males and females. We observed similar rates of cannabis use at work for non-medical purposes, with approximately 12% of respondents reporting some form of cannabis use at work.

### Poly-substance Use

According to the survey, respondents frequently co-used cannabis with other substances, such as alcohol, tobacco, and illicit substances. Approximately half of study respondents report using cannabis with alcohol. Cannabis is frequently used with tobacco; however, the method of tobacco administration differs by age group. Over one-third (35%) of respondents report the poly use of cigarettes with cannabis; however, rates are considerably lower in younger demographics (15% of respondents ages 16-20 years and 26% of respondents ages 21-25 years). Poly use of cannabis with e-cigarettes is reported less by comparison, with just 9% of respondents reporting e-cigarette and cannabis co-use. E-cigarettes were used with cannabis at a much higher rate by younger respondents, with 25% of respondents ages 16-20 years and 23% of respondents ages

21-25 years reporting co-use. Additionally, one out of ten respondents report co-use of cannabis and illicit substance(s), a trend warranting additional research and monitoring.

### Health Care Use and Cannabis

In this study, respondents report varied experiences with healthcare related to cannabis. First, the use of cannabis did not frequently result in the use of healthcare services due to an adverse outcome from cannabis use, with one out of 20 respondents reporting seeking healthcare services for a negative cannabis-related incident. Conversely, approximately half (46%) of respondents report using cannabis to regulate mental health concerns (e.g., anxiety, depression, bipolar disorder) and 39% report using cannabis to alleviate physical pain. Notably, younger individuals (ages 16-20 years and 21-25 years) and those of lower perceived income (e.g., those reporting making ends meet as “Very difficult” or “Difficult”) were also more likely to report using cannabis to manage their mental and/or physical health.

### History of Cannabis Arrest

Approximately 4% of respondents report a previous cannabis arrest. Although this rate itself may not warrant concern, there were notable discrepancies in reported arrests by demographic groups. Males, students, and Black, Hispanic, and Native/ Mainland or Islander individuals report higher rates of previous arrests than their counterparts. It is important to note that out of all race and ethnic categories, Black respondents report the highest rate of cannabis arrest (10%).

## IV. Policy Considerations for the Commonwealth

Based on this assessment of cannabis use trends in Massachusetts from 2019-2020, the Commission offers the following considerations for policymakers in the Commonwealth. These considerations echo previous reports, including those from past ICPS findings. In fact, this report and survey on which it is based underscore the value of several Commission programs that are underway or planned for the future.

### Education and Prevention

Education about cannabis policy, regulations, and safe use continues to be important to mitigate potential adverse effects, including planning for driving or using machinery after cannabis use and understanding the negative side effects. Data shows gaps in knowledge of Massachusetts-specific policies and regulations and the value of the regulated market. It is critical that the Commonwealth has a layered approach to education and prevention to reach varying groups, including efforts at the individual, interpersonal, community, and society levels.

**Consideration 1:** The Commission could continue to support and seek funding for continuing the Public Awareness Campaign started with the Department of Public Health in 2018. Additional pre-and-post survey assessments of the public awareness campaign continuation could be used to monitor constituents' knowledge of cannabis policies, risks, social norms, and change in knowledge over time. If funded, the Commission should consider a focus on macro-level policy education, youth and emerging adult prevention, and education on adverse consequences and harm mitigation, such as focus on the following areas warranting education based on study findings:

- Cannabis risks including differential effects of varying methods of consumption, substance use dependence potential, pregnant and breastfeeding women risks, youth risks, driving and riding with impaired driving risks, inhalation risks, high potency risks, mental health risks, and poly-substance use risks. [See Sections: 1) *III.D. Methods of Consumption*, *2) III.F. Cannabis Knowledge and Social Norms,* and 3*) III.G.1. Driving and Riding Behaviors*]

- Where and under what circumstances cannabis is safe to consume, such as at the workplace. [See Section, *III.G.2. Use at Work*]

[See Reports: (1*) A Baseline Review and Assessment of Cannabis Use and Youth: Literature Review and Preliminary Data in Massachusetts,* Sections: (A) *IX. Public Health Framework: Commonwealth of Massachusetts: Regulations and Public Health* and (B) *Appendix VI: Public Awareness Campaigns;* and (2), *More About Marijuana Public Awareness Campaign Effectiveness*, and 3) *A Baseline Review and Assessment of Cannabis Use and Public Safety Part 1: Operating under the Influence of Cannabis: Literature Review and Preliminary Data in Massachusetts*]

**Consideration 2:** The Commission could continue and build on the systematic approach to the Responsible Vendor Training (RVT) Program to ensure annual evidence-based education for all cannabis industry agents in accordance with Commission adult-use and medical marijuana regulations. New research and data should be incorporated into the RVT curriculum as new information is learned, such as foci on impaired driving, cognitive effects, and changes in policy and/or regulation. The program should be evaluated to assess effectiveness and areas of improvement. [See Sections: 1) *III.D. Methods of Consumption*, *2) III.F. Cannabis Knowledge and Social Norms,* 3*) III.G.1. Driving and Riding Behaviors,* and 4*) III.I.1. Health Care Use/ Cannabis as Treatment*]

**Consideration 3:** The Commission could collaborate with state and local stakeholders involved with youth education and safety to better educate youth about cannabis use, short-and-long term effects, as well as work collaboratively to prevent youth early initiation of cannabis use. Youth education efforts should differentiate between medical and nonmedical use. [See Sections: 1) *III.C. Age of Cannabis Initiation,* 2) *III.D. Methods of Consumption*, *3) III.F. Cannabis Knowledge and Social Norms,* 3*) III.G.1. Driving and Riding Behaviors,* and Report, *A Baseline Review and Assessment of Cannabis Use and Youth: Literature Review and Preliminary Data in Massachusetts*]

## Future Research and Data

In the US, there continues to be major barriers to conducting research with cannabis products under the Federal 1970s Controlled Substance Act and its classification as a Schedule 1 substance, the most restrictive ranking. This strict scheduling prevents researchers and policymakers from developing evidence-based clarity on clinical effects and therapeutic potential, risks of cannabis consumption, and social impacts of regulation and industry development. Epidemiologic research assessing trends with systematic survey data collection is both possible and critical. These study findings highlight the following areas that are vital to monitor with additional studies and surveillance.

Data collection and monitoring are critical for a safe and well-regulated cannabis industry. Monitoring cannabis use trends using reliable, systematic data is essential to assess changes in trends over time and to better understand the impacts of changing cannabis policy and regulations. Continued and timely monitoring would permit policymakers to make changes to prevent adverse outcomes if concerns arise.

As stated in the Commission's 2022 goals for its Executive Director, the Commission could continue collaboration with public and private sector researchers and academics, including state researchers and epidemiologists in government cannabis regulatory entities, including public health working groups to continue to identify best practice monitoring tools and learn from states with more established markets [e.g., Council of State and Territorial Epidemiologists (CSTE), Cannabis Regulators Association (CANNRA), University of Waterloo].

**Consideration 1:** Research should consider adapting more nuanced ways to assess gender in addition to sex to better understand use trends and potential disproportionate impact or risk factors associated with gender identity. Respondents are asked about their gender identity on the ICPS, but the response options place the traditional gender binary at the center (e.g., "Man", "Woman", "Other" or "Unstated/Don't know"). Respondents are given the ability to write in an identity if they choose "Other", but future work should consider including response options for common gender identities that are not on the binary, such as response options for individuals that are nonbinary, genderfluid, or agender. Including these response options would provide cleaner, easier to use data and help researchers to answer burgeoning questions about how non-cisgender individuals use and perceive cannabis. [See Section, *III.A. Demographics*]

**Consideration 2:** Research should further assess cannabis arrest rates using self-report surveillance system surveys in conjunction with criminal justice databases, such as the National Incident-Based Reporting System and municipality law enforcement data. This data would help assess discrepancies in criminal justice encounters by demographic groups. Arrest assessments at different municipality levels across the Commonwealth could also be informative to assess localized discrepancies. Additionally, studies using qualitative data could help illuminate the continued disproportionate impact of arrests of different racial/ethnic groups. Together, these studies would provide greater understanding of persons and communities disproportionately harmed by prohibition and enforcement of cannabis (often referred to as the "War on Drugs") to rectify past harms.

**Consideration 3:** Similar to the ICPS's subjective indicator for socio-economic status (SES), research and surveillance system surveys should assess validity of different metrics for SES for use in surveys. Traditional SES metrics, such as income level or highest year of education, may not be flexible enough to adequately account for different demographic groups, living situations, and geographic areas across the Commonwealth. These metrics would assist to better understand how different SES groups interact with the cannabis industry(ies) and understand cannabis use risks. [See Sections: 1) *III.A. Demographics* and 2) *III.J. Illicit Market*]

**Consideration 4:** Research should further assess the intersection of cannabis use and health care, including both proactive health care usage (i.e., seeking cannabis to treat a mental or physical health symptom(s) or illness(es)) and retroactive health care (i.e., seeking out health care due to cannabis use). These assessments would assist in both understanding the clinical needs of constituents and frequency and type of adverse effects of cannabis use. [See Section, *III.I. Health Care Use/ Cannabis as Treatment* and Report, *High Tetrahydrocannabinol (THC) Cannabis and Effects on the Human Body—More Research Needed. A Legislative Report and Considerations for Research and Policy*]

**Consideration 5:** Research should further assess sourcing of cannabis and cannabis products, including assessment of the scope of illicit market and the rationales for continued sourcing of illicit market products. This information could assist policymakers and regulators adjust cannabis laws and regulations to make the licensed market more appealing to consumers and patients, if that is a policy goal. Further, it could benefit the cannabis industry by highlighting consumer and patient preferences. [See Section, *III.J. Illicit Market* and Reports: 1) *A Preliminary Assessment of the Massachusetts Cannabis Industry: Literature Review and Preliminary Data in Massachusetts* and 2) *A Baseline Review and Assessment of Cannabis Use and Public Safety Part 2: 94C Violations and Social Equity: Literature Review and Preliminary Data in Massachusetts*]

**Consideration 6:** Research should further assess methods of cannabis consumption and differential risks and benefits of the consumption methods to inform both industry and regulators. The ICPS survey data shows changing trends in preference of products and consumption methods in the legalized cannabis market(s). This information warrants continued collection and assessment to determine correlations, and even casual relationships, between types of consumption and public health impacts, as the 2019 vaporizer illness demonstrated. Understanding relationships between products, consumption preferences, and effects on cannabis users can provide information to improve medical marijuana recommendations, products, and the Commonwealth's overall program. Further, it can point licensed Marijuana Enterprises and Marijuana Treatment Centers to efforts that enhance the consumer's and patient's experience, attracting them to the regulated market. Finally, this information would be useful for future consideration of adult-use and medical marijuana regulations, particularly as the Commission evaluates relatively new license types like delivery and social consumption sites. [See Sections: *III.D. Methods of Consumption* and *IV. Considerations: Education and Prevention* (Considerations 1-3), and Reports: 1) *High Tetrahydrocannabinol (THC) Cannabis and Effects on the Human Body—More Research Needed. A Legislative Report and Considerations for*

*Research and Policy* and 2) *A Preliminary Assessment of the Massachusetts Cannabis Industry: Literature Review and Preliminary Data in Massachusetts*]

**Consideration 7:** Research should assess heterogeneity of municipality-level policies and potential effects, such as allowance for retail stores, host community agreements, permission for social consumption sites, and other provisions. Local policies impact access to regulated cannabis for consumers and patients and the development of a diverse, inclusive cannabis industry. [See Section, *III.J. Illicit Market* and Report, *Identifying Disproportionately Impacted Areas by Cannabis Prohibition in Massachusetts*]

**Consideration 8:** To comprehensively understand trends among different groups in the population at large, the Commission could collaborate and participate in other studies with systematic data collection of metrics applicable to the Commission's research agenda. The Commonwealth and its relevant agencies could work collaboratively with researchers to define priority areas of research and consistent data metrics to monitor cannabis use trends and outcomes systematically in Massachusetts. Given the varying data collection mechanisms implemented across the Commonwealth and its agencies, the state could add metrics to pre-existing surveillance systems to more accurately assess types, methods, frequency, and quantity patterns of cannabis use among different population groups (e.g., age, sex/gender, race/ethnicity, urban/suburban/rural, and socioeconomic status), and partner with health systems to assess adverse clinical health effects, such as cannabis use disorders, acute psychosis, and co-occurring mental health and cannabis use disorders.

- Seek to collaborate with researchers in healthcare systems and college health centers to monitor the rates of cannabis use disorder, and adults and emerging adults presenting to any healthcare setting with acute cannabis use symptoms or related cannabis use health concerns.
- Seek to collaborate with researchers in the primary and secondary educational systems to monitor changing norms and use patterns among youth to create best practices for prevention, intervention, and education.
- Assess metrics in ongoing data collection mechanisms in the Commonwealth, including groups not assessed in the current study. For example, the Pregnancy Risk Assessment Monitoring System (PRAMS) to assess cannabis use in prenatal and breastfeeding women, two at-risk cohorts, and perceived social norms of cannabis use during pregnancy.
- Continue collaboration with the Council of State and Territorial Epidemiologists, including assessment of optimal Internal Classification of Diseases (ICD) codes for monitoring purposes and systematically monitor and report incidences of cannabis-related ICD-9 and ICD-10 codes in health-care settings, to better understand adult and emerging adult cannabis use and cannabis-related clinical outcomes.
- Continue collaboration with University of Waterloo on the ICPS to continue to assess cannabis use and behaviors, including information about the illicit cannabis market and modes of consumption, two critical but currently under-studied metrics
- Continue collaboration with researchers at Boston Children's Hospital, where the Poison Control Center is housed, to systematically code and report Poison Control Center data related to cannabis exposures and types of products of exposure.

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# VI. Appendices

## Appendix I: Acronyms

| Acronym | Meaning |
|---|---|
| **BRFSS** | Behavioral Risk Factor Surveillance System |
| **CAOA** | Cannabis Administration and Opportunity Act |
| **CBD** | Cannabidiol |
| **CNB** | Cannabis Control Commission |
| **CSA** | Controlled Substance Act |
| **CUD** | Cannabis Use Disorder |
| **DEA** | Drug Enforcement Agency |
| **FDA** | US Food and Drug Administration |
| **ID** | Identification |
| **MA** | Massachusetts |
| **ME** | Marijuana Establishment |
| **MORE** | Marijuana Opportunity Reinvestment and Expungement Act |
| **MTC** | Marijuana Treatment Facility |
| **MTF** | Monitoring the Future |
| **N or n** | Sample |
| **NA** | Not Applicable |
| **NCSL** | National Conference of State Legislatures |
| **NSDUH** | National Survey on Drug Use and Health |
| ***p*** | Probability value ("p-value"); testing the likelihood that results did not occur due to chance |
| **PSU** | Primary Sampling Unit |
| **THC** | Tetrahydrocannabinol |
| **US** | United States |
| **YRBSS** | Youth Risk Behavioral Surveillance System |

## Appendix II: International Cannabis Policy Study (ICPS) Survey Metrics

| Section | Short-Form | Whole Question | Response Options |
|---|---|---|---|
| **III.A. Demographics** | **Age** | "How old are you today?" | Number, 0-99 |
| | **Student Status** | "Are you currently a student or will you be going to school next term?" | 1= Yes<br>2= No<br>-77=Don't know<br>-88=Refuse to answer |
| | **Sex** | "What sex were you assigned at birth, on your original birth certificate?" | 1= Female<br>2= Male<br>-77=Don't know<br>-88=Refuse to answer |
| | **Gender** | "How would you describe your gender today? (Select one)." | 1= Woman<br>2= Man<br>3= Other: _____<br>77= Don't know<br>88= Refuse to answer |
| | **Race** | "What race do you consider yourself to be?" | 1= White<br>2= American Indian or Alaskan Native<br>3= Asian<br>4= Black or African American<br>5= Native Hawaiian or Pacific Islander<br>6= Other / 2+ races/Unstated |
| | **Ethnicity** | "Do you consider yourself to be Hispanic, Latino, or of Spanish origin? Spanish, Hispanic or Latino people may be of any race. If you are not sure, please see the list of Hispanic or Latino categories below." | 1= Yes<br>2= No<br>77= Don't know<br>88 = Refuse to answer |
| | **Income Adequacy** | Thinking about your family's income, how difficult or easy is it to make ends meet? | 1= Very difficult<br>2= Difficult<br>3= Neither easy nor difficult<br>4= Easy<br>5= Very easy<br>77= Don't know 88= Refuse to answer |
| **III.B. Use Frequency** | **Use Frequency** | "How often do you use marijuana?" | 0 = Never user<br>1 = Used more than 12 months ago<br>2 = Past 12-month user<br>3 = Monthly user |

| | | | |
|---|---|---|---|
| | | | 4 = Weekly user<br>5 = Daily/almost daily user |
| **III.C. Age of Cannabis Initiation** | **Age of Cannabis Initiation** | "How old were you when you first used marijuana?<br>Enter age in years:_____" | Number, 0-99 |
| **III.D. Methods of Consumption** | Methods of consumption | "Have you used marijuana in any of the following ways?"<br><br>**Note**: This question is asked separately as a yes/no question for each mode of use. | 1 = No<br>2 = Yes:<br><br>**Concentrates:** Concentrates (e.g., wax, shatter, budder)<br><br>**Drinks**: Drinks (marijuana cola, tea, or coffee)<br><br>**Edibles**: Edibles/foods<br><br>**Flower**: Dried herb (smoked or vaped)<br><br>**Hash/kief**: Hash or kief<br><br>**Oils, Oral**: Cannabis oils or liquids taken orally (e.g., drops or capsules)<br><br>**Oils, Vaporized**: Cannabis oils or liquids for vaping<br><br>**Tinctures**: Tinctures (concentrated amounts ingested orally or taken under the tongue)<br><br>**Topicals**: Topical ointments (e.g., skin lotions or bath products) |
| **III.E. Sources of Cannabis** | Sources of cannabis | "In the past 12 months have you gotten any type of marijuana from the following sources?"<br><br>**Note**: This question is asked separately as a yes/no question for each source option. | 0 = No<br>1 = Yes:<br><br>**Dealer:** From a dealer (in person)<br><br>**Delivery service:** Internet delivery service or mail order<br><br>**Family or friend:** From a family member or friend |

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| | | | **Self-grown:** I made or grew my own<br><br>**Licensed store:** From a store, co-operative or dispensary (in person) |
| **IV. Knowledge and Social Norms** | **Should cannabis be legal?** | Should the use of recreational (non-medical) marijuana be…? | 0 = Illegal<br>1 = Legal |
| | **Questions/ Percent Correct** | The percent of questions about cannabis answered correctly. Respondents were asked nine questions about the health effects of cannabis with scientifically supported correct answers.<br><br>**QUESTIONS:**<br><br>Q1. Can marijuana smoke be harmful?<br><br>Q2. Can it be harmful to use marijuana when pregnant or breastfeeding?<br><br>Q3. Can it be dangerous to drive or operate machinery after using marijuana?<br><br>Q4. Can marijuana be addictive?<br><br>Q5. Can regular marijuana use increase the risk of psychosis and schizophrenia?<br><br>Q6. Are teenagers at greater risk of harm from using marijuana than adults?<br><br>Q7. Can using marijuana cause diabetes? | Percent Correct = Number correct/Number attempted<br><br>**ANSWERS:**<br>Q1.<br>Yes (Correct response)<br>No, Maybe or Don't know (Incorrect response)<br><br>Q2. Yes (Correct response)<br>No, Maybe or Don't know (Incorrect response)<br><br>Q3. Yes (Correct response)<br>No, Maybe or Don't know (Incorrect response)<br><br>Q4. Yes (Correct response)<br>No, Maybe or Don't know (Incorrect response)<br><br>Q5. Yes (Correct response)<br>No, Maybe or Don't know (Incorrect response)<br><br>Q6. Yes (Correct response)<br>No, Maybe or Don't know (Incorrect response)<br><br>Q7. No (Correct response)<br>Yes, Maybe or Don't know (Incorrect response)<br><br>Q8. No (Correct response) |

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| | | Q8. Can marijuana or CBD help prevent or cure cancer?<br><br>Q9. Can high-THC marijuana products negatively affect memory and concentration? | Yes, Maybe or Don't know (Incorrect response)<br><br>Q9. Yes (Correct response)<br>No, Maybe or Don't know (Incorrect response) |
| | **Friends Using (Of Top 5)** | How many of your five closest friends use marijuana? | 1= None<br>2= One<br>3= Two<br>4= Three<br>5= Four<br>6= Five<br>77= Don't know<br>88= Refuse to answer |
| **V.A. Driving Behaviors** | **Cannabis Driver** | Have you ever driven a vehicle (e.g., car, snowmobile, motor boat, or an off-road vehicle (ATV)) within 2 hours of using marijuana? | 0= No, never or not in the past 12 months<br>1= Yes, in the past 12 months<br>-77= Don't know |
| | **Passenger to Cannabis Driver** | Have you ever been a passenger in a vehicle (e.g., car, snowmobile, motor boat, or an off-road vehicle (ATV) driven by someone who had been using marijuana in the last 2 hours? | 0= No, never or not in the past 12 months<br>1= Yes, in the past 12 months<br>-77= Don't know |
| | **Drive Plan** | Have you ever planned ahead or decided NOT to drive to avoid driving high? | 1= Yes<br>2= No<br>77= Don't know<br>88= Refuse to answer |
| **V.B. Use at Work** | **Use at Work** | In the past 30 days, have you used marijuana at work (including breaks) or within 2 hours of starting work? | 1= Yes<br>2= No<br>3= Not applicable – I have not worked in the past 30 days<br>77= Don't know<br>88= Refuse to answer |
| **V.C. Poly-Substance Use** | **Poly Use of Cannabis with Other Substances** | "Which substances have you used on the same occasion with marijuana in the past 12 months?" | 1 = No<br>2 = Yes:<br><br>**Use with Alcohol:** Alcohol<br><br>**Use with Cigarettes**: Tobacco cigarettes |

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| | | **Note**: This question is asked separately as a yes/no question for each category of substance. | **Use with E-Cigarettes:** E-cigarettes / vaped nicotine<br><br>**Use with Illicit Substances:**<br><br>**- Amphetamines:** Amphetamines (e.g., speed, crystal meth or ice)<br><br>**-MDMA:** MDMA (e.g., ecstasy, Molly, E, X)<br><br>**-Hallucinogens:** Hallucinogens (e.g., LSD, acid, PCP, magic mushrooms or 'shrooms', mescaline, peyote)<br><br>**-Cocaine:** Cocaine (e.g., crack, blow, snow)<br><br>**-Heroin:** Heroin (e.g., smack, dope), illegal fentanyl, or other illegal/street opioids<br><br>**-Rx Painkillers:** Prescription pain relievers to get high (e.g., oxycodone, hydrocodone)<br><br>**-Other Rx Drugs**: Other prescription medication to get high (e.g., Adderall, Valium) |
| **VI.A. Health Care Use/Cannabis as Treatment** | **Seeking of Medical Treatment** | In the past 12 months, did you seek medical help for any adverse or negative health effect(s) caused by using marijuana? | 1= Yes<br>2= No<br>77= Don't know<br>88= Refuse to answer |
| | **Use to Manage Mental Health** | Have you ever used marijuana to improve or manage symptoms for any of the following:<br>SELECT ALL THAT APPLY. | 0 = No<br>1 = Yes:<br><br>**Anxiety:** Anxiety (including phobia, obsessive-compulsive disorder or a panic disorder) |

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| | | | **Depression:** Depression (including dysthymia)<br><br>**PTSD:** Post-traumatic stress disorder (PTSD) or traumatic event (e.g., abuse or loss)<br><br>**Bipolar:** Bipolar disorder, mania, or borderline personality disorder<br><br>**Psychosis:** Psychosis (e.g., paranoia, disorganized thinking, hearing voices that others can't hear) or Dissociative Identity Disorder<br><br>**Schizophrenia:** Schizophrenia<br><br>**Alcohol/Drug Use:** Alcohol or other drug use<br><br>**Eating Disorder:** Eating disorder<br><br>**ADD/ADHD:** ADD/ADHD<br><br>**Other:** Other significant emotional or mental health problem (we'll ask about pain, sleep, and physical health symptoms) on the next screen):_____ |
| | **Use to Manage Physical Health** | Have you ever used marijuana to improve or manage symptoms for any of the following:<br>SELECT ALL THAT APPLY. | 0 = No<br>1 = Yes:<br><br>**Headaches/Migraine:** Headaches/migraines<br><br>**Pain:** Pain (including arthritis, neuropathy or premenstrual syndrome)<br><br>**Nausea:** Nausea/vomiting or chemotherapy symptoms<br><br>**Lack of appetite:** Lack of appetite<br><br>**Seizures:** Seizures |

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| | | | **Muscle spasms:**<br><br>**Cancer:** To shrink tumors or treat cancer<br><br>**Insomnia:** Problems sleeping<br><br>**Digestion:** Digestion/gastrointestinal issues (Crohn's Disease, colitis, irritable bowel syndrome, inflammatory bowel disease, etc.)<br><br>**Fibromyalgia:** Fibromyalgia<br><br>**Other:** Other condition(s) (please specify):_____ |
| **VII.A. Percent Legal Cannabis Purchase** | **Percent Legal Purchase: All** | Overall, how much of the marijuana that you used in the past 12 months was purchased from LEGAL/AUTHORIZED sources?<br>ENTER % FROM LEGAL SOURCES: _____ % | A number, 0-100 |
| | **Percent Legal Purchase: Concentrates** | Overall, about what percentage (%) of the concentrate that you used in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |
| | **Percent Legal Purchase: Drinks** | What percentage (%) of the marijuana drinks that you drank in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |
| | **Percent Legal Purchase: Edibles** | What percentage (%) of the edibles that you ate in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |

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| | **Percent Legal Purchase: Flower** | Overall, about what percentage (%) of the dried herb that you used in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |
| | **Percent Legal Purchase: Oils, Oral** | Overall, about what percentage (%) of the oil or liquid drops that you used in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |
| | **Percent Legal Purchase: Oils, Vaporized** | Overall, about what percentage (%) of the oil or liquid that you VAPED in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |
| | **Percent Legal Purchase: Tinctures** | Overall, about what percentage (%) of the tinctures that you used in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |
| | **Percent Legal Purchase: Topicals** | Overall, about what percentage (%) of the topicals that you used in the past 12 months came from LEGAL/AUTHORIZED sources?<br>ENTER NUMBER: _____ % | A number, 0-100 |
| **VII.B. Reasons for Avoiding Legal Purchase** | **Reasons for purchasing illicit cannabis** | What were the main reasons you bought from illegal/unauthorized sources instead of legal/authorized sources?<br>SELECT ALL THAT APPLY. | **High Prices:** Legal sources had higher prices<br><br>**Less Convenient:** Legal sources were less convenient<br><br>**Too Far:** Legal stores were too far away/there are none where I live |

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| | | | **Dealer Loyalty:** Loyalty to my dealer<br><br>**Not Anonymous:** I wanted to stay anonymous<br><br>**Requires ID:** Legal sources require ID<br><br>**Product not offered legally:** Legal sources didn't sell the products I wanted<br><br>**Cannot buy legally:** I can't legally buy marijuana where I live<br><br>**Low quality in legal market:** Legal sources had lower-quality marijuana<br><br>**Low supply in legal market:** Legal sources had low supply or ran out |
| **VII.C. History of Cannabis Arrests** | **History of Cannabis Arrests** | **Have you ever been arrested for any of the following cannabis offences…? SELECT ALL THAT APPLY.** | 0 = No<br>1 = Yes:<br><br>**Possession:** Cannabis possession<br><br>**Distribution:** Cannabis trafficking, cultivation or importation |