Cannabis Control Commission
COMMONWEALTH OF MASSACHUSETTS

A Baseline Review and Assessment of the Massachusetts Adult-Use Cannabis Industry:

Market Data and Industry Participation

February 2020

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Purpose

This report has been prepared in response to the enabling legislation, Chapter 55 of the Acts of 2017 section 17a (iii) to assess two items on the Cannabis Control Commissions' 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 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*."

This report responds to two of the research agenda priorities for the adult-use cannabis market:

(1) ownership and employment trends in the marijuana industry examining participation by racial, ethnic and socioeconomic subgroups, including identification of barriers to participation in the industry; and
(2) 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.

Chapter 55 additionally 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.

***Note:** This report focuses on the first 12-months of adult-use sales and agent registrations from the first licensed Marijuana Establishments, which includes adult-use Marijuana Establishments and co-located Marijuana Establishments (medical and adult-use) that have submitted or began the application process for licensure in Massachusetts as of November 20, 2019.

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I. Executive Summary

While cannabis is not new, the legal marketplace for adult-use cannabis has only recently emerged in the United States. In 2012, Colorado and Washington made history as the first states to legalize adult-use cannabis, and Colorado retail stores opened for business in 2014.[1] Additional states followed suit with a range of heterogenous policies and regulations, the result has been a legal industry with distinct differences from other industries. Research on the adult-use market, industry participation, characteristics, and scope are only beginning to develop. This report begins to fill this gap with a preliminary assessment of the **adult-use** cannabis market in Massachusetts using data from the first 12-months after the first retail stores opened. Both the adult-use and medical cannabis markets will be assessed together in future reports.

Massachusetts legalized adult-use cannabis in 2016 and the first retail stores opened in 2018. From November 20, 2018 to November 20, 2019, the first full year of open retail stores, a gross total of $394,333,153.80 in sales (not including taxes) were recorded. For this report, the Massachusetts Cannabis Control Commission ("Commission") provides a scoping review of the legal market with baseline data from the first year of retail sales. The report aims to assess both the state of legal market products and sales, and industry participation (agent registration) by gender, race/ethnicity, veteran-status, farmer-status, and diversity in ownership (DIO) status.

Industry product and sales in the **adult-use** market were extracted from the state's seed-to-sale tracking system and organized into a policy heterogeneity framework ("P's of Legalization").[2] This includes descriptive data on types of cannabis establishments, production data, market share by product type, and product sales data. Industry participation in the adult-use market was assessed through the industry participation portal (*i.e. MassCIP*) including total agent registrations and demographic breakdowns. To contextualize baseline results, we also include literature reviews on the economics of cannabis demand, observations of products and prices in the legal and illicit markets, and participation in the legal cannabis industry.

***Note**: The illicit and full medical markets are not assessed in this report.

Main Findings

Adult-Use Market Data (11/20/18-11/20/19)

- As of November, 2019, there are 98 final adult-use Marijuana Establishment licenses in Massachusetts:
  - Final licenses consist of 37% Marijuana Retailers, 32% Marijuana Cultivators, and 27% Marijuana Product Manufacturers;
- Adult-use cannabis sales total $394,333,153.80 (not including taxes);
- Buds (flower) comprise the majority of sales (51%), followed by concentrates (19%), and edibles (17%);
- Concentrates (each) represent 19% of total cannabis products sold and account for 27% of total sales; and
- Among final licenses, provisional licenses, and applications under provisional consideration, 54% have registered medical dispensary priority; 44% are general applicants; and 2% have economic empowerment priority.

Adult-Use Industry Participation (11/20/18-11/20/19)

- As of Novemeber, 2019, there are 6,973 adult-use agent registrations (individual agents may have >1 registration(s)). Of out all registrations: 82% are employees, 8% are managers, 6% are executives, 3% are directors, and 2% are board members;
  - Agent registrations account for 4,228 unique individuals;
- The majority of agent registrations identify as White (75%), followed by decline to answer (10%), and Hispanic, Latino, or Spanish (6%);
- The majority of agent registrations identify as male (67%), non-Veteran (89%), and non-farmer (99%);
- Most agent registrations are Massachusetts (MA) residents (83%):
  - Of MA registrations, 30% were for persons residing in an Area of Disproportionate Impact or Named City; and
- Among final licenses, provisional licenses, and applications under provisional consideration, 90% of businesses do not identify with any Diversity in Ownership (DIO) criteria.

II. Brief History of Cannabis Laws

Worldwide, cannabis has been used for religious, recreational, and therapeutic purposes for thousands of years.[3–7] In the United States (U.S.), cannabis cultivation and use were legal under federal and state laws throughout most of American history. An increase in cannabis use from 1910-1920, coupled with political hysteria, led 29 states including Massachusetts to pass laws prohibiting the possession or sale of cannabis.[4,8,9]

In 1970, The Federal Controlled Substance Act (CSA) replaced the Marihuana Tax Act of 1937 and placed cannabis ("marijuana") as a Schedule 1 drug, the most restrictive ranking. Despite increasing stringency of federal cannabis policies over time, the recreational use of cannabis increased. In 1971, President Richard Nixon declared a war on drugs aiming to combat drug abuse on the supply and demand sides. However, a disproportionate number of War on Drug policies focused on criminal justice enforcement and punishment for drug offenses—creating systematic changes in the criminal justice system.

Currently in the CSA and under the U.S. Drug Enforcement Agency (DEA) jurisdiction, cannabis remains classified as a Schedule 1 drug, contending that it has: (1) a high potential for abuse, (2) no current accepted medical use in the U.S., and (3) a lack of accepted safety for use under medical supervision.[10,11]

Moving Toward Legalization

Movement toward cannabis legalization has occurred on a state-by-state basis. The first wave of cannabis legalization was decriminalization, which replaced criminal sanctions for possession and small-scale casual distribution of cannabis with civil fines.[12] Since 1972, 22 states and the District of Columbia (D.C.) have enacted policies decriminalizing small amounts of cannabis.[13]

Medicinal marijuana policies, which allow access and use of cannabis for certain medical purposes, followed. Since 1996, 33 states and the District of Columbia have enacted varying laws permitting comprehensive medicinal cannabis programs.

Since 2012, 11 states and D.C. have enacted varying laws permitting small amounts of cannabis for non-medical adult-use for those 21 years-old or older ("21≤").

Massachusetts

Massachusetts enacted and implemented all three types of cannabis legalization in disparate waves. All three waves of Massachusetts cannabis legalization were enacted via ballot initiatives: cannabis decriminalization in 2008 with Question 2, "*The Sensible Marijuana Policy Initiative*," medicinal cannabis in 2012 with 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 Question 4, "*Massachusetts Legalization, Regulation and Taxation of Marijuana Initiative.*"

III. Data Sources and Limitations

Section 17 of Chapter 94G of the Massachusetts General Laws states the Cannabis Control Commission research agenda shall include but not be limited to:

> "…*economic and fiscal impacts for state and local governments including the impact of legalization on the production and distribution of marijuana in the illicit market and the costs and benefits to state and local revenue;* (iv) *ownership and employment trends in the marijuana industry examining participation by racial, ethnic and socioeconomic subgroups, including identification of barriers to participation in the industry;* (v) *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…"*

Industry participation and seed-to-sale tracking data are analyzed in this report. We extrapolate data from the Cannabis Control Commission ("Commission") data warehouse platform ("Open Data"), which includes both industry participation (i.e. MassCIP) and seed-to-sale tracking (i.e. Metrc) data.

Identification of barriers to participation is not assessed in this report, as it has been examined elsewhere.[1] The illicit market is not assessed is this report due to time and resource constraints; However, data sources to assess this construct in future reports are provided.

[See subsection *Potential Data Sources for Future Reports* below]

Data Warehouse Overview

Data from two distinct portals: (1) seed-to-sale tracking (Metrc) and (2) industry participation (MassCIP) are centralized under one data platform via a third party a vendor (Socrata) for regulation and monitoring purposes.

Commission regulations require all Marijuana Establishments, Medical Marijuana Treatment Centers, and Independent Testing Laboratories to track cannabis through Massachusetts's seed-to-sale tracking system [See: 935 CMR 500.105(8)(e)]. This tracking captures everything that happens to a cannabis plant, from cultivation, through growth, harvest and manufacturing of products, including any transportation, to inventory storage and final sale of products to consumers or other licensees.

Additionally, all owners, persons with controlling interests, and persons working in the legal cannabis industry are required to complete an agent registration. Therefore, Massachusetts's data warehouse platform is a rich data source for legal cannabis production, manufacturing, sale, and

[1] See Special Report: A Baseline Review and Assessment of the Massachusetts Cannabis Industry's Required Positive Impact Plans (page 24) and 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 (page 66).

ownership and employment in the legal industry. [See the Open Data Platform for publicly available seed-to-sale system tracking and industry data: https://opendata.mass-cannabis-control.com/]

For this report, we assess cannabis product and sales data ("fiscal impacts") and owner and employee demographic (*e.g. gender, race/ethnicity, veteran status*) ("ownership and employment trends") data.

Limitations

Massachusetts's data warehouse platform, including both seed-to-sale tracking and industry data, is subject to limitations. Human error may occur when entering plant and/or agent data into the system. There may be inconsistent use of the seed-to-sale tracking system between establishments (*e.g. coding of product type*). Additionally, researchers identify the following limitations to similar seed-to-sale tracking systems: dishonest and/or neglectful reporting,[14] software glitches,[14] lack of official codebook,[14] and challenges discerning price and potency among all products types.[15]

There are additional limitations in tracking industry participation by demographic characteristics. Data for agent registrations are typically reported by owners, therefore, employee data may be inaccurate, and certain characteristics (*e.g. race/ethnicity*) may be subject to greater inaccuracies. Additionally, certain demographic characteristics of underrepresented persons (*e.g. person with disabilities, LGBT+ individuals)* are not captured.

Potential Data Sources for Future Reports

1. International Cannabis Policy Study

The International Cannabis Policy Study (Principle Investigator, Dr. David Hammond, University of Waterloo, 2018-ongoing) is a Canada/U.S. epidemiologic study surveilling varying cannabis use patterns and outcomes, including: problem use, and legal and illicit market sourcing. Massachusetts's respondents are surveyed for this study. Through collaboration with the International Cannabis Policy Study team, the Commission aims to conduct a preliminary assessment of "*the expansion or contraction of the legal marketplace, including estimates and comparisons of pricing and product availability in both markets*" among Massachusetts respondents in future reports.

2. Follow-up to DPH Marijuana Baseline Report: *Financial Modeling Section*

The Marijuana Baseline Health Study (MBHS) (Massachusetts Department of Public Health, 2019), includes a financial modeling section that projects the cannabis market.[16] Researchers in this report assume, "*approximately 65% of marijuana users would shift from purchasing their marijuana in the illicit marketplace to purchasing from a dispensary*."[16] In future years, a follow-up to this study could be conducted.

3. Law Enforcement Seizure Data via National Incident Based Reporting System or Directly from Law Enforcement Departments

Law enforcement data (via the National Incident Based Reporting System (NIBRS)) for participating municipalities includes data on drug seizures. While seizures likely represent illicit cannabis, legally produced cannabis could be captured in this data. However, seized cannabis likely represents a small percent of all illicit market cannabis and would need to be used in conjunction with other data to attempt to triangulate the scope of the illicit market.

4. National Survey on Drug Use and Health (NSDUH) Self-Reported Cannabis Use

Self-report cannabis use rates in the NSDUH could be compared to legal sales to attempt to triangulate the illicit market (see Caulkins et al. 2019).[17] However, there are a number of limitations to this work and it would not provide any firm estimates of the illicit market.

5. Localized/Municipality Level Data (*e.g. Census, Zillow Rent Index*)

Various data sources are necessary to assess the costs and benefits to local and state government. Geo-mapping of select census level data points (*e.g. unemployment rate, property values, rental price estimates*) could be examined in conjunction with Marijuana Establishment locations and self-report data to begin to triangulate local level industry effects.

6. Survey of Ancillary Business

The cannabis industry includes ancillary businesses whose employees do not touch cannabis product(s), but that otherwise engage with the industry. For example, Heating/Ventilation/Air Conditioning (HVAC) technicians or energy and electrical companies that work with cannabis companies. These businesses are external to the seed-to-sale tracking system, therefore, any assessment would require other mechanisms of analyses, such as a primary survey of ancillary business.

***Note:** This report focuses on the first 12-months of adult-use sales and agent registrations from the first licensed Marijuana Establishments, which includes adult-use Marijuana Establishments and co-located Marijuana Establishments (medical and adult-use) that have submitted or began the application process for licensure in Massachusetts as of November 20, 2019.

IV. Methods

Time Frame

Massachusetts seed-to-sale tracking system data were extracted from the data management portal for all legal adult-use cannabis products in Massachusetts from November 20, 2018 – November 20, 2019. This represents one year from the start of legal adult-use retail sales. Please see the Open Data Platform for access to select data. StataMP 15 was used for all analyses.

Data in the seed-to-sale tracking system are self- or owner-reported and exclude voided transactions.

The following product types are captured and were extracted from the seed-to-sale tracking system: Buds ("flower"); Concentrate (each); Concentrate; Infused (edible); Infused (non-edible); Infused Pre-Rolls; Raw Pre-Rolls; Shake/Trim (by strain); Shake/Trim; Kief; and Other. [See *Table IV.1. Product Category Descriptions* below for description of each product type as provided by the Massachusetts seed-to-sale provider] Importantly, data is reported by each establishment so there is a change of inconsistency regarding product type.

Table IV.1. Product Category Descriptions (as provided by Massachusetts seed-to-sale tracking system provider)

Product Type	Count or Weight Based	Description
Buds	Weight	The actual nuggets that a consumer grinds and smokes. Buds are the part of the cannabis plant that contain the cannabinoids including THC, CBD, CBG, and THCV.
Concentrate	Weight	A concentrate is any type of cannabis product that is refined from flowers into a more purified and potent form. A concentrate can refer to any form of hash, kief, or hash oil (*e.g. CO2, BHO, shatter, budder, wax*).
Concentrate (Each)*	Count	See above. The difference with this item category is that the data reporter can make this a count-based item. This is generally seen in prepackaged concentrates that are a standard weight that are easier to manage from an inventory perspective such as vaporizer cartridges.
Infused (edible)	Count	Edibles are cannabis-infused products that are consumed orally. Common forms of edibles include baked goods (*e.g. brownies and cookies*) and candy (*e.g. chocolate, gummies, and lollipops*).
Infused (non-edible)	Count	Cannabis-infused products that are not taken through oral consumption and digestion. This includes a range of products such as tinctures and transdermal patches.
Infused Pre-Rolls	Weight	Raw flower (ground bud or shake trim) cannabis that has been infused with a concentrate and rolled with cigarette paper or tobacco leaves prior to sale.

Raw Pre-Rolls	Weight	Raw flower (ground bud or shake/trim) cannabis that was prepared by rolling in cigarette paper or tobacco leaves before its sale.
Kief	Weight	Kief is a result of separating trichomes from the cannabis plant. Kief is a powdery substance that holds the most amounts of cannabinoids, making it potent and a very pure form of concentrate. Not typically sold to patients/consumers and is used primarily in Product Manufacturer licenses to produce concentrates.
Shake/Trim	Weight	Shake is the excess cannabis product that is separated from the nuggets of bud during the packaging process. Trim is the excess snipping of leaves from buds of cannabis plants during the harvesting process. Shake/Trim is lower in potency and quality than buds and is typically used in the product manufacturing or producing pre-rolls to be sold to patients/consumers.
Shake/Trim (by strain)	Weight	See above. The difference is this item category requires a strain to be associated with it.
Suppositories	Count	A solid medical preparation of a cannabis infused product in a roughly conical or cylindrical shape, designed to be inserted into the rectum or vagina to dissolve.

*After the study period, a new category was created for vaporizer cartridges and disposable pens. In the future, this will enable further stratification of concentrate categories to reflect vaporizer cartridge and pen sales. Currently, those items are tracked primarily under Concentrate (each); However, they also appear as Concentrate and Infused non-edible.

Analytic Plan

1. Market Data

Unit of Analysis

This report primarily utilizes an "item-level" unit of analysis, meaning we analyze each retail product separately, rather than a "transaction-level" unit of analysis which could contain multiple items. This is consistent with similar research.[18]

Potency

While laboratory results from a source product capture the potency of cannabis products, potency analyses (*e.g. % THC:% CBD*) are not examined in this report due to time constraints and data limitations (see below). Other researchers capture potency by summing active THC and 0.877 times inactive THC (THC-A).[17–19]

A limitation to the current seed-to-sale tracking system is the ability to extract product item and potency laboratory results simultaneously. Both data points are collected in the system; However, the system currently requires manual linkage of laboratory results from an item's "parent batch" to the item. Linkage between individual product and laboratory result could not be fulfilled for this report due to time and resources constraints. Efforts to include such analyses in future reports will be assessed. This represents a limitation to the immediate application of seed-to-sale tracking system data and analyses. Other researchers report challenges to collecting potency for certain product types in similar seed-to-sale tracking systems (*e.g. lack of potency data for edibles*).[17]

2. "Participation" (Ownership and Employment) Data

Unit of analysis

The unit of analysis for agents is primarily individual-level (*i.e. agent registration-level*). Agent registrations account for: board members, directors, employees, executives, managers, and volunteers. The exception to this unit of analysis are Tables VI.B.11 and Table VI.B.12, which assess diversity in ownership (DIO) at the business-level.

Note: "Agent" refers to a registered board member, director, employee, executive, manager, or volunteer of a Marijuana Establishment. Employees includes consultants or contractors who provide on-site services to a Marijuana Establishment related to the cultivation, harvesting, preparation, packaging, storage, testing, or dispensing of cannabis. One individual can have multiple agent registrations.

V. "P's of Legalization" Framework

Cannabis legalization policy, regulation, implementation, enforcement, and fidelity of implementation are heterogenous processes across states and countries, and these differences will affect the impact of legalization. While findings and projections from other states offer key insight, analysis that does not account for the unique policy scape miss critical differences. This report focuses on the short-term (*i.e. one-year after implementation*) impacts of legalization on the cannabis market in Massachusetts.

To account for the unique policy cannabis policy landscape in Massachusetts, we use Kilmer's (2019) framing of the "14 P's" which mark differences in policy design choices that will ultimately impact outcomes.[20] These design differences are described in the table below and frame VI.A.1. Market Data subsection of the baseline data section.

Table V.1. "14 P's of Cannabis Legalization" (Kilmer, 2019)

Policy Design	Description
1. Production	Production in a legal market is less expensive and more efficient than in the illicit market. The extent to which production is able to operate most efficiently is shaped by policy decisions, including number and size of legal ("licensed") producers, production location, and legal products.
2. Profit Motive	A small number of heavy users will represent the majority of legal cannabis sales in retail stores.[21] The impact of profit motive is shaped by policy decisions, such as allowing non-profit legal cannabis (*e.g. home grow; cooperatives),* and whether for-profit companies are allowed (*e.g. retail stores versus state run stores*).
3. Power to Regulate	The body responsible for regulating cannabis, including whether or not the regulatory body is located in an existing entity, and the actions available to this body will affect outcomes.
4. Promotion	Industry promotion and advertisement of cannabis products will affect legalization outcomes. The impact of promotion is shaped by policy decisions that restrict or allow promotion (*e.g. logo/packaging restrictions; advertising restrictions*).
5. Prevention and treatment	The extent to which resources are provided toward preventing risky and illicit cannabis use (*e.g. use by people <21 years old; accidental ingestion*) and resources to treat problem use will affect outcomes. Prevention will also be shaped by harm reduction policy decisions (*e.g. childproof packaging; public awareness campaigns; density of retail stores*).
6. Policing and enforcement	The extent to which law enforcement resources, priorities, and time are devoted to cannabis related offenses after legalization will impact outcomes.
7. Penalties	How heavy penalties are for cannabis behaviors that remain illegal after legalization (*e.g. underage use, operating under the influence of cannabis)* will impact outcomes.
8. Prior criminal records	Whether and to what extent prior cannabis convictions are sealed and/or expunged will impact outcomes.
9. Product types	The types of cannabis products available for sale in retail stores will impact outcomes.

10. Potency	The potency of legal cannabis, particularly THC levels, will affect outcomes. Policy decisions, such as potency limits or potency-based taxes, will affect potency levels in products and their subsequent impact.
11. Purity	The purity (*e.g. mold; pesticides; additives*) of legal cannabis is impacted by policy decisions (*e.g. product labeling; restriction on products that can be infused with cannabis; testing protocols*) and will impact outcomes.
12. Price	The price of cannabis, particularly price per THC unit, will impact consumption, tax revenue, diversion, and legal versus illicit consumption. Price and its impact will be impacted by policy decisions (*e.g. taxes; regulatory/licensing/compliance fees*).
13. Preference for licenses	Whether and to whom is given licensure preference is a policy decision that will impact outcomes.
14. Permanency	The flexibility of cannabis policy and regulation are directly impacted by policy decisions (*e.g. "sunset provisions;" separate regulatory agency*).

VI. Baseline Data

Unless noted, baseline data are limited to **adult-use** Marijuana Establishments, which includes co-located Marijuana Establishments (medical and adult-use) that have submitted or began the application process for cannabis establishment licensure in Massachusetts as of November 20, 2019. Marijuana Establishments may hold multiple licenses but may not hold more than three licenses for each license type. Please note that establishments may hold a final license but not yet be fully operational. [See *Appendix 2, Table 1* for a description of license types available in the Commonwealth]

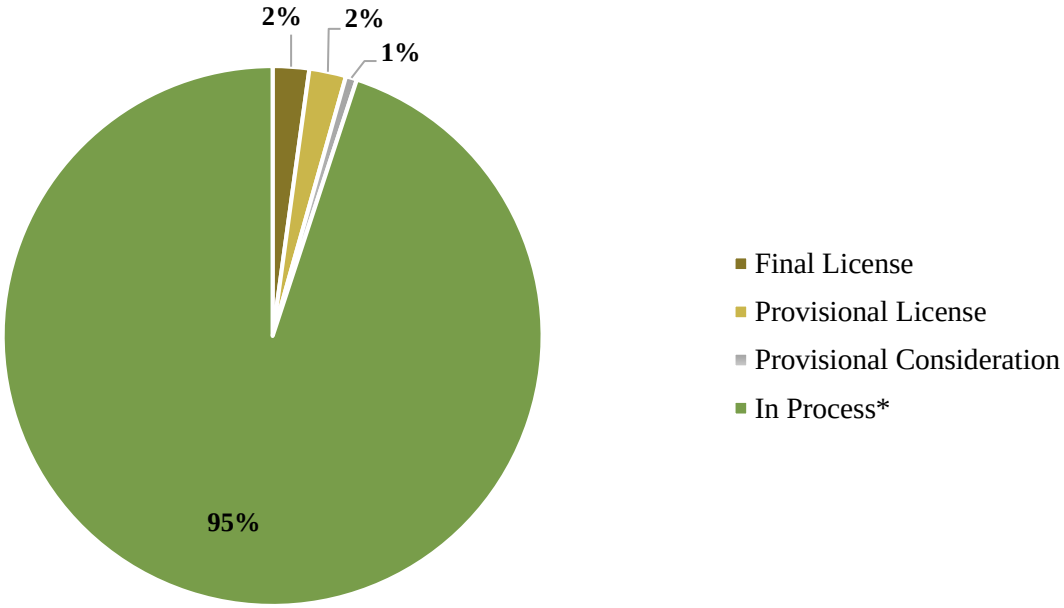
The subsection, VI.A. Market Data, provides an overview of license/application statuses, the distribution of final licenses, plant activity, and product sales. The "14 P's of Legalization" framework guides data presentation and findings.[20] The subsection, VI.B., recommends a "15th P," ***Participation***, and examines ownership and employment trends in the industry as captured through agent registration data.

VI.A. Adult-Use Market Data

Adult-Use License and Application Status

Since November 20, 2019, 98 final licenses were issued in Massachusetts. Another 99 provisional licenses were issued, and an additional 30 applications were under provisional consideration (*i.e. provisionally approved applications*). [See *Table VI.A.1. License Status* and *Table VI.A.2. License Status Totals*]

Table VI.A.1. Adult-Use License Status [Current as of 11/20/19]



***Note**: In Process includes application that are incomplete (n=3,569), pending (n=400), and withdrawn (n=397). This includes co-located medical and adult-use establishments.

Table VI.A.2. Adult-Use License Status Totals [Current as of 11/20/19]

License Status	Total	(%)
Final License	98	(2%)
Provisional License	99	(2%)
Provisional Approval	30	(0.7%)
Denied	4	(0.9%)
***In Process, including:**		
Incomplete	3,569	(77.6%)
Pending	400	(8.7%)
Withdrawn	397	(8.6%)
In Process Total	4,366	(95%)
Total	**4, 597**	

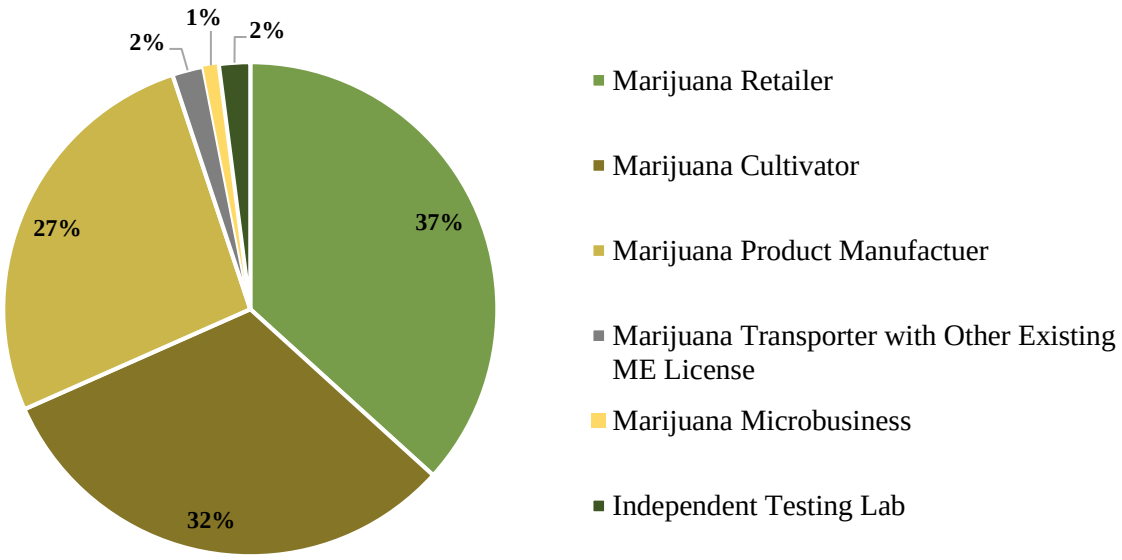
Adult-Use Final Licenses

Final licenses are the second to last step before a cannabis business may commence operations. A final license indicates that the Commission has approved a business contingent on a final inspection. After inspections are complete, the Commission will issue a commence operations notice and the business may commence operations.

As of November 20, 2019, there were: 36 marijuana retailer licenses, 31 marijuana cultivator licenses, 26 marijuana product manufacturer licenses, 2 marijuana transporter with other existing marijuana establishment license licenses, 1 marijuana microbusinesses license, and 2 independent testing laboratory licenses issued. [See *Graph VI.A.3. Marijuana Establishments with Final License by License Type* and *Appendix 2, Table 3* for final license totals; see *Appendix 2, Table 1* for description of license types]

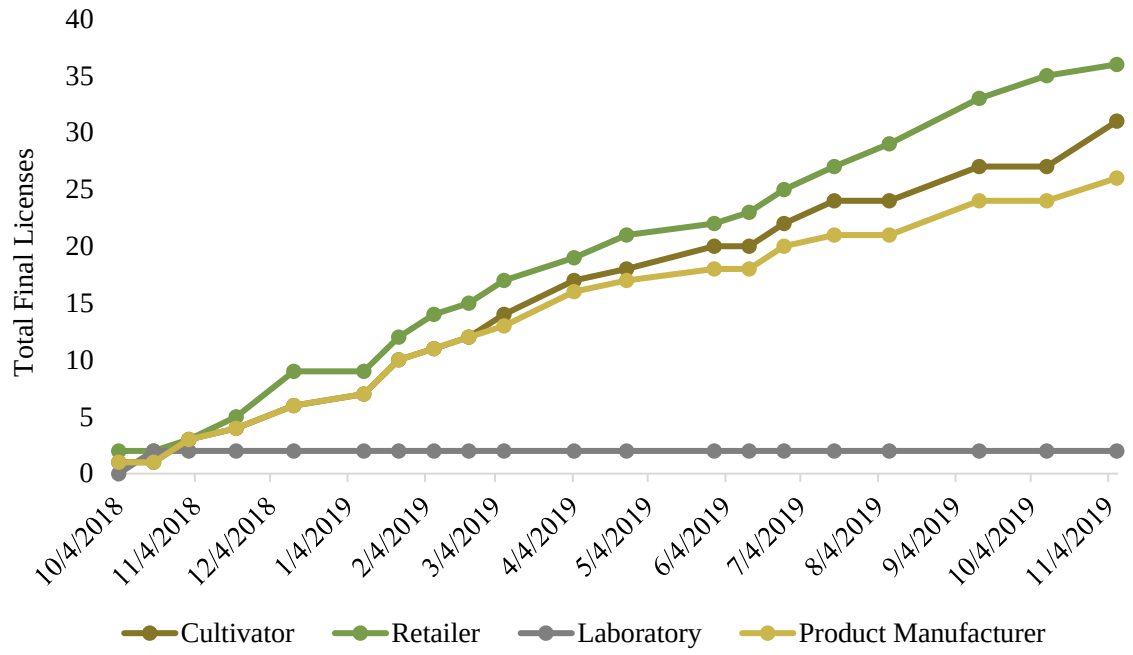
As of November 20, 2019, 33 adult-use cannabis stores have opened in the Commonwealth.

Graph VI.A.3. Marijuana Establishments with Final License by License Type [Current as of 11/20/19]



The first adult-use final licenses were issued on October 4, 2018. Two cannabis retailers opened to the public on November 20, 2018. Final licenses for cannabis retailers, cultivators, and product manufacturers have increased at a steady rate through November 4, 2019. However, independent testing laboratories, which test all cannabis products before they can be sold, have remained at two final licenses (issued October 18, 2018). [See *Graph VI.A.4. Timeline of Final License by License Type*]

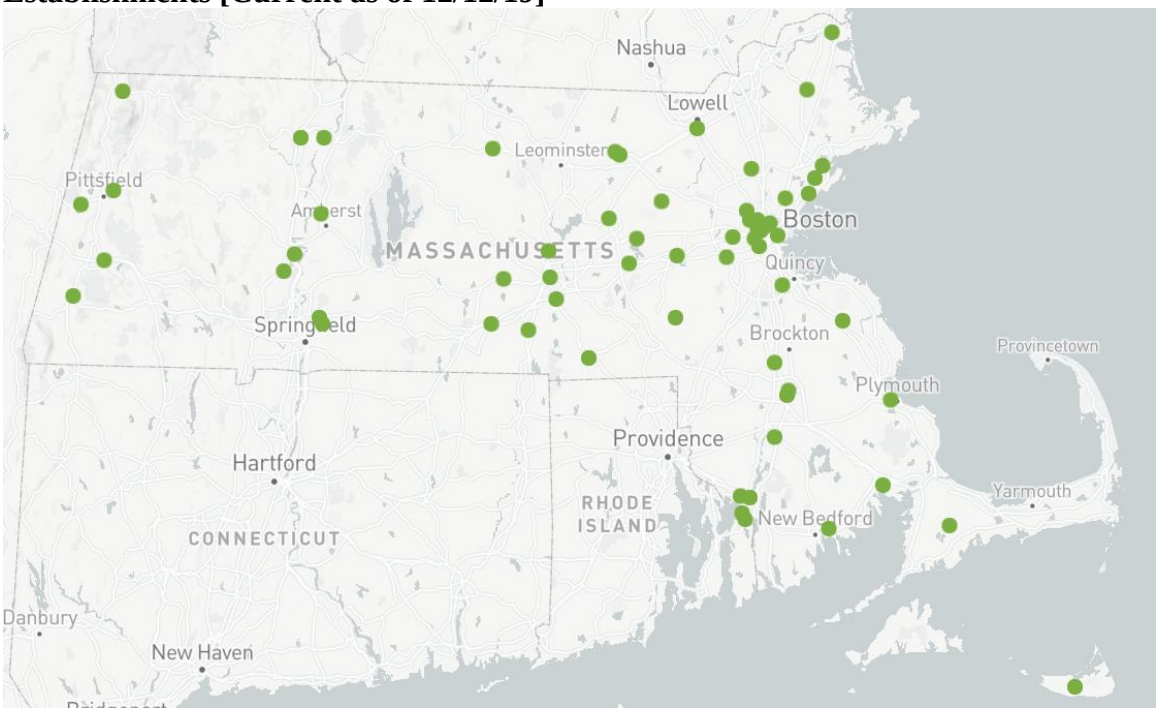
Graph VI.A.4. Timeline of Final Licensure by License Type [11/20/18-11/7/19]



Final licenses are not randomly distributed. Cities and towns differ in their consideration of cannabis business, approval processes, and bans for cannabis establishments within their jurisdictions. [See *Appendix 2, Table 2* for Marijuana Establishments with final license by city/town]

The figure below shows the spatial locations of both operational adult-use retailer stores and medical marijuana treatment centers. [See *Figure VI.A.1*]

Figure VI.A.1. Locations of Massachusetts Adult-Use and Medical-Use Marijuana Establishments [Current as of 12/12/19]



Source: Store Locator, MoreAboutMJ.org, retrieved December 12, 2019, https://moreaboutmj.org/marijuana-store-locate/

1. Production

Production ability, capacity, and efficiency will impact the size of the market and price of products. Differences in production may help explain differences in legalization impacts between states with legal cannabis markets. For example, in 2019, the Oregon Liquor Control Commission estimated that producers produced approximately twice as much cannabis as expected demand.[22] High supply and low wholesale price contributed to low prices, and illustrates how production differences help explain key differences between legal markets.[22] As of September 1, 2019, Oregon stopped processing additional production license application.[23] In contrast, Washington state imposed limits on the number of licenses at the start of legalization.[24]

Legal market production can be measured through the number of licensed cultivators, and the size of canopy for each cultivator. It can also be measured through total plant activity and volume of licensed marijuana establishments. This includes total: (1) plant count, (2) mature plant count, (3) plant vegetative count, (4) plant flowering count, (5) plant harvested count, and (6) plant destroyed count. [See *Table VI.A.5. Plant State Definitions* below for additional detail on categories and *Graph VI.A.6. Total Plant Activity and Volume*]

Table VI.A.5. Plant State Definitions

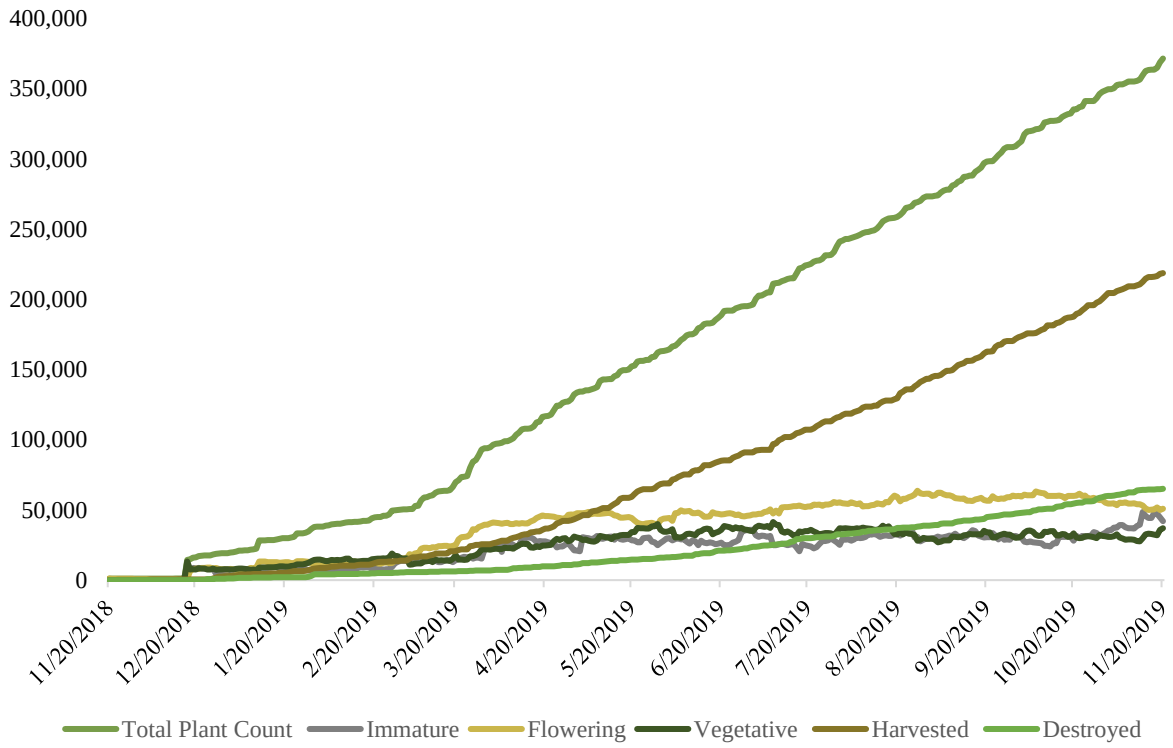
Plant State	Description
Mature Plant	Plants greater than 8” tall.
Plant Vegetative	The state of the cannabis plant which is a form of asexual reproduction in plants during which plants do not produce resin or flowers and are bulking up to a desired production size for flowering.
Plant Flowering	Flowering is the gametophytic or reproductive state of cannabis in which the plant is in a designated flowering space within a cultivation facility with a light cycle intended to produce flowers, trichomes and cannabinoids characteristic of cannabis.
Plant Harvested	Plant harvested generally refers to plants that are in the drying and curing phase.
Plant Destroyed	Plants destroyed refers to plants that are rendered unusable by the marijuana establishment. Plants in this count may not be processed, sold, or given away.

Source: Massachusetts Seed-to-Sale Guidance, https://mass-cannabis-control.com/wp-content/uploads/2018/09/Seed-to-Sale-Tracking-Guidance-09182018-v-FINAL-for-Web.pdf, retrieved October 17, 2019.

Findings

From November 20, 2018 – November 20, 2019, a total of 371,596 cannabis plants were legally produced in the adult-use market. This total represents all plants (excluding immature plants) that have been through flowering, vegetation, harvesting, and additionally includes plants that were destroyed. [See *Graph VI.A.6. Total Plant Activity and Volume*]

Graph VI.A.6. Total Plant Activity and Volume [11/20/18-11/20/19]



2. Profit Motive

A small number of heavy users will represent the majority of legal cannabis sales in retail stores, therefore, the extent to which the industry is driven by profit-motive will affect the impact(s) of legalization.[21] An assessment of the profit motive is beyond the scope of this report.

3. Power to Regulate

The body responsible for regulating cannabis, location, capacity, and the actions available to this entity, will affect economic and social impacts of cannabis legalization. An assessment of the power to regulate is beyond the scope of this report.

4. Promotion

Marketing and promotion will affect economic and social impacts of cannabis legalization. An assessment of industry advertisement is beyond the scope of this study.
[See: A Baseline Review and Assessment of Cannabis Use and Youth: Literature Review and Preliminary Data in Massachusetts (2019) *Appendix VII: Public Health and Prevention in Regulations, as of July 2019* for information about regulations to restrict industry promotion and advertisement]

Market Segmentation

Market segmentation, or targeting products and services to a specific sub-group (*i.e. niche marketing*), may result in varying levels of promotion to different groups.[25] See Cooke et al. 2018 for analysis of market segmentation in a sample of California medical dispensaries.[25] No articles that assess market segmentation in the adult-use market were identified, representing a gap in the literature.

5. Prevention and treatment

Limiting access to retail cannabis stores may be a prevention tool; However, more research on effectiveness is needed.[26] Previous research of alcohol and tobacco stores identify density limits as a prevention mechanism for reducing alcohol and tobacco use.[27] Some medical cannabis research suggests that higher retail outlet density is associated with increased cannabis use and associated negative outcomes.[28,29] However, findings are mixed. Some studies do not report store density effects on use.[30–32] Additionally, there are key differences from medical cannabis stores to adult-use cannabis stores. For example, medical stores are restricted to registered patients, therefore, medical findings may not reflect the impact(s) of adult-use cannabis stores. Additionally, delivery service availability may increase legal cannabis access beyond store locations.[30]

Only one study assessed whether access to adult-use cannabis stores, including proximity, geospatial density, and per capita density, were associated with increased cannabis use.[24] Everson et al. 2019 compared self-reported "any" and "heavy" cannabis use measures, as captured in the Washington State Behavioral Risk Factor Surveillance System (BRYFSS, 2009-2016), to respondent's distance from a cannabis retail store.[24] This study reports current use increased among adults within 18 miles of a store and frequent use increased among those within 0.8 miles of a store.[24]

There is research to suggest that adult-use cannabis stores are more likely to be located in lower-income areas with average lower socioeconomic status[33,34] and greater proportions of racial and ethnic minorities.[35] Careful monitoring of the impacts of cannabis retail store density remains critical, particularly to prevent perpetuation of harms to communities disproportionately affected by prohibition and enforcement. An assessment of treatment access is beyond the scope of this study.

Although an assessment of prevention and treatment are beyond the scope of this report, for additional prevention tools built into legal cannabis regulations, see A Baseline Review and Assessment of Cannabis Use and Youth: Literature Review and Preliminary Data in Massachusetts (2019) *Appendix VII: Public Health and Prevention in Regulations, as of July 2019* which details regulatory regulations aiming to restrict underage access.

6. Policing and Enforcement

The extent to which law enforcement priorities and resources are directed toward cannabis violations will affect the social and economic impacts of cannabis legalization. See Part 2: 94C Violations and Social Equity: Literature Review and Preliminary Data in Massachusetts – A Baseline Review and Assessment of Cannabis Use and Public Safety for a baseline study of cannabis violations in the Commonwealth. An assessment of policing and enforcement is beyond the scope of this study.

7. Penalties

The severity of penalties for illicit cannabis behaviors after legalization (*e.g. underage use, operating under the influence of cannabis*) will affect the social and economic impacts of legalization. See Adinoff and Reiman 2019 for an examination of state-to-state variation in penalties for illicit cannabis in states with adult-use legalization.[36] An assessment of penalties is beyond the scope of this study.

8. Prior Criminal Records

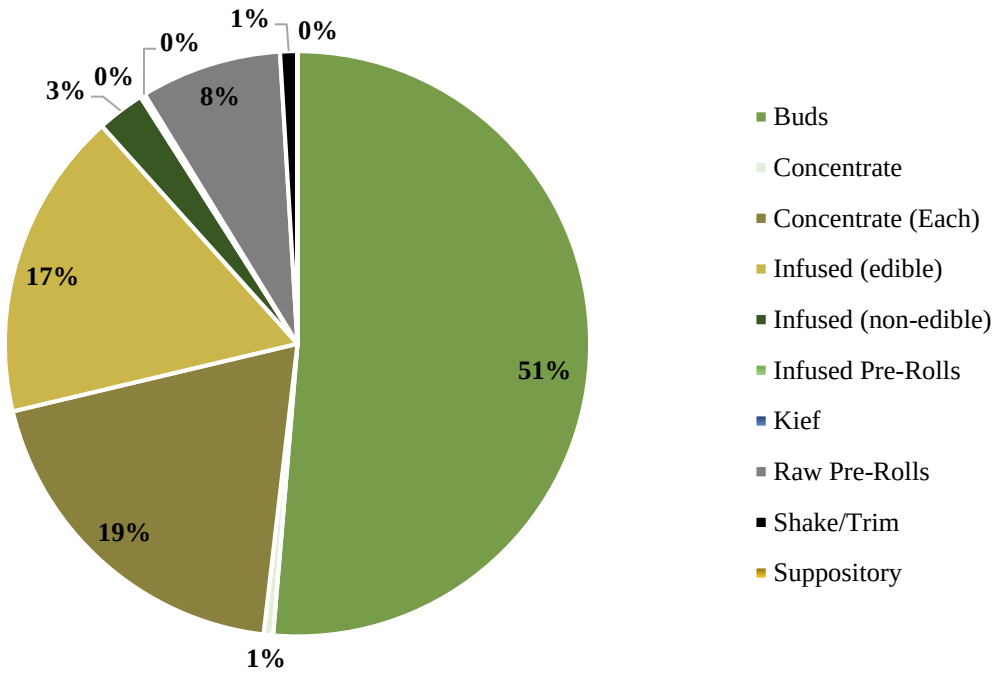
Whether to seal or expunge and to what extent prior cannabis convictions are sealed or expunged will affect the social and economic impacts of legalization. An assessment of criminal records is beyond the scope of this study. See Part 2: 94C Violations and Social Equity: Literature Review and Preliminary Data in Massachusetts – A Baseline Review and Assessment of Cannabis Use and Public Safety.

9. Product Types

The types of cannabis products available for sale in retail stores will impact social and economic outcomes. In Massachusetts, a wide range of cannabis products are permitted. [See *Table IV.1. Product Category Descriptions*]

In the first year of adult-use cannabis retail sales (including co-located adult-use and medical stores), buds ("flower") (51%) comprise the majority of sales, followed by concentrate (each) (19%), and infused (edible) (17%). [See *Graph IV.A.7. Market Share by Product Type* and *Appendix 3, Table 1* for total number of products sold]

Graph IV.A.7. Total Sales by Product Type [11/20/18-11/20/19]



***Note**: Data contains all sales from adult-use consumers and patients purchasing from an adult-use and/or medical co-located store.

10. Potency

Cannabis policy design and implementation will affect the potency of products and their subsequent impact. In the Massachusetts adult-use market, edibles have a limit of five mg of THC per dose, and 100 mg of THC for the entire package. (935 CMR 500.140(4)) There are no set caps on THC potency for all other products (*e.g. flower, concentrates*) and taxes are not currently tied to product potency.

Massachusetts requires all products be tested for their cannabinoid profile (*i.e. the dry-weight percentages, of delta-nine-tetrahydrocannabinol, cannabidiol, tetrahydrocannabinolic acid and cannabidiolic acid*) as well as for contaminants. (935 CMR 500.160(2)) Testing must be performed by an Independent Testing Laboratory licensed by the Commission in accordance with sampling and analysis protocols adopted by the Commission for testing finished cannabis and cannabis products and environmental media. (935 CMR 500.160(1)) The Commission may require additional testing. (935 CMR 500.160(2)) Laboratory testing results are recorded in the seed-to-sale tracking system; However, potency per product could not be assessed for this report.

While potency results for individual products can be determined through the laboratory results of a product's original batch, these results are not currently linked to the "final product." At this time, manual linkage of the original laboratory report and the final product is required to examine the potency level per product. Extraction and linkage could not be conducted for this report, representing a significant limitation. For a literature review on potency in the legal

market, see *VII. Literature Review of Market and Industry Data* subsection *2. Observation from Real Markets (Licit and Illicit).*

Certain types of cannabis products are known to have a higher potency of THC, including concentrates as compared to bud ("flower"). Therefore, an assessment of product type trends may indicate whether highly potent products ("concentrates") are increasing in popularity as compared to typically less-highly potent products ("flower"). [See *VII. Literature Review of Market and Industry Data* subsection *2. Observation from Real Markets (Licit and Illicit)*][14,18,19]

***Note**: Concentrate sales, including oils for vape products and vapes, were impacted by the statewide ban on vaporizing products and a subsequent quarantine on medical cannabis vaporizing products (excluding flower vaporizers) from September 24, 2019 through the end of study period.

11. Purity

The purity, quality, and perceived quality of products may affect demand and legalization impacts. Massachusetts requires laboratory testing of products; However, a full assessment of testing is beyond the scope of this report. For more information about purity in the Massachusetts market see "Guidance for Farmers" located here: https://mass-cannabis-control.com/wp-content/uploads/2018/08/Farmers-Guidance-v-FINAL-Commission.pdf.

Testing Accuracy

Research is only beginning to assess accuracy of cannabis product testing and best practices for laboratories. See Jikomes and Zoorob 2018 for an assessment of differences in THC and CBD testing in legal cannabis products across Washington state laboratories.[37]

12. Price

Price is heavily affected by policy decisions and is known to impact demand and consumption.[2] [See section *VII. Literature Review of Market and Industry Data 1. Market Analysis Cannabis Price Elasticity and Demand*] State taxation policy, as well as the ability for licensees to vertically integrate, the number of licensees, and regulatory costs may all impact price in varying ways. In Massachusetts, adult-use cannabis is subject to a state sales tax of 6.25%, a state excise tax of 10.75%, and there is a local option for cities or towns of up to 3%. Findings do not assess taxes. A tax assessment is beyond the scope of this report.

Purchase Behaviors

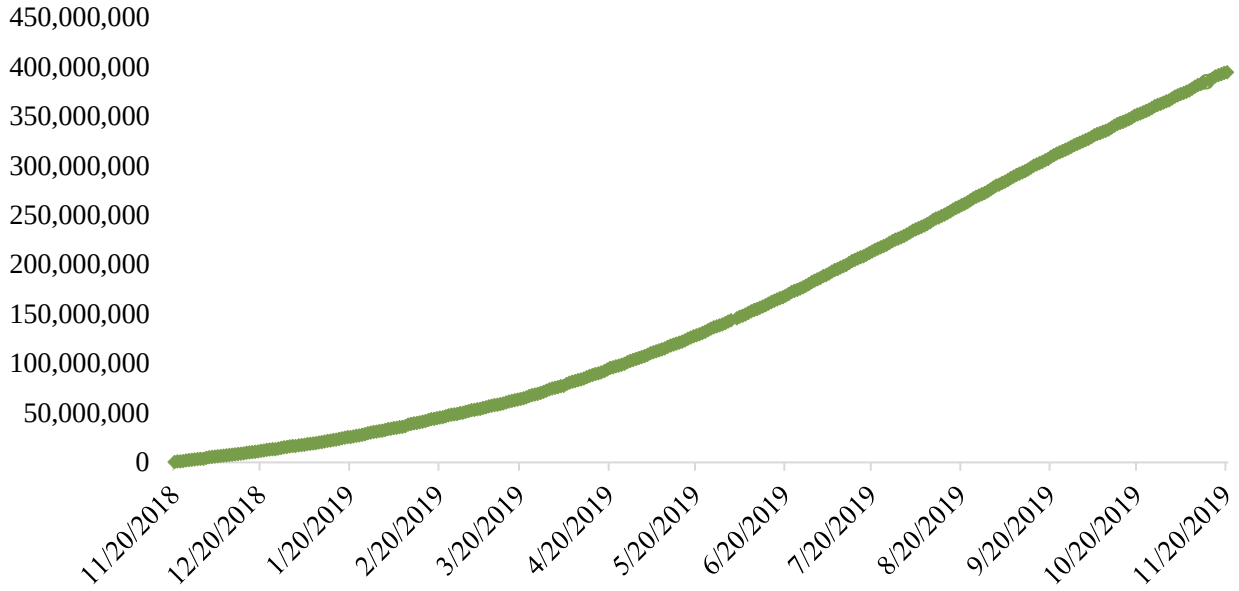
While some research assesses purchasing behaviors among patients in the medical cannabis market, there is very little information about purchase behaviors in the adult-use market. In the medical market, one study of purchase behavior in a single medical cannabis store in California report participants spent an average of $40.82 on bud (range $10-$255) per transaction.[38] Older patients and patients with a medical recommendation for anxiety, sleeping problems, or non-specified conditions spent more than younger patients and patients with chronic pain.[38] Another

study of 16 Los Angeles medical dispensaries report edible purchasing was more common in dispensaries located in areas with higher socioeconomic status and less common among Black and Hispanic patients compared to other non-white racial cohorts.[39] It is unknown if findings from medical cannabis facilities are applicable to adult-use retail stores.

Findings

From November 20, 2018 to November 20, 2019, gross ("total") sales for adult-use cannabis retail stores and co-located medical and adult-use stores were $394,333,153.80. Medical cannabis only store sales are not included in this figure. Total sales do **not** include tax(es) collected. [See *Table VI.A.8. Gross Sales for All Adult-Use Cannabis Products* for one year of retail stores data in dollars. This was an average of $1,077,412.50 sales per day. See *Appendix 3, Chart 2* for chart of total sales by day.]

Table VI.A.8. Gross Sales for All Adult-Use Cannabis Products [11/20/18-11/20/19]



In the first year of retail sales, buds ("flower") was the most frequently purchased product category, with a total of 4,705,546 units sold in total costing $191,940,288.30, or an average price per unit of $40.79. Concentrate (each) was the second most frequently purchased product category with 1,782,161 units sold in total costing $107,352,20,6.40 or an average price of $60.24 per unit. Infused (edible) was the third most frequently purchased product category with 1,564,222 units sold, for a total cost of $60,076,284.20, or an average of $38.41 per unit. [See *Table IV.1 Product Category Descriptions* for description of each product category, also see *Appendix 3, Table 3* for a glimpse of product category sales in a one-week period (11/12/19-11/19/19)]

Buds ("flower") represented 51% of total cannabis products sold and accounted for 49% of total sales. Concentrates (each) represented 19% of total cannabis products sold and accounted for 27% of total sales. Infused (edible) represented 17% of total cannabis products sold and accounted for 15% of total sales. [See *Table IV.A.10 Percent of Total Units Versus Total Sales*]

Table VI.A.9. Sales by Product Category [11/20/18-11/19/19]

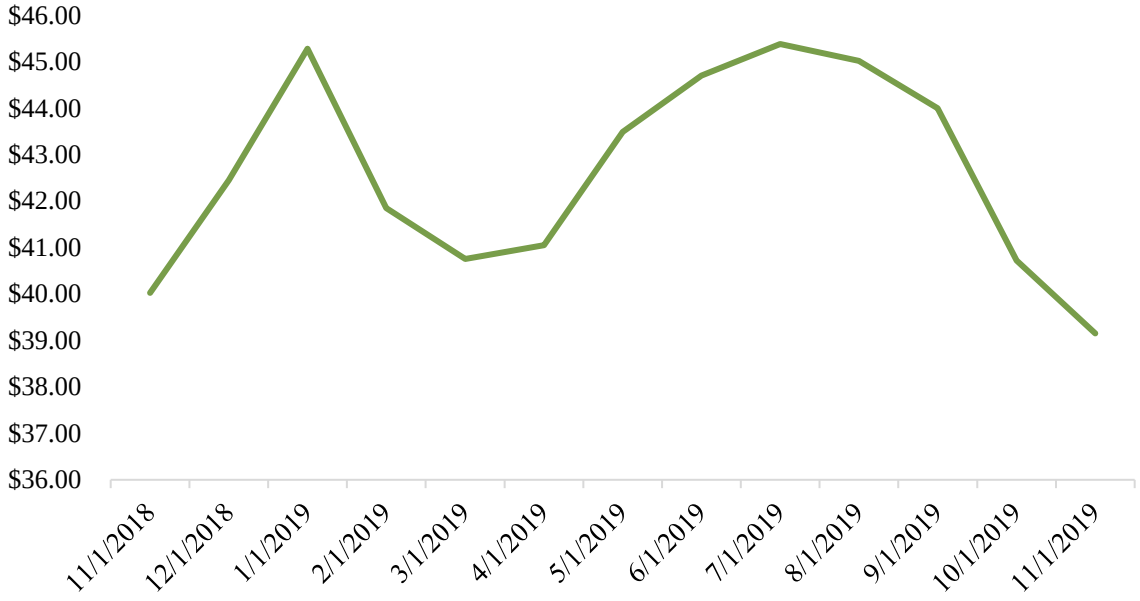
Product Category	Total Units	Total in Dollars	Average Cost Per Unit
Buds	4,705,546	$ 191,940,288.30	$ 40.79
Concentrate	47,688	$ 3,449,114.20	$ 72.33
Concentrate (Each)	1,782,161	$ 107,352,206.40	$ 60.24
Infused (edible)	1,564,222	$ 60,076,284.20	$ 38.41
Infused (non-edible)	241,373	$ 14,336,714.10	$ 59.40
Infused Pre-Rolls	15,987	$ 317,772.50	$ 19.88
Kief	9,017	$ 276,511.50	$ 30.67
Raw Pre-Rolls	713,747	$ 13,873,448.30	$ 19.44
Shake/Trim	4,442	$ 132,132.00	$ 29.75
Shake/Trim (by strain)	83,035	$ 1,949,656	$ 23.48
Suppository	47	$ 1,200.00	$ 25.53
Total	**9,167,265**	**$ 393,705,328**	

Table VI.A.10. Percent of Total Units Versus Total Sales [11/20/18-11/19/19]

Product Category	Percent of Total Units	Percent of Total Sales
Buds	51%	49%
Concentrate	1%	1%
Concentrate (Each)	19%	27%
Infused (edible)	17%	15%
Infused (non-edible)	3%	4%
Infused Pre-Rolls	0%	0%
Kief	0%	0%
Raw Pre-Rolls	8%	4%
Shake/Trim	0%	0%
Shake/Trim (by strain)	1%	0%
Suppository	0%	0%
Total	**100%**	**100%**

The average price per unit of all cannabis product types combined ranged between $39.15 and $45.38 per month. The average price per unit in the first year of retail sales was $42.61. [See *Graph IV.A.11. Aggregate Price Per Unit by Month*]

Graph VI.A.11. Aggregate Price Per Unit by Month [11/20/18- 11/19/19]



Note: A unit is a count of a specific item. For example, if a consumer purchases one ounce of a variety of cannabis bud, that would be one unit. If another consumer buys one pre-roll that would be one unit. This table presents raw average price per unit and does not control for potential confounding variables.

State and Local Tax

In Massachusetts, cannabis consumers pay a 6.25% sales tax and 10.75% excise tax. Additionally, municipalities have the option of adding up to a 3% local tax. As previously mentioned, price data collected in Massachusetts's seed-to-sale tracking system does **not** include tax, therefore, none of the tables/figures in this report include an assessment of taxes.

13. Preference for Licenses

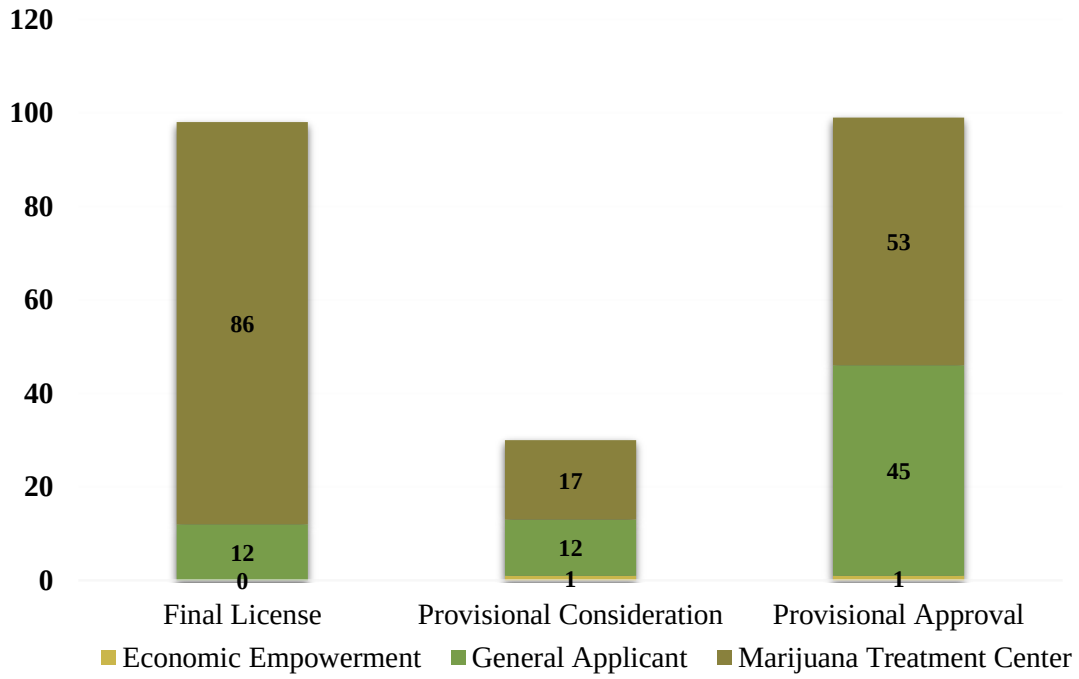
Preference for licenses directly impacts the cannabis industry and marketplace and will affect industry participation. In Massachusetts during the study period, current registered medical marijuana treatment centers (MTCs) and persons with economic empowerment certification status have priority in the licensure process (*i.e. application expedited to the front of the review line*).

The Commission's economic empowerment certification program (2018) prioritized license review for applicants residing in communities disproportionally impacted by cannabis prohibition, and explicitly included those affected by certain past drug convictions as indicated by a drug-related Criminal Record Check Services (CORI). [See *Appendix 6, Table 1* for full qualifying criteria]

Findings

As of November 20, 2019, 88% (n=86) of final licenses were registered medical marijuana treatment centers (MTCs) (*i.e. facilities already operational as medical dispensaries*) priority applications; 12% (n=12) were general applicants, and none were economic empowerment applicants. Taken together; 54% (n=70) of the final licensed, provisionally licensed, and applications under provision consideration were MTC priority applicants; 44% (n=57) were general applicants; and 2% (n=2) were economic empowerment licenses. [See *Table VI.A.12. Priority Status by License Type (Final License, Provisional Consideration, Provisional License)* and see *Appendix 6, Table 2* for priority status by all license states, including pending]

Table VI.A.12. Priority Status by License Status (Final License, Provisional Consideration, Provisional License) [as of 11/20/19]



14. Permanency

The flexibility of cannabis policy and regulation are directly impacted by policy decisions, such as sunset provisions and regulatory structure. In Massachusetts, the Cannabis Control Commission ("Commission") was formed as a new independent agency to regulate the cannabis industry in the Commonwealth. A comprehensive review of licensee perception of permanency is outside the scope of this report.

VI.B. 15th P: "Participation" [Ownership and Employment Data]

Agent Registrations

As of November 20, 2019, 6,973 agent registrations are reported. An individual agent may have more than one agent registration if they are associated with more than one license type. There are 4,228 unique agents; However, this report is limited to reporting agent registrations, therefore, certain individuals may be counted one or more times. Additionally, agent registration data are typically reported by an owner, rather than self-reported by each individual agent, thus, the validity (accuracy) and reliability (consistency) of this data are unknown.

Total agent registrations include: 5,683 employees (82% of agent registrations), 530 managers (8%), 393 executives (6%), 206 directors (3%), 135 board members (2%), and 6 volunteers (0%). [See *Graph VI.B.1. Agent Registrations by Role* and *Appendix 7, Table 1*]

As of November 20, 2019, the greatest number of agent registrations are associated with Marijuana Retailers (n=2,674 (38%)), followed by Marijuana Cultivators (n=2,204 (32%)), and Marijuana Product Manufacturers (n=1,939 (28%)). [See *Table VI.B.2 Agent Registrations by License Type*]

The majority of agent registrations are for Massachusetts residents (83%) compared to out-of-state residences (17%) and New England residents (96%) compared to non-New England residents (4%). [See *Graph VI.B.3. Agent Registrations by Massachusetts Residency*] For additional data on agent registrations, including residency by state, see Appendix 7, Table 2.

Graph VI.B.1. Agent Registrations by Role [11/20/18-11/20/19]

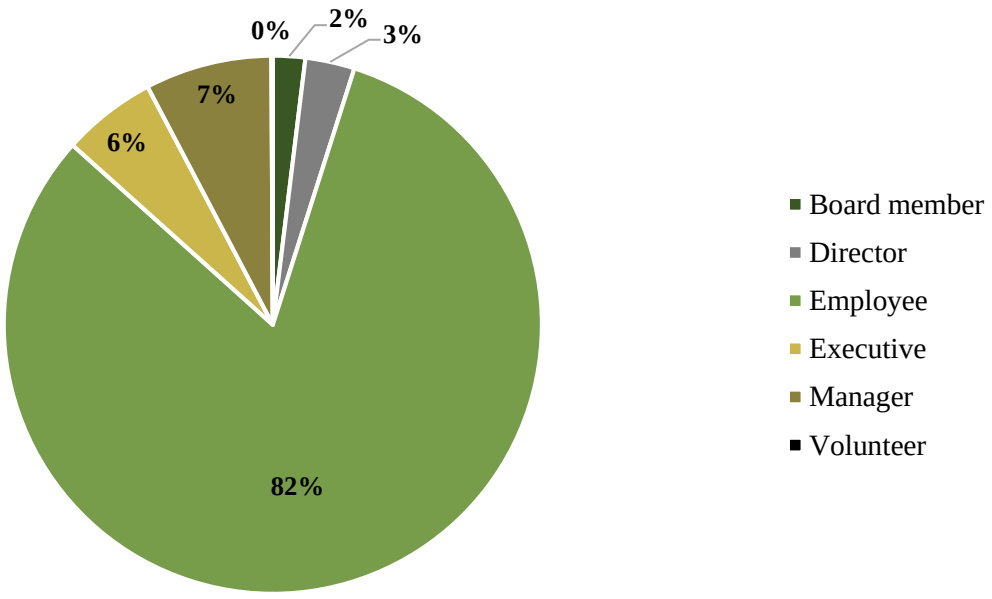
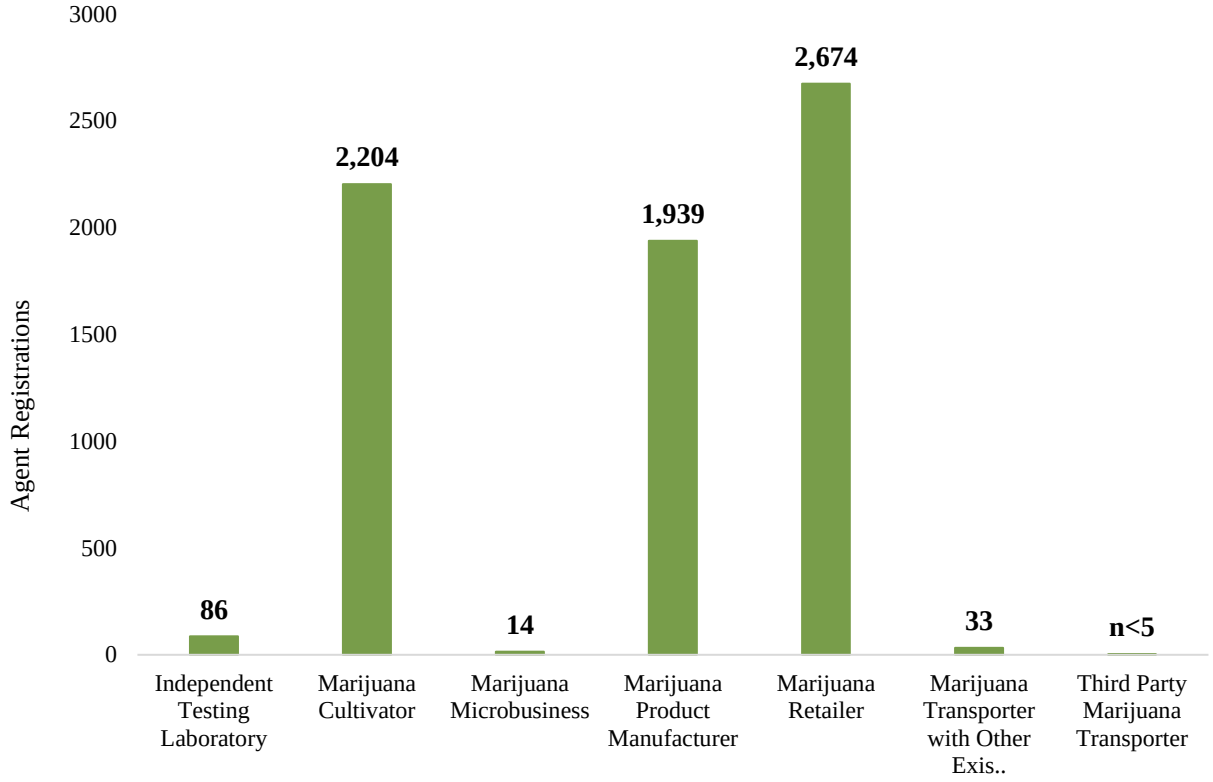
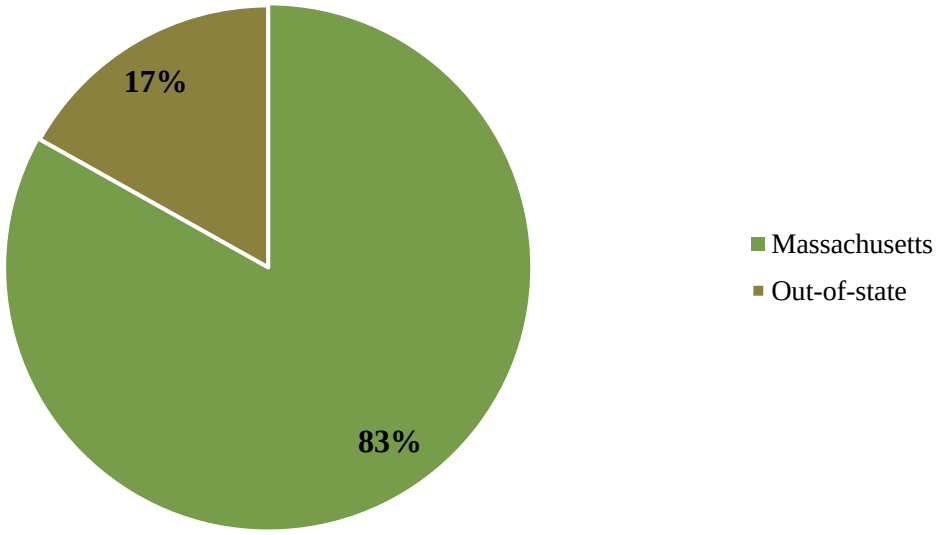


Table VI.B.2. Agent Registrations by License Type [11/20/18-11/20/19]



Graph VI.B.3. Agent Registrations by Massachusetts Residency [11/20/18-11/20/19]



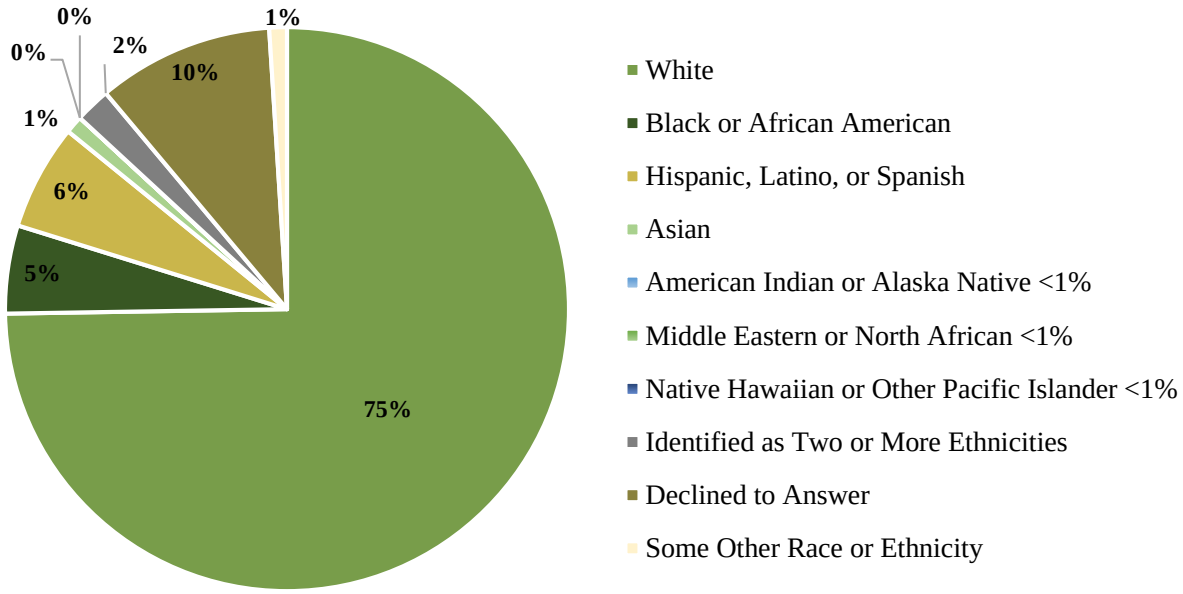
Agent Registrations by Demographics

Owners may record agent registration data in the industry participation system (i.e. MassCIP) rather than the agent themselves. Therefore, there may be inaccuracies in agent registration data, particularly for non-owner demographic information (*e.g. race/ethnicity*). The validity (accuracy) and reliability (consistency) of data are unknown. Additionally, as noted above, individuals may have more than one agent registration (*e.g. person is associated with more than one license type*). The presented data reflects total agent registrations, not individual agents as separate entities.

The majority of agent registrations identify as White (74%). Race/ethnicity is not reported ("decline to answer") for approximately 10% of agent registrations. Approximately, 7% of agent registrations identify as Hispanic, Latino, or Spanish persons, and about 5% as Black/African American persons. All other racial/ethnic cohorts make up ≤2% of agent registrations. [See *Table VI.B.4. Race/Ethnicity of Agent Registrations* below and *Appendix 4, Table 1* for definitions of racial/ethnic categories as recorded in Massachusetts's seed-to-sale tracking system]

We are unable to aggregate race/ethnicity by role (*e.g. board member, owner, manager, employee, etc.*) since race/ethnicity is not currently linked at the individual-level in the data. This limitation represents a major gap to the findings presented. We aim to link these datasets to permit assessments in the future.

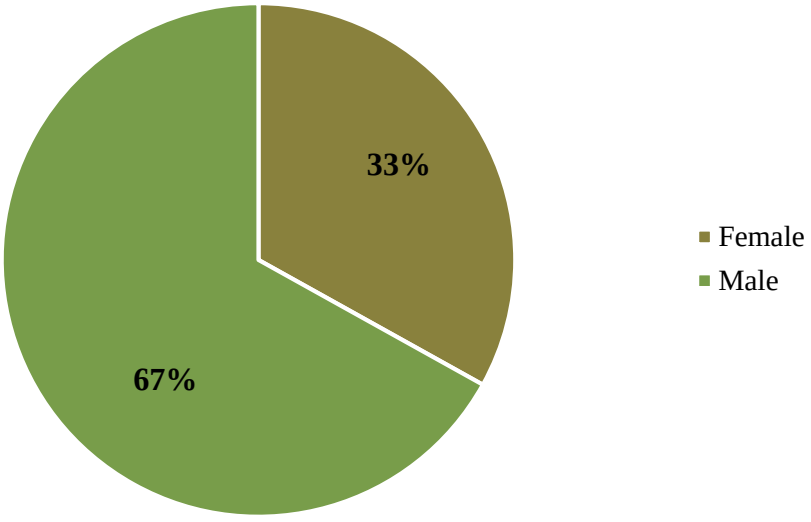
Table VI.B.4. Race/Ethnicity of Agent Registrations (N=6,953) [Current as of 11/20/19]



Like race/ethnicity, gender may be reported in agent registrations by an owner and therefore may not be self-reported. Findings reflect agent registrations (*i.e. persons will be counted more than once if they have multiple agent registrations*). The reported data show that the majority of agent registrations were for males (67%). [See *Table VI.B.5. Gender of Agent Registrations* below]

Compared to males, female agent registrations comprised a smaller percentage of each role. Specifically, female agent registrations made up 16% of total board member registrations, 17% of directors, 35% of employees, 19% of executives, and 31% of managers. [See *Table VI.B.6. Agent Registrations by Gender and Role*]

Table VI.B.5. Gender of Agent Registrations (N= 6,953) [Current as of 11/20/19]



Note: Agent registrations reporting self-defined gender not shown (n=6 (0.1%))

Table VI.B.6. Agent Registrations by Gender and Role [Current as of 11/20/19]

Role	Female	(Percent)	Male	(Percent)
Board Member	21	(16%)	114	(84%)
Director	34	(17%)	172	(83%)
Employee	1,996	(35%)	3,663	(65%)
Executive	75	(19%)	318	(81%)
Manager	165	(31%)	362	(69%)
Total	**2,291**	**(33%)**	**4,635**	**(67%)**

Veteran status is also reported in agent registrations, typically by owners. Of all agent registrations, 3% report Veteran-status. The majority did not report Veteran-status (89%) or preferred not to indicate Veteran-status (8%). [See *Table VI.B.7. Veteran Status of Agent Registration*]

Of the 183 agent registrations reporting Veteran-status, 79% are employees (147), 9% are directors (16), 7% are executives (13), 3% are managers (6), and 2% are board members (n<5). [See *Table VI.B.8. Agent Registration by Veteran Status and Role*]

Table VI.B.7. Veteran Status of Agent Registrations (N= 6,953) [Current as of 11/20/19]

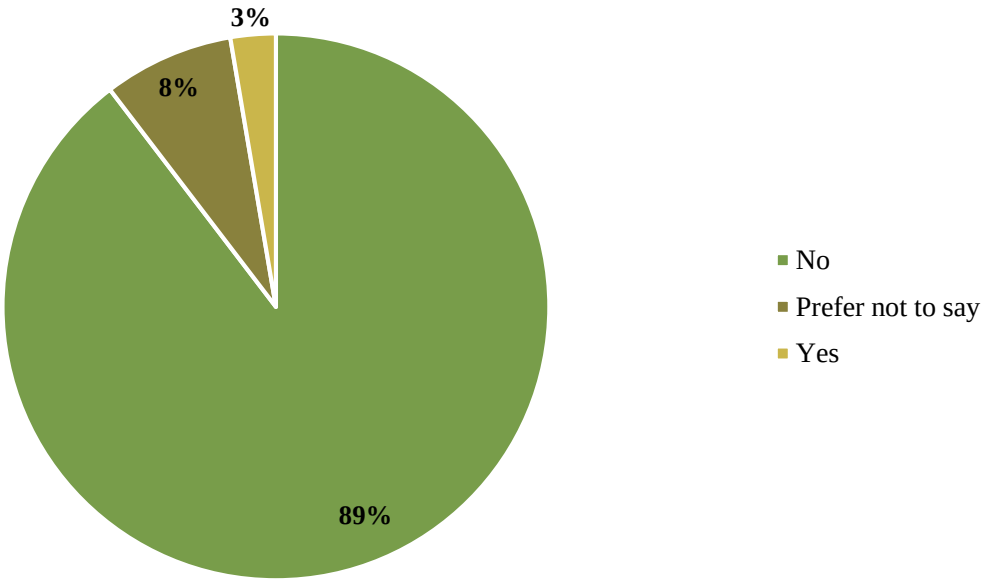
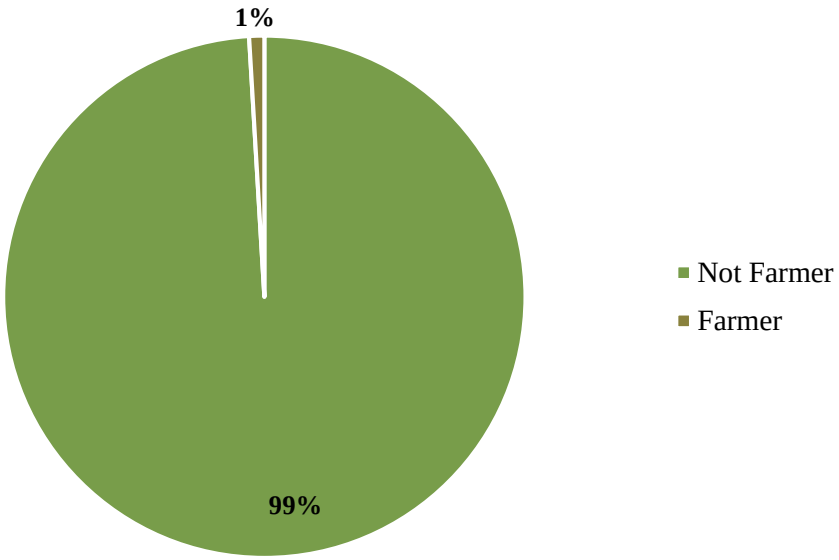


Table VI.B.8. Agent Registration by Veteran Status and Role (N= 6,953) [Current as of 11/20/19]

Role	Veteran	(Percent)	Not Veteran or Do Not Disclose	(Percent)
Board member	4	(3%)	131	(97%)
Director	16	(8%)	190	(92%)
Employee	147	(3%)	5,536	(97%)
Executive	13	(3%)	380	(97%)
Manager	6	(1%)	524	(99%)
Total	**186**	**(3%)**	**6,761**	**(97%)**

Farmer-status is also reported in agent registrations. Data show that the majority of agent registrations do not report farmer-status (99%), with <1% reporting farmer-status (65). [See *Table VI.B.9. Agent Registrations by Farmer Status*] Of those reporting farmer-status, 60% of registrations are employees, 18% are managers, and 14% are executives.

Table VI.B.9. Agent Registrations by Farmer-Status (N= 6,953) [Current as of 11/20/19]



Areas of Disproportionate Impact (ADI) and Named Cities

This subsection assesses agent registrations from the 29 cities and towns identified as areas of disproportionate impact (ADIs) and named cities by a 2017 study contracted by the Commission and conducted by Dr. Jon B. Gettman (see report here).

Only certain census tracts qualify as an ADI in four cities (Boston, Worcester, Lowell, and Springfield); However, due to time and resource constraints, this analysis did not further stratify agent registrations into specific census tracts within each city identified in the study. Therefore, the numbers below represent all agent registrations that report residence in any one of the ADI listed cities or towns. Thus, these numbers may overestimate agent registrations solely residing in an ADI.

Persons from an ADI and named cities comprise 25% of all agent registrations and 30% of all agent registrations from Massachusetts. The ADIs or named cities with the greatest number of agent registrations are: Fall River (n=272 (4%) of total agent registrations), Worcester (n=233 (3%)), Boston (n=231 (3%)), and Springfield (n=114 (2%)). Fitchburg, Lowell, Brockton, and Holyoke followed, each reporting over 75 agent registrations. [See *Table VI.B.10. Agent Registration by ADI and Named Cities*]

Table VI.B.10. Agent Registrations by ADI and Named Cities (N= 6,953) [Current as of 11/20/19]

ADI and Named Cities	Total	Percent of Total Agent Registrations	Percent of Massachusetts Agent Registrations
Abington	7	0%	0%
Amherst	25	0%	0%
Boston*	231	3%	4%
Braintree	17	0%	0%
Brockton	81	1%	1%
Chelsea	8	0%	0%
Fall River	272	4%	5%
Fitchburg	89	1%	2%
Greenfield	21	0%	0%
Haverhill	54	1%	1%
Holyoke	78	1%	1%
Lowell*	83	1%	1%
Lynn	33	0%	1%
Mansfield	15	0%	0%
Monson	15	0%	0%
New Bedford	62	1%	1%
North Adams	29	0%	1%
Pittsfield	37	1%	1%
Quincy	47	1%	1%
Randolph	13	0%	0%
Revere	12	0%	0%
Southbridge	19	0%	0%
Spencer	34	0%	1%
Springfield*	114	2%	2%
Taunton	47	1%	1%
Walpole	27	0%	0%
Wareham	22	0%	0%
West Springfield	28	0%	0%
Worcester*	233	3%	4%
Total	**1,753**	**25%**	**30%**

*Only certain census tracts qualify as an ADI; However, this analysis includes all agent registration that report living in an ADI or named city.

Diversity in Industry Ownership (DIO)

The Commission collects data on diversity in agent registrations as well as businesses, including women-owned, minority-owned, Veteran-owned, LBGT^{+}-owned, or owner is a person with a disability. This data is self-reported in the industry participation portal (*i.e. MassCIP*) with additional information requiring verification for select categories eligible for expedited review.

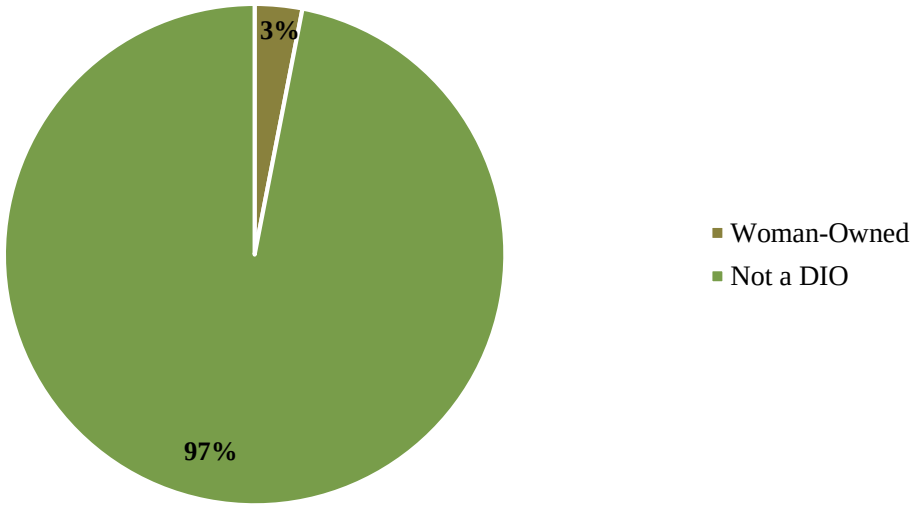
This report assessed all business-level diversity measures collected at the Commission. In this data, businesses may be included in any or all of the following categories: (1) Women-owned, (2) Veteran-owned, (3) Minority-owned, (4) LBGT-owned, and (5) Disability-owned. For purposes of this report, we refer to businesses self-reporting any of these diversity in ownership criteria as "Diversity in Ownership (DIO)." All DIO data are self-reported by the Marijuana Establishment.

As of November 20, 2019, the vast majority (97%) of Marijuana Establishments with a final license do not self-identify as a DIO. [See *Table VI.B.11. Final Licenses by DIO Status*]

***Note**: Similar to the federal-level Disadvantaged Business Enterprise (DBE) Certification program, the state-level Supplier Diversity Office (SDO) of the Operational Services Division (OSD) in the Commonwealth certifies businesses as: (1) Minority Business Enterprises (MBE); (2) Women Business Enterprises (WBE); (3) Veteran Business Enterprises (VBE), and (4) Portuguese Business Enterprises (PBE) in Massachusetts. This is commonly referred to as "diversity certification." To be eligible, the business applicant must be 51% owned and controlled by a person with at least one of these eligibility criteria (*i.e. woman, minority, Veteran, or Portuguese*) and have a principal place of business in the Commonwealth. Certification is provided after attending a mandatory, two-hour pre-certification workshop.

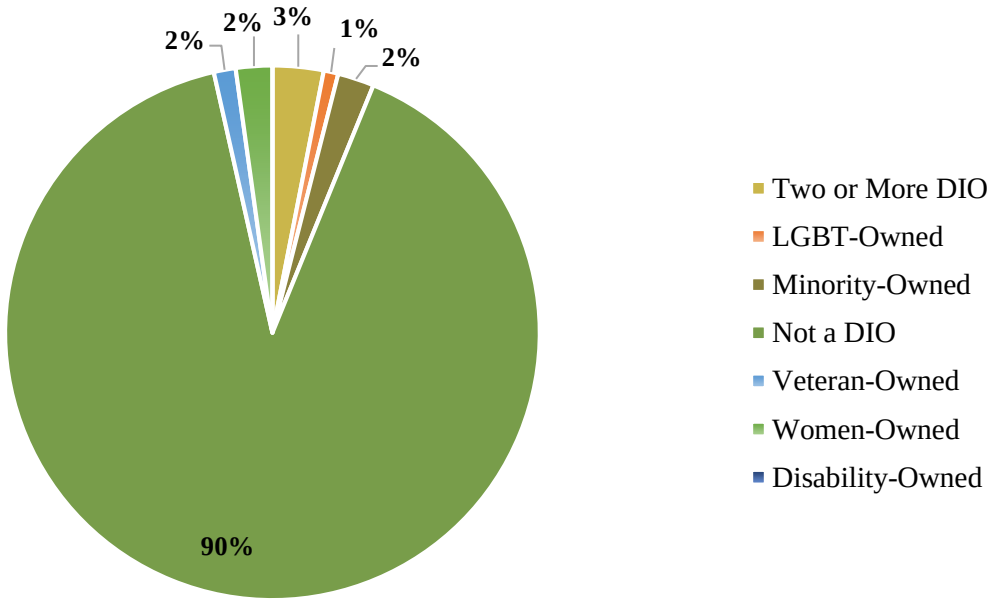
Although it is not part of the Massachusetts's eligibility criteria for diversity certification or expedited licensing review, the Commission additionally collects industry ownership data on other measures, including: (1) Lesbian, gay, bisexual, transgender (LGBT^{+}) and (2) Persons with a disability.

Table VI.B.11. Final Licenses by Diversity in Ownership (DIO) Status (n=98) [Current as of 11/20/19]



Approximately 10% of businesses identify as having diversity in ownership among final licenses, provisional licenses, and provisionally approved applications (n=227). [See *Table VI.B.12. DIO Status for Applications with Provisional License, Provisional Consideration, and Final Licensure* and *Appendix 5* for total counts]

Table VI.B.12. DIO Status of Applications with Provisional License, Provisional Consideration, and Final Licensure (n=227) [Current as of 11/20/19]



VII. Literature Review of Market and Industry Data

Methods

Targeted searches were conducted in August-October 2019 in GoogleScholar and through reference review of identified articles. Search terms included: “cannabis,” “marijuana,” “behavioral economic,” “purchase task,” “elasticity,” “demand,” “price,” “economics,” “substitution,” “seed to sale,” “market,” “illicit,” “participation,” “diversity,” and “industry.” Author reference libraries searches were also conducted. Literature reviews and studies published between 2014-September 2019 were collected. Articles with U.S. samples were prioritized, and the search was limited to English language articles.

1. Market Analysis: *Cannabis Price Elasticity and Demand (theoretical)*

Twelve studies examine the demand-side economics for cannabis, including price elasticity (*i.e. how sensitive demand for cannabis is to price*).[40,41,50,51,42–49] Only one study is exclusive to participants living in a state with legal adult-use cannabis.[50] Other study samples include participants in states/countries where cannabis was illegal, therefore, results may not generalize to populations with access to legal cannabis.

Eight studies use a marijuana (“cannabis”) purchase task,[41,42,45–50] one study uses crowdsource data (priceofweed.com),[40] and one study uses a survey of French cannabis users when a sample of their cannabis was collected for testing.[44] Two studies are literature reviews.[43,51] Four studies include samples of regular and frequent cannabis users,[41,45–47] two studies include near-daily or daily cannabis users,[44,48] two studies include regular tobacco and cannabis users,[42,48] and two studies include those who have used cannabis at least once in the past six months.[49,50]

In a scoping literature review of purchase tasks for substances, Zvorksy et al. 2019 conclude that “demand tasks,” such as the cannabis purchase task, are effective in measuring demand outcomes, most sensitive to intensity (*i.e. total amount that would be obtained if the product were free)* and the maximum price to be paid for product.[43] Aston et al. 2015 specifically validate the cannabis purchase task and report the task has good validity and specificity.[52] However, there are inconsistencies between studies when conducing the purchase task (*e.g. studies differ in the measure of purchase and consumption, such as “one hit” or “one joint”*), which complicates comparisons.[47]

Importantly, key limitations to this literature prevent predictive analyses of consumption change based on price change and/or legal changes. In a 2014 review, Pacula and Lundberg conclude that results from this literature cannot be used to accurately predict changes to cannabis consumption in a legal cannabis market.[51] Researchers emphasize the need for data on heavy users, who comprise a small proportion of total users, but make up a greater proportion of cannabis consumption and sales.[51]

Findings

Is Cannabis Sensitive to Price? (Elasticity)

Studies consistently report evidence of price elasticity for cannabis (*i.e. as the price of cannabis increases, demand decreases*).[44–46,48–51] Specific estimates for the elasticity of demand vary, likely due to different samples and methods. Importantly, sensitivity may also differ by population. For example, youth typically demonstrate more sensitivity to price in comparison to adults.[18,51]

Two studies report that legal cannabis is less elastic than illicit cannabis.[49,50] Amlung and MacKillop 2019 report the price elasticity for legal cannabis is 43% lower than the elasticity for illicit cannabis.[49] Amlung et al. 2019 additionally report that a legal cannabis option greatly reduces the elasticity of illicit cannabis (-126%), while an illicit substitute for legal cannabis reduces the elasticity of legal cannabis to a less extent (-59%).[50] In a comparison study, Peters et al. 2017 report that respondents show greater sensitivity to cigarette prices compared to cannabis.[48]

Critically, there are additional factors beyond price that have either been empirically shown to affect or theoretically affect demand for cannabis. While outside the scope of this section, Pacula and Lundberg 2014 identify harm perception, policy environment, and legal risks to also impact demand.[51] Therefore, individuals living in a state with legal cannabis may weigh systematically different risks/benefits when determining their demand for cannabis than those in non-legalized states.

Does User Type Affect Price Elasticity?

Two studies use a cannabis purchase task to examine differences between user groups and report that heavier users are more sensitive to cannabis price compared to lighter users.[45,46] Specifically, Collins et al. 2014 report that heavy cannabis users report greater sensitivity to price, and Vincent et al. 2017 report that heavy users have a lower price in which they would stop purchasing cannabis (*i.e. lower breakpoint*).[45,46] Researchers note this finding may be due to increased knowledge about typical cannabis prices among heavy users.[45] Additionally, the cannabis purchase task may not be reflective of real world behaviors.[46]

In review, Pacula and Lundberg 2014 report similar results among alcohol consumers, where very heavy consumers show greater price elasticity than light drinkers.[51]

Do Cravings and Satiety Affect Price Elasticity?

Cannabis demand and price elasticity appear to be influenced by craving and satiety.[41,42] Metrik et al. 2016 induced craving for cannabis prior to a cannabis purchase task and report that craving increases demand and the price participants indicate they would pay for cannabis.[41] Conversely, Hindocha et al. 2017 provided a sample of participants with cannabis prior to the cannabis purchase task to induce satiety, and report that participants decrease their demand and price they

would pay for additional cannabis.[42] These studies suggest demand is not static, and may change based on craving or satiety experiences.

Does the Quality of Cannabis Impact Price Elasticity?

The quality of cannabis may also play a role in determining levels of price elasticity. One cannabis purchase task study asks users about their purchase behavior for low, medium, and high quality cannabis, and report that participants are willing to pay more for higher quality cannabis.[45] In contrast, one study of French near-daily illicit users, report that price elasticity is not influenced by real or perceived product potency/quality.[44] Neither study uses data from legal retail stores, which are required to test products and label potency, unlike illicit sources, therefore findings may not generalize to populations living in a state with a legal market.

Is Legal Cannabis a Substitute for Illicit Cannabis?

Two behavioral economic studies use an online marijuana ("cannabis") purchase task[52] to examine substitution effects for illicit and legal cannabis.[49,50] Both report evidence of "asymmetric substitutability," where legal cannabis is favored as a substitute (*i.e. decreased demand*) for illicit cannabis.[49,50] Both studies also report a preference for legal cannabis with participants reporting that if both legal and illicit cannabis were freely available, they would consume more legal cannabis.[49,50] Amlung et al. 2019 report that participants would increase their demand by 4.5 grams if both options were freely available.[50] As noted above, an important caveat is that Amlung and MacKillop 2019 report high-risk users showing less sensitively to a legal cannabis option than lower-risk user groups.[49]

Price also impacts substitution.[49,50] Consumers are willing to pay more for legal cannabis until a certain threshold, when preference changes back to illicit cannabis if price(s) are deemed too high. Amlung and MacKillop 2019 report that legal cannabis is strongly preferred when priced similarly or slightly higher than illicit cannabis.[49] In a Canadian sample, this price fell between $10–$12/gram, but researchers report preference for illicit cannabis when the price increased beyond this threshold.[49] In an American sample, Amlung et al. 2019 report that "$10/gram of illegal cannabis is roughly equivalent to $15/gram of legal cannabis, while $10/gram of legal cannabis is roughly equivalent to $7/gram of illegal cannabis."[50] At a higher price of $20/gram, researchers report that average consumption would be 64% illicit.[50] Therefore, while legal cannabis is preferred, a price that is too high may result in more users staying in or moving to the illicit market. Amlung and MacKillop 2019 conclude that pricing policy will need to be optimized to maximize the benefits of a legally regulated cannabis marketplace.[49]

2. Observation from Real Markets (Legal and Illicit)

Seven studies assess consumer patterns and/or product and potency patterns in legal adult-use and illicit cannabis markets.[14,17–19,37,53,54] All studies examine the legal adult-use market,[14,18,19,53] and two examine both the legal and illicit markets.[17,54] The majority of studies only examine Washington state data,[14,17–19,37,54] and one study examines data from both Washington and Colorado.[53] Studies most frequently use seed-to-sale tracking data.[14,17–19,37] Additional data sources include wastewater,[54] an extraction of advertised prices by cannabis dispensaries,[53] the National Survey of Drug Use and Health (NSDUH),[17] and other primary surveys.[17,53]

Findings

How are Consumer Patterns in the Illicit Market Impacted by Legalization?

In the Commission's report, "*Special Report: Evaluating the Impact of Cannabis Legalization in Massachusetts: State of the Data*," we identify two approaches for estimation of a drug market including: (1) supply side (*i.e. production-based and seizure-based*); and (2) demand side (*i.e. consumption-based and expenditure-based*) estimates.[55,56] While the illicit market is notoriously challenging to measure (see Kilmer et al. 2011),[57] two studies examine the impact of legalization in the illicit market through both supply and demand.[17,54] Caulkins et al. 2019 examined one year of Washington state seed-to-sale data (July 2016-2017) and compare results to rates of cannabis use as reported in the state's National Survey on Drug Use and Health (NSDUH) data.[17] Separately, researchers conducted a survey to understand the frequency and amount of cannabis typically consumed by different user groups.[17] Researchers did not expect to find a perfect match between legal cannabis sales and self-reported consumption, even if all cannabis had been obtained through the legal market due to use by tourists, legal home grow, medical purposes, unused products, and diversion, among other factors.[17,58] However, researchers report that a large portion of cannabis sales and product (*i.e. $1.66 billion and over 200 metric tons of flower*) occur in the illicit market.[17]

Burgard et al. 2019 examine wastewater for the metabolite, 11-nor-9-carboxy-Δ^9-tetrahydrocannnabinol (THC-COOH), in a three-year period spanning pre- and post-cannabis retail sales in Washington state.[54] Researchers report cannabis consumption approximately doubled over the study period as measured in THC-COOH while cannabis sales in retail stores increased at 60-70%.[54] Researchers conclude that some users switched from the illicit to the legal market but could not estimate the percent of legal or illicit consumption.[54]

In the gray literature, a report commissioned by the Colorado Department of Revenue and Marijuana Enforcement Division report that in 2017, *(~three years after the first retail cannabis store opened*), the illicit market was largely absorbed by the legal market.[58] Importantly, there is policy heterogeneity [see section *V. P's of Legalization*] between each state with legal adult-use cannabis which make state-to-state comparisons challenging.[59]

How is Price Impacted by Adult-Use Legalization?

Price is important to track as it affects consumption and tax revenue.[53] Two theoretical studies report that legal cannabis is preferred to illicit cannabis, where consumers indicate a willingness to pay more, but only up to a certain point before many turn back to the illicit market.[49,50]

Four articles examine cannabis price in the legal adult-use market.[14,18,19,53] One study reports that in the short term (4-5 months after legal cannabis markets opened), cannabis prices do not decrease.[53] Three studies in Washington state report that cannabis prices decreased soon after the market opened, and over a period of two-to three years.[14,18,19]

Researchers expect cannabis prices to decrease if there is a move from the illicit to a legal market due to increased efficiencies *(see Hunt and Pacula 2017*).[53] However, in the short-term, this may not be seen for varying reasons such as a delay in licensing, heightened demand, lags in production capacity. Hunt and Pacula 2017 argue that if prices do not decrease, short run factors are dominating the current market.[53] If short run factors are at play, researchers suggest consumption levels are unlikely to change significantly, and therefore any research assessing the impact of cannabis laws and potential harms will not fully capture the impact of a mature market.[53]

Hunt and Pacula 2017 examine Colorado and Washington cannabis prices at four- to five-months following adult-use implementation ("retail stores open").[53] This study employs a cannabis-user survey and crowdsource data to capture both legal and illicit prices and report no change in price of adult-use or medical cannabis at four- to five- months after the market opened.[53] Seed-to-sale data are not examined in this study. When researchers look specifically at participants reporting purchase from adult-use stores, purchasers report higher prices than those purchasing from a friend in the short-term following implementation.[53]

In a two-year analysis (2014-2016) of flower and extract legal sales in Washington's seed-to-sale database, Smart et al. 2017 report that prices dropped sharply and then stabilized, after retail stores opened.[19] Potency is associated with higher prices, but price per unit of THC in more potent products are lower than cost per unit of THC in less potent products.[19] There is no evidence that retail stores offer significant savings for buying larger quantities,[19] unlike quantity discounts that are reported in the illicit market.[44] A separate analysis of 2.5 years of Washington state seed-to-sale data assess factors beyond retail price and report steep initial decreases in price among cannabis for processors and retailers in the first year with retail stores.[18] Prices continue to decrease in the next year and a half; However, prices drop at a slower rate.[18] Interestingly, researchers report the wholesale to retail price remains stable at an approximate 3:1 ratio.[18]

In the gray literature, a Colorado report finds retail store cannabis prices decrease, but the price of a single THC serving decreases quicker than the price of flower.[58] An Oregon report also finds a rapid decrease in median price per gram resulting from high-supply and low-wholesale price.[22]

How are Product Types and Potency Impacted by Adult-Use Legalization?

Four studies examine the types of legal adult-use products sold. All studies use Washington state data.[14,18,19,37]

Flower accounts for the majority of sales, but later declines in percent of market share as other forms of consumption gained popularity.[14,18,19] An analysis of 2.5 years of Washington state retail sales report that together, wax, shatter, and resin represent the fastest growing product segment.[18] Smart et al. 2017 also report increases in demand for inhalable extracts.[19]

There appears to be a trend toward higher potency products in the legal market. Smart et al. 2017 observes a trend toward a higher percent of THC in flower products and among inhalable extracts.[19] Jikomes and Zoorob 2018 examine THC content across time in the six largest testing laboratories in Washington state, thereby controlling for between laboratory differences, and report THC levels in flower and concentrates increase from 2014 to 2015, and stabilize from 2015 to April, 2017.[37]

In the gray literature, a Colorado report finds cannabis potency in the legal market increased between 2014 and 2017.[58] An Oregon report similarly finds a shift from flower, leaves, and non-infused pre-rolls towards extracts and concentrates since 2017.[22]

3. Participation in Legal Cannabis Industry

While participation in the cannabis industry is not new, participation in the legal cannabis market is a new phenomenon. Lack of diversity is a major concern in the nascent industry, particularly in the context of the historic inequities of cannabis prohibition and enforcement. See 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 for a review of cannabis violations in Massachusetts. Consistent with other literature, this report finds that Black and Hispanic/Latino cohorts are disproportionately impacted by cannabis prohibition and enforcement.[60]

For additional context, research shows that Black and Hispanic/Latino cohorts hold fewer position of ownership in U.S. businesses compared to White cohorts.[61–63] There are also significant income and wealth gaps between racial/ethnic minorities, particularly Black and Hispanic/Latinos in comparison to White cohort counterparts.[61,64] Research additionally shows that women hold fewer positions of ownership and leadership in U.S. businesses, and hold less wealth compared to men.[65] Importantly, persons of certain intersectional identities (*e.g. Black women*)[66,67] and persons from other demographic cohorts (*e.g. people with disabilities*)[68] also have disproportionately lower positions of ownership and leadership compared to their share of the population. The scope of this review is limited to racial/ethnic minorities and women and is limited to articles examining the cannabis market specifically.

Seven articles were identified.[1,69–74] Studies include qualitative data analysis of interviews,[69,72] advertisements,[69] job postings,[72] and consisted of commentary papers[70,71] and legal analysis[1] or reviews.[73] All, with the exception of one paper, primarily focuses on participation in the legal cannabis market.[72] No articles analyze demographic data from legal cannabis markets.

Findings

Theoretical

Cannabis industry participation assessments are just beginning to develop, and remain largely in journalism, gray literature reports, and student-research,[75,76] rather than peer-review journals. However, a small body of research applies historical findings, qualitative review, and projections to identify potential barriers to legal cannabis market participation among Black and Hispanic/Latino people and women.[1,69–71,73,74] Themes from these studies and reviews are synthesized below and provide context to the disparities identified in baseline data. [See section *VI. Baseline Data*]

Research identifies several components in the legal cannabis market that pose greater challenges to Black and Hispanic/Latino cohorts compared to their White counterparts. Specific to the licensure process, researchers identify criminal record restrictions, high fees, and other cost-prohibitive practices as barriers.[70] Four studies identify restrictions that prevent those with felony records from working in the legal industry as a major obstacle.[1,70,73,74] Research suggests that the disproportionate impact of policing and drug law violations, including cannabis, on Black and Hispanic/Latino communities results in systematic exclusion of the people most affected by

cannabis prohibition from benefiting from legalization.[1] One study additionally identifies that high fees associated with licensure disproportionately impacts Blacks compared to Whites due to racial disparities in wealth.[70] Beyond licensure fees, researchers also identify the high cost of conducting business, including for regulatory compliance, and lack of access to traditional banking, as barriers to entry.[1]

External to the licensure process, two studies identify the legally tenuous position of cannabis, (*i.e. remains federally illegal*) disincentivizes minority involvement in comparison to other race cohorts.[70,74] Bender 2017 describes this phenomenon as a reluctance of minorities, already subject to undue scrutiny by law enforcement officials, to enter a high-profile market that is not fully legal.[74] These cannabis-specific barriers occur in the context of larger and structural barriers beyond the scope of this section and report.

In studies of female participation in the cannabis market, two articles identify sexualization of the cannabis plant, plant trimmers, and products in the cannabis market as elements that may negatively affect female participation and leadership opportunity.[69,72] August 2013 examine job postings for cannabis trimmers in the illicit market and report many postings were sexualized.[72] In a study of women participating in the legal market, Kittel 2018 also identifies sexism and sexualization in qualitative interviews with participants (N=5); However, participants differ in how they perceive the impact of sexualization on participation.[69] Access to capital and lack of traditional banking concerns in the cannabis-industry may also disproportionately impact women, and as noted previously, cannabis-specific barriers occur in the context of larger and structural barriers beyond the scope of this review.

Legal Market

One peer review article examines racial/ethnic or gender representation in the legal cannabis markets.[36] [See Section *VI. Baseline Data* for Massachusetts data] Adinoff and Reiman report participation data by race/ethnicity lacks, and identifies Massachusetts as the only state reporting industry participation by race/ethnicity.[36] This represents a critical area for future research. Separately, two papers cite journalist Amanda Chicago Lewis (2016), who reports that Black owners comprise approximately 1% of legal cannabis owners.[1,74,77] One author notes that earlier states to legalize cannabis have lower proportions of minorities, particularly Black residents, compared to the country.[74] As additional states move toward cannabis legalization, studies of industry participation are critical.

VIII. **Research Gaps**

After a baseline review of the data and literature regarding the legal adult-use cannabis market and participation, the Commission's Research Department, with consultation and collaboration with varying researchers, highlight the following gaps in our collective knowledge, gaps needed to guide evidence-based policy decisions.

- Participation in the legal cannabis market, including ancillary business, by demographic cohort, including race/ethnicity, gender and other underrepresented cohorts (with stratification by employee versus owner);
- Impact of social equity provisions on the industry and market, including participation;
- Purchase behavior, use, and consumption behaviors among heavy users who will comprise the largest proportion of consumption and sales;
- Purchasing behavior in the adult-use market among all use groups;
- Market segmentation in the adult-use market;
- Geospatial characteristics of retail stores and other license types;
- Impact of legalization on product potency, price, and types of product;
- Price sensitivity across varying cohorts in the legal versus illicit market;
- Efficacy of laboratory testing for purity, quality, accuracy, and impact of consumer perception of product purity;
- Percent and characteristics of sales occurring in the legal market compared to the illicit market.

IX. References

1. Rahwanji M. “Hash”ing Out Inequality in the Legal Recreational Cannabis Industry. *Northwest J Int Law Bus*. 2019;39(3):333-358.
2. Kilmer B. Policy designs for cannabis legalization: starting with the eight Ps. *Am J Drug Alcohol Abuse*. 2014;40(4):259-261. doi:10.3109/00952990.2014.894047
3. Bostwick JM. Blurred Boundaries: The Therapeutics and Politics of Medical Marijuana. *Mayo Clin Proc*. 2012;87(2):172-186. doi:10.1016/j.mayocp.2011.10.003
4. Pacula RL, Chriqui JF, Reichmann DA, Terry-McElrath YM. State medical marijuana laws: understanding the laws and their limitations. *J Public Health Policy*. 2002;23(4):413-439. http://www.ncbi.nlm.nih.gov/pubmed/12532682.
5. Courtwright DT, Belenko SR. Drugs and Drug Policy in America: A Documentary History. *Am J Leg Hist*. 2000;44(3):317. doi:10.2307/3113869
6. Mikuriya TH. Marijuana in medicine: past, present and future. *Calif Med*. 1969;110(1):34-40. http://www.ncbi.nlm.nih.gov/pubmed/4883504.
7. Bridgeman MB, Abazia DT. Medicinal cannabis: history, pharmacology, and implications for the acute care setting. *Pharm Ther*. 2017;42(3):180-188. doi:10.1177/2045125312457586
8. David F. Musto. Opium, Cocaine and Marijuana in American History. *Sci Am*. 1991;265(1):40-47. https://www.jstor.org/stable/24936977?seq=1#page_scan_tab_contents.
9. Gieringer DH. The Forgotten Origins of Cannabis Prohibition in California. *Contemp Drug Probl*. 1999;26(2):237-288. doi:10.1177/009145099902600204
10. Diversion Control Division, Drug Enforcement Administration (DEA) USD of J (DOJ). Title 21 United States Code (USC) Controlled Substances Act. https://www.deadiversion.usdoj.gov/21cfr/21usc/. Accessed October 16, 2018.
11. U.S. Drug Enforcement Agency. Drug Scheduling. webpage. https://www.dea.gov/drug-scheduling. Accessed October 16, 2018.
12. Jeffrey Miron. *The Effect of Marijuana Decriminalization on the Budgets of Massachusetts Governments, With a Discussion of Decriminalization’s Effect on Marijuana Use: An Update of Miron (2002a)*. Cambridge, MA; 2008. https://scholar.harvard.edu/files/miron/files/decrim_update_2007-1.pdf.
13. National Conference of State Legislatures. Marijuana Overview. webpage. http://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx. Accessed October 16, 2018.
14. Davenport S. Price and product variation in Washington’s recreational cannabis market. *Int J Drug Policy*. 2019;(xxxx):0-1. doi:10.1016/j.drugpo.2019.08.004
15. Williams J, Banta-Green C, Burgard D. The Need for Beter Marijiana Sales Data. *Addiction*. 2017;112:2179-2181. doi:10.1007/978-3-642-17410-0
16. Massachusetts Department of Public Health. *Marijuana Baseline Health Study*.; 2019. https://www.mass.gov/report/massachusetts-department-of-public-health-marijuana-research.
17. Caulkins JP, Davenport S, Doanvo A, et al. Triangulating web & general population surveys: Do results match legal cannabis market sales? *Int J Drug Policy*. 2019;(June):1-8. doi:10.1016/j.drugpo.2019.06.010
18. Caulkins JP, Bao Y, Davenport S, et al. Big data on a big new market: Insights from

Washington State's legal cannabis market. *Int J Drug Policy*. 2018;57:86-94. doi:10.1016/j.drugpo.2018.03.031
19. Smart R, Caulkins JP, Kilmer B, Davenport S, Midgette G. Variation in cannabis potency and prices in a newly legal market: evidence from 30 million cannabis sales in Washington state. *Addiction*. 2017;112(12):2167-2177. doi:10.1111/add.13886
20. Kilmer B. How will cannabis legalization affect health, safety, and social equity outcomes? It largely depends on the 14 Ps. *Am J Drug Alcohol Abuse*. July 2019:1-9. doi:10.1080/00952990.2019.1611841
21. Callaghan RC, Sanches M, Benny C, Stockwell T, Sherk A, Kish S. Who consumes most of the cannabis in Canada? Profiles of cannabis consumption by quantity. *Drug Alcohol Depend*. 2019;205(September):107587. doi:10.1016/j.drugalcdep.2019.107587
22. Oregon Liquor Control Commission. *Recreational Marijuana Supply and Demand Legislative Report*.; 2019. https://www.oregon.gov/olcc/marijuana/Documents/Bulletins/2019 Supply and Demand Legislative Report FINAL for Publication(PDFA).pdf.
23. Oregon Liquor Control Commission. Recreational Marijuana FAQs: Licensing-General. https://www.oregon.gov/olcc/marijuana/Pages/FAQs-Licensing-General.aspx.
24. Everson EM, Dilley JA, Maher JE, Mack CE. Post-Legalization Opening of Retail Cannabis Stores and Adult Cannabis Use in Washington State, 2009–2016. *Am J Public Health*. 2019;109(9):1294-1301. doi:10.2105/ajph.2019.305191
25. Cooke A, Freisthler B, Mulholland E. Examination of Market Segmentation among Medical Marijuana Dispensaries. *Subst Use Misuse*. 2018;53(9):1463-1467. doi:10.1080/10826084.2017.1413391
26. Lipperman-Kreda S, Grube JW. Impacts of Marijuana Commercialization on Adolescents' Marijuana Beliefs, Use, and Co-use With Other Substances. *J Adolesc Heal*. 2018;63(1):5-6. doi:10.1016/j.jadohealth.2018.05.003
27. Berg CJ, Henriksen L, Cavazos-Rehg PA, Haardoerfer R, Freisthler B. The emerging marijuana retail environment: Key lessons learned from tobacco and alcohol retail research. *Addict Behav*. 2018;81(5):26-31. doi:10.1016/j.addbeh.2018.01.040
28. Freisthler B, Gruenewald PJ. Examining the relationship between the physical availability of medical marijuana and marijuana use across fifty California cities. *Drug Alcohol Depend*. 2014;143(4):244-250. doi:10.1016/j.drugalcdep.2014.07.036
29. Mair C, Freisthler B, Ponicki WR, Gaidus A. The impacts of marijuana dispensary density and neighborhood ecology on marijuana abuse and dependence. *Drug Alcohol Depend*. 2015;154(3):111-116. doi:10.1016/j.drugalcdep.2015.06.019
30. Lankenau SE, Tabb LP, Kioumarsi A, Ataiants J, Iverson E, Wong CF. Density of Medical Marijuana Dispensaries and Current Marijuana Use among Young Adult Marijuana Users in Los Angeles. *Subst Use Misuse*. 2019;6084. doi:10.1080/10826084.2019.1618332
31. Shi Y. The availability of medical marijuana dispensary and adolescent marijuana use. *Prev Med (Baltim)*. 2016;91:1-7. doi:10.1016/j.ypmed.2016.07.015
32. Shi Y, Cummins SE, Zhu S-H. Medical Marijuana Availability, Price, and Product Variety, and Adolescents' Marijuana Use. *J Adolesc Heal*. 2018;63(1):88-93. doi:10.1016/j.jadohealth.2018.01.008
33. Myran DT, Brown CRL, Tanuseputro P. Access to cannabis retail stores across Canada 6 months following legalization: a descriptive study. *C Open*. 2019;7(3):E454-E461.

doi:10.9778/cmajo.20190012
34. Tabb LP, Fillmore C, Melly S. Location, location, location: Assessing the spatial patterning between marijuana licenses, alcohol outlets and neighborhood characteristics within Washington state. *Drug Alcohol Depend*. 2018;185(February):214-218. doi:10.1016/j.drugalcdep.2018.01.004
35. Shi Y, Meseck K, Jankowska MM. Availability of Medical and Recreational Marijuana Stores and Neighborhood Characteristics in Colorado. *J Addict*. 2016;2016:1-7. doi:10.1155/2016/7193740
36. Adinoff B, Reiman A. Implementing social justice in the transition from illicit to legal cannabis. *Am J Drug Alcohol Abuse*. 2019;2990. doi:10.1080/00952990.2019.1674862
37. Jikomes N, Zoorob M. The Cannabinoid Content of Legal Cannabis in Washington State Varies Systematically Across Testing Facilities and Popular Consumer Products. *Sci Rep*. 2018;8(1):1-15. doi:10.1038/s41598-018-22755-2
38. Kepple NJ, Freisthler B. Who's Buying What and How Much? Correlates of Purchase Behaviors From Medical Marijuana Dispensaries in Los Angeles, California. *J Prim Prev*. 2018;39(6):571-589. doi:10.1007/s10935-018-0528-5
39. Kepple NJ, Freisthler B. Place over traits? Purchasing edibles from medical marijuana dispensaries in Los Angeles, CA. *Addict Behav*. 2017;73(November 2016):1-3. doi:10.1016/j.addbeh.2017.04.010
40. Davis AJ, Geisler KR, Nichols MW. The price elasticity of marijuana demand: evidence from crowd-sourced transaction data. *Empir Econ*. 2015;50(4):1171-1192. doi:10.1007/s00181-015-0992-1
41. Metrik J, Aston ER, Kahler CW, et al. Cue-elicited increases in incentive salience for marijuana: Craving, demand, and attentional bias. *Drug Alcohol Depend*. 2016;167(3):82-88. doi:10.1016/j.drugalcdep.2016.07.027
42. Hindocha C, Lawn W, Freeman TP, Curran HV. Individual and combined effects of cannabis and tobacco on drug reward processing in non-dependent users. *Psychopharmacology (Berl)*. 2017;234(21):3153-3163. doi:10.1007/s00213-017-4698-2
43. Zvorsky I, Nighbor TD, Kurti AN, et al. Sensitivity of hypothetical purchase task indices when studying substance use: A systematic literature review. *Prev Med (Baltim)*. 2019;(August):105789. doi:10.1016/j.ypmed.2019.105789
44. Ben Lakhdar C, Vaillant NG, Wolff FC. Price elasticity of demand for cannabis: Does potency matter? *Addict Res Theory*. 2016;24(4):300-312. doi:10.3109/16066359.2016.1139699
45. Vincent PC, Collins RL, Liu L, Yu J, De Leo JA, Earleywine M. The effects of perceived quality on behavioral economic demand for marijuana: A web-based experiment. *Drug Alcohol Depend*. 2017;170:174-180. doi:10.1016/j.drugalcdep.2016.11.013
46. Collins RL, Vincent PC, Yu J, Liu L, Epstein LH. A behavioral economic approach to assessing demand for marijuana. *Exp Clin Psychopharmacol*. 2014;22(3):211-221. doi:10.1037/a0035318
47. Aston ER, Farris SG, MacKillop J, Metrik J. Latent factor structure of a behavioral economic marijuana demand curve. *Psychopharmacology (Berl)*. 2017;234(16):2421-2429. doi:10.1007/s00213-017-4633-6
48. Peters EN, Rosenberry ZR, Schauer GL, O'Grady KE, Johnson PS. Marijuana and tobacco cigarettes: Estimating their behavioral economic relationship using purchasing tasks. *Exp Clin Psychopharmacol*. 2017;25(3):208-215. doi:10.1037/pha0000122

49. Amlung M, MacKillop J. Availability of legalized cannabis reduces demand for illegal cannabis among Canadian cannabis users: evidence from a behavioural economic substitution paradigm. *Can J Public Heal*. 2019;110(2):216-221. doi:10.17269/s41997-018-0160-4
50. Amlung M, Reed DD, Morris V, Aston ER, Metrik J, MacKillop J. Price elasticity of illegal versus legal cannabis: a behavioral economic substitutability analysis. *Addiction*. 2019;114(1):112-118. doi:10.1111/add.14437
51. Pacula RL, Lundberg R. Why Changes in Price Matter When Thinking About Marijuana Policy: A Review of the Literature on the Elasticity of Demand. *Public Heal Rev*. 2014;35(2):1-18.
52. Aston ER, Metrik J, MacKillop J. Further validation of a marijuana purchase task. *Drug Alcohol Depend*. 2015;152(8):32-38. doi:10.1016/j.drugalcdep.2015.04.025
53. Hunt P, Pacula RL. Early Impacts of Marijuana Legalization: An Evaluation of Prices in Colorado and Washington. *J Prim Prev*. 2017;38(3):221-248. doi:10.1007/s10935-017-0471-x
54. Burgard DA, Williams J, Westerman D, et al. Using wastewater-based analysis to monitor the effects of legalized retail sales on cannabis consumption in Washington State, USA. *Addiction*. 2019;114(9):1582-1590. doi:10.1111/add.14641
55. Whitehill JM, Geissler KH, Doonan SM, Johnson JK. *Special Report: Evaluating the Impact of Cannabis Legalization in Massachusetts: State of the Data*. Boston, MA; 2019. https://mass-cannabis-control.com/wp-content/uploads/2019/11/RR5-Special-Report-Evaluating-the-Impact-of-Cannabis-Legalization-in-MA-State-of-the-Data-Nov-2019-2.pdf.
56. Parey M, Rasul I. Measuring the Market Size for Cannabis: A New Approach Using Forensic Economics. *CEPR Discuss Pap*. 2017. doi:10.1111/(ISSN)1468-0335
57. Kilmer B, Caulkins JP, Pacula RL, Reuter PH. Bringing perspective to illicit markets: estimating the size of the U.S. marijuana market. *Drug Alcohol Depend*. 2011. doi:10.1016/j.drugalcdep.2011.08.008
58. Orens A, Light M, Lewandowski B, Rowberry J, Saloga C. *Market Size and Demand for Marijuana in Colorado 2017 Market Update*.; 2018. https://www.colorado.gov/pacific/sites/default/files/MED Demand and Market Study 082018.pdf.
59. Johnson JK, Doonan SM. Building Evidence-Based Prevention Mechanisms Into Cannabis Legalization Policy and Regulations. *Am J Public Health*. 2019;9(109):1165-1166. https://ajph.aphapublications.org/doi/10.2105/AJPH.2019.305249.
60. Doonan SM, Johnson JK. *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*.; 2019. https://mass-cannabis-control.com/wp-content/uploads/2019/04/1.-RR2-94C-Violations-FINAL.pdf.
61. Herring C, Henderson L. Wealth Inequality in Black and White: Cultural and Structural Sources of the Racial Wealth Gap. *Race Soc Probl*. 2016;8(1):4-17. doi:10.1007/s12552-016-9159-8
62. Beckwith AL, Carter DR, Peters T. The Underrepresentation of African American Women in Executive Leadership: What's Getting in the Way? *J Bus Stud Q*. 2016;7(4):115-134. www.money.cnn.com/2015/01/28/news/economy/mcdonalds-ceo-diversity.
63. U.S. Census Bureau. Annual Survey of Entrepreneurs. 2016.

https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk#.
64. Oliver M, Shapiro T. *Black Wealth/White Wealth: A New Perspective on Racial Inequality*. Routledge; 2013.
65. Ruel E, Hauser RM. Explaining the Gender Wealth Gap. *Demography*. 2013;50(4):1155-1176. doi:10.1007/s13524-012-0182-0
66. Gibbs SR. The bitter truth: A comparative analysis of black male and black female entrepreneurs. *J Dev Entrep*. 2014;19(1). doi:10.1142/S108494671450006X
67. Neumeyer X, Santos SC, Caetano A, Kalbfleisch P. Entrepreneurship ecosystems and women entrepreneurs: a social capital and network approach. *Small Bus Econ*. 2019:1-15. doi:10.1007/s11187-018-9996-5
68. Renko M, Parker Harris S, Caldwell K. Entrepreneurial entry by people with disabilities. *Int Small Bus J Res Entrep*. 2016;34(5):555-578. doi:10.1177/0266242615579112
69. Kittel J. Women in Weed: Gender, Race, and Class in the Cannabis Industry. *Arbutus Rev*. 2018;9(1):32-45.
70. Danquah-Brobby E. Comment: Prison For You. Profit For Me. Systemic Racism Effectively Bars Blacks From Participation in Newly-Legal Marijuana Industry. *Univ Balt Law Rev*. 2017;46(3):523-546.
71. Valleriani J, Lavalley J, McNeil R. A missed opportunity? Cannabis legalization and reparations in Canada. *Can J Public Heal*. 2018;109(5-6):745-747. doi:10.17269/s41997-018-0121-y
72. August K. Women in the marijuana industry. *Humboldt J Soc Relat*. 2013;35(1):89-103.
73. Thompson BY. "Good moral characters": how drug felons are impacted under state marijuana legalization laws. *Contemp Justice Rev Issues Crim Soc Restor Justice*. 2017;20(2):211-226. doi:10.1080/10282580.2017.1307109
74. Bender SW. The Colors of Cannabis: Reflections on the Racial Justice Implications of California's Proposition 64. *UC Davis Law Rev*. 2016;689(2014):11-23.
75. Pruitt AS. Managing the Inclusivity-Exclusivity Dialectic: a Comparison of Women in Tech, Funeral Directing, and Cannabis. 2019. https://scholar.colorado.edu/socy_gradetds/75.
76. Rogers KA. Breaking the Grass Ceiling: Race, Gender, and Sexuality in the U.S. Legal Cannabis Industry. 2017.
77. Chicago Lewis A. How Black People Are Being Shut Out of America's Weed Boom: Whitewashing the Green Rush. *BuzzFeed News*. https://www.buzzfeednews.com/article/amandachicagolewis/americas-white-only-weed-boom. Published 2016.

X. Appendices

Appendix 1. Acronyms

Acronym	Meaning
BRFSS	Behavioral Risk Factor Surveillance System
CBD	Cannabidiol
CSA	Controlled Substance Act
DBE	Disadvantaged Business Enterprise
DEA	U.S. Drug Enforcement Agency
DIO	Diversity in Ownership
DPH	Department of Public Health
HVAC	Heating/Ventilation/Air Conditioning
LGBT+	Lesbian, Gay, Bisexual, Transgender
M.G.L.	Massachusetts General Law
MA	Massachusetts
ME	Marijuana Establishment
MBE	Minority Business Enterprises
MTC	Medical Marijuana Treatment Center
NIBRS	National Incident Based Reporting System
NSDUH	National Survey on Drug Use and Health
OSD	Operational Services Division
PBE	Portuguese Business Enterprises
SDO	Supplier Diversity Office
THC	Delta 9-Tetrahydrocannabinol
THC-A	Tetrahydrocannabinolic Acid
U.S.	United States
VBE	Veteran Business Enterprises
WBE	Women Business Enterprises
YRBS	Youth Risk Behavior Survey

Appendix 2. Final Adult-Use License Data

Table 1. License Types and Descriptions [Current as of 11/20/19]

License Type	Description
Marijuana Retailer	A Marijuana Retailer is an entity authorized to purchase and deliver cannabis and cannabis products from Marijuana Establishments and to sell or otherwise transfer cannabis and cannabis products to Marijuana Establishments and to consumers.
Marijuana Cultivator	A Marijuana Cultivator may cultivate, process and package cannabis, to transfer and deliver cannabis products to Marijuana Establishments, but not to consumers. A Craft Marijuana Cooperative, which will be discussed in further detail below, is a type of Marijuana Cultivator. Cultivators may select what tier they will be in, which will affect their application and licensing fees. The following options are available, but no licensee may have a total canopy of more than 100,000 square feet.
Marijuana Product Manufacturer	A Marijuana Product Manufacturer is an entity authorized to obtain, manufacture, process and package cannabis and cannabis products, to deliver cannabis and cannabis products to Marijuana Establishments and to transfer cannabis and cannabis products to other Marijuana Establishments, but not to consumers.
Marijuana Transporter with Other Existing Marijuana Establishment License	A Marijuana Transporter is an entity that may only transport cannabis or cannabis products when such transportation is not already authorized under a Marijuana Establishment license if it is licensed as a Marijuana Transporter
Marijuana Microbusiness	A Microbusiness is a co-located Tier 1 Marijuana Cultivator, and/or Marijuana Product Manufacturer limited to purchase 2,000 pounds of cannabis from other Marijuana Establishments in one year.
Independent Testing Laboratory	An Independent Testing Laboratory is an entity that does not hold any other type of Marijuana Establishment license and is properly accredited to perform tests in compliance with protocols for testing cannabis and cannabis products.
Standards Testing Laboratory	A Standards Testing Laboratory is an entity that would otherwise qualify to be an Independent Testing Laboratory but instead performs blind tests to verify the results of an Independent Testing Laboratory at the request of the Commission
Craft Marijuana Cooperative	A Craft Marijuana Cooperative is a type of Marijuana Cultivator which may cultivate, obtain, manufacture, process, package and brand cannabis and cannabis products to deliver cannabis to Marijuana Establishment but not to consumers.

For more detail see Commission Guidance, "Guidance on Types of Marijuana Establishment Licenses" https://mass-cannabis-control.com/wp-content/uploads/2018/04/Guidance-License-Types.pdf

Table 2. Final Adult-Use License by City/Town [Current as of 11/20/19]

City/Town/Location	Total	Total Industry (%)
Andover	2	(2.0%)
Attleboro	1	(1.0%)
Ayer	3	(3.1%)
Barre	1	(1.0%)
Bellingham	2	(2.0%)
Boston	4	(4.1%)
Bridgewater	2	(2.0%)
Brockton	3	(3.1%)
Cambridge	1	(1.0%)
Chicago	1	(1.0%)
Chicopee	3	(3.1%)
Easthampton	3	(3.1%)
Fall River	3	(3.1%)
Fitchburg	3	(3.1%)
Framingham	1	(1.0%)
Franklin	4	(4.1%)
Gardner	1	(1.0%)
Georgetown	3	(3.1%)
Great Barrington	1	(1.0%)
Greenfield	1	(1.0%)
Hudson	1	(1.0%)
Leicester	3	(3.1%)
Littleton	2	(2.0%)
Lowell	3	(3.1%)
Marlborough	1	(1.0%)
Medway	2	(2.0%)
Millbury	1	(1.0%)
Millis	1	(1.0%)
Nantucket	3	(3.1%)
Newburyport	2	(2.0%)
Newton	1	(1.0%)
Oxford	1	(1.0%)
Pittsfield	7	(7.1%)
Plymouth	3	(3.1%)
Somerset	1	(1.0%)
Salem	3	(3.1%)
Salisbury	1	(1.0%)
Sheffield	1	(1.0%)
Somerset	1	(1.0%)

Turners Falls	3	(3.1%)
Uxbridge	2	(2.0%)
Woburn	3	(3.1%)
Wareham	1	(1.0%)
Webster	2	(2.0%)
West Newton	1	(1.0%)
Westborough	2	(2.0%)
Worcester	3	(3.1%)

Table 3. Final Adult-Use License by License Type [Current as of 11/20/19]

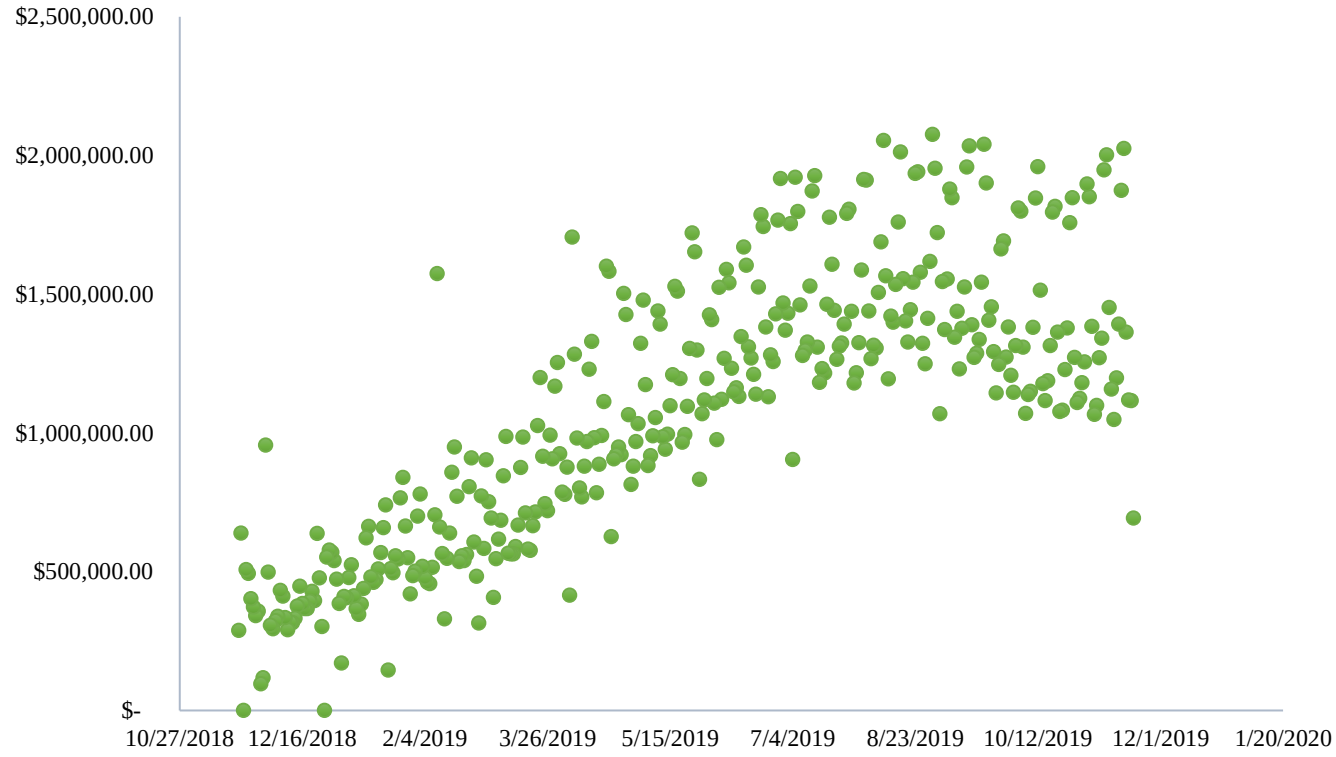
License Type	Total	Percent of Industry (%)
Independent Testing Laboratory	2	(2%)
Marijuana Cultivator	31	(32%)
Marijuana Microbusiness	1	(1%)
Marijuana Product Manufacturer	26	(27%)
Marijuana Retailer	36	(37%)
Marijuana Transporter with Other Existing License	2	(2%)
Total	**98**	**(100%)**

Appendix 3. Adult-Use Sales Data

Table 1. Sales by Product Category [11/20/18-11/20/19]

Product Category	Total	(%)
Buds	4,705,546	(51%)
Concentrate	47,688	(1%)
Concentrate (Each)	1,782,161	(19%)
Infused (edible)	1,564,222	(17%)
Infused (non-edible)	241,373	(3%)
Infused Pre-Rolls	15,987	(0%)
Kief	9,017	(0%)
Raw Pre-Rolls	713,747	(8%)
Shake/Trim	4,442	(0%)
Shake/Trim (by strain)	83,035	(1%)
Suppository	47	(0%)
Total	**9,167,265**	**(100%)**

Chart 2. Adult-Use Sales Per Day [11/20/18-11/20/19]



***Note**: Reporting total sales per day for all adult-use stores. Data does not control for additional number of retail stores over time.

Table 3. Sales by Product Category for Week of 11/13/19-11/19/19

Product Category	Total Units	Total in Dollars	Average Price Per Unit
Buds	133,110	$ 5,884,005.20	$ 44.20
Concentrate	1,697	$ 125,829.90	$ 74.15
Concentrate (Each)	19,654	$ 1,118,636.41	$ 56.92
Infused (edible)	50,037	$ 1,952,034.10	$ 39.01
Infused (non-edible)	1,461	$ 66,348.78	$ 45.41
Infused Pre-Rolls	58	$ 1,131.50	$ 19.51
Kief	696	$ 17,120.30	$ 24.60
Raw Pre-Rolls	50,086	$ 860,395.00	$ 17.18

Appendix 4. Race/Ethnicity Data

Table 1. Race and Ethnicity Definitions

Description [as recored in Massachusetts seed-to-sale tracking system]
Asian (Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese)
American Indian or Alaska Native
Black or African American (of African Descent, African American, Nigerian, Jamaican, Ethiopian, Haitian, Somali)
Declined to answer
Hispanic, Latino, or Spanish (Mexican or Mexican American, Puerto Rican, Cuban, Salvadoran, Dominican, Colombian)
Middle Eastern or North African (Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian)
Native Hawaiian or Other Pacific Islander (Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, Marshallese)
Some Other Race or Ethnicity
Two or more Race/Ethnicity categories

Table 2. Race and Ethnicity for Agent Registrations [Current as of 11/20/19]

Race/Ethnicity	Total	(%)
Asian	92	(1%)
American Indian or Alaska Native	23	(0%)
Black or African American	369	(5%)
Declined to answer	718	(10%)
Hispanic, Latino, or Spanish	508	(7%)
Middle Eastern or North Africa	24	(0%)
Native Hawaiian or Other Pacific Islander	6	(0%)
Some Other Race or Ethnicity	100	(1%)
White	5,249	(74%)
Total	**7,089**	**(100%)**

Table 3. Race/Ethnicity (%) of Agent Registrations Between License Types with ≥5 unique entities [Current as of 11/20/19]

	Marijuana Cultivator Freq. (%)		Marijuana Product Manufacturer Freq. (%)		Marijuana Retailer Freq. (%)	
Asian	23	(1%)	29	(1%)	92	(1%)
American Indian or Alaska Native	11	(0%)	6	(0%)	23	(0%)
Black or African American	108	(5%)	81	(4%)	369	(5%)
Declined to answer	227	(10%)	247	(13%)	718	(10%)
Hispanic, Latino, or Spanish	139	(6%)	136	(7%)	508	(7%)
Middle Eastern or North African	7	(0%)	≤5	(0%)	24	(0%)
Native Hawaiian or Other Pacific Islander	≤5	(0%)	≤5	(0%)	6	(0%)
Some Other Race or Ethnicity	26	(1%)	30	(2%)	100	(1%)
White	1,711	(76%)	1,440	(73%)	5,249	(74%)

Appendix 5. Diversity in Ownership Business Enterprise Data

Table 1. Diversity in Ownership (DIO) Status for All Application Statuses [Current as of 11/20/19]

	Final License (n=98)	**Provisional License** (n=99)	**Provisional Consideration** (n=33)	**In Process** (n= 4,366)	**Denied** (n=4)	**Total**
Two or More DIO	0	6	1	146	0	153
LGBT-owned	0	2	0	18	0	20
Minority-Owned	0	2	3	145	0	150
Not a DIO	95	84	26	840	4	1,049
Veteran-Owned	0	3	0	24	0	27
Women-Owned	3	2	0	82	0	87
Disability-Owned	0	0	0	11	0	11
Total	**98**	**99**	**30**	**1,266**	**4**	**1,497**

Table 2. DIO Status by License Type for All Approved and Pending Licenses (n=670) [Current as of 11/20/19]

	Disability-Owned	**LGBT-Owned**	**Minority-Owned**	**Veteran-Owned**	**Woman-Owned**
Craft Marijuana Cooperative	1	0	0	1	1
Independent Testing Lab	0	0	1	0	1
Marijuana Cultivator	2	4	14	7	13
Marijuana Microbusiness	2	1	2	2	3
Marijuana Product Manufacturer	1	5	9	4	9
Marijuana Research Facility	1	1	1	2	2
Marijuana Retailer	2	4	29	7	25
Marijuana Transporter	0	0	0	0	1
Standards Laboratory	0	0	0	0	0
Third Party Marijuana Transporter	0	0	1	0	1
Total	**9**	**15**	**57**	**23**	**56**

***Note**: Data includes all applications (licensed and non-licensed)

Appendix 6. Priority Status Data

Table 1. Economic Empowerment Certification Program (2018) Eligibility [Applicants must have met 3:5 criteria]

Majority of ownership belongs to people who have lived in areas of disproportionate impact* for five of the last ten years;
Majority of ownership has held one or more previous positions where the primary population served were disproportionately impacted, or where primary responsibilities included economic education, resource provision or empowerment to disproportionately impacted individuals or communities;
At least 51% of current employees/sub-contractors reside in areas of disproportionate impact and will increase to 75% by first day of business;
At least 51% of employees or sub-contractors have a drug-related CORI, but are otherwise legally employable in a cannabis-related enterprise;
A majority of the ownership is made up of individuals from Black, African American, Hispanic, or Latino descent; and
Owners can demonstrate significant past experience in or business practices that promote economic empowerment in areas of disproportionate impact.

Note: See https://mass-cannabis-control.com/wp-content/uploads/2018/04/Guidance-for-Identifying-Areas-ofDisproportionate-Impact.pdf for list of cities designated areas of disproportionate impact.

Table 2. Priority Application Status for All Application Status' [Current as of 11/20/19]

	Final License (n=98)	**Provisional License** (n=99)	**Provisional Consideration** (n=33)	**In Process** (n= 4,366)	**Denied** (n=4)	**Total**
Economic Empowerment	0	1	1	110	0	112
General Applicant	12	45	12	4,093	4	4,166
Registered Medical Dispensary	86	53	17	163	0	319
Total	**98**	**99**	**30**	**4,366**	**4**	**4,593**

Appendix 7. Adult-Use Agent Registration Data

Table 1. Agent Registration by Role

Role	Total	Percent
Board member	135	2%
Director	206	3%
Employee	5,683	82%
Executive	393	6%
Manager	530	8%
Volunteer	6	0%
Total	6,953	100%

Table 2. Agent Registration by State of Residency

State	Total	Percent
AK	2	0%
AL	1	0%
AZ	6	0%
CA	3	0%
CO	62	1%
CT	149	2%
FL	52	1%
GA	2	0%
IA	1	0%
IL	26	0%
IN	3	0%
KY	1	0%
MA	5,780	83%
MD	18	0%
ME	35	1%
MI	1	0%
MN	3	0%
NC	1	0%
NH	178	3%
NJ	19	0%
NV	5	0%
NY	47	1%
OH	2	0%
OR	7	0%
PA	9	0%
RI	507	7%

TX	5	0%
VA	7	0%
VT	10	0%
WA	10	0%
WV	1	0%
Total	**6,953**	100%