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Maryland Future Adult Use Cannabis Demand & Predictive Modeling

A Behavioral Economic Study

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About the Authors

Cannabis Public Policy Consulting is the leading government consulting & research firm producing dozens of publications on cannabis demand, public health outcomes and market surveillance

Michael Sofis, PhD

Director, Research and Products

Dr. Sofis received his PhD in behavioral psychology at the University of Kansas and completed a three-year post-doctoral fellowship at Dartmouth College funded by the National Institute on Drug Abuse. He has published 27 peer-reviewed scientific manuscripts, including 13 on the impacts of cannabis legalization and cannabis health outcomes.

Mackenzie Slade, MPH

Director

Ms. Slade received her Masters in Public Health from UCLA Fielding School with a focus in health policy. As an implementation scientist, she has strategized and launched four cannabis markets, conducted market surveillance and implemented research to practice plans for countless cannabis agencies.

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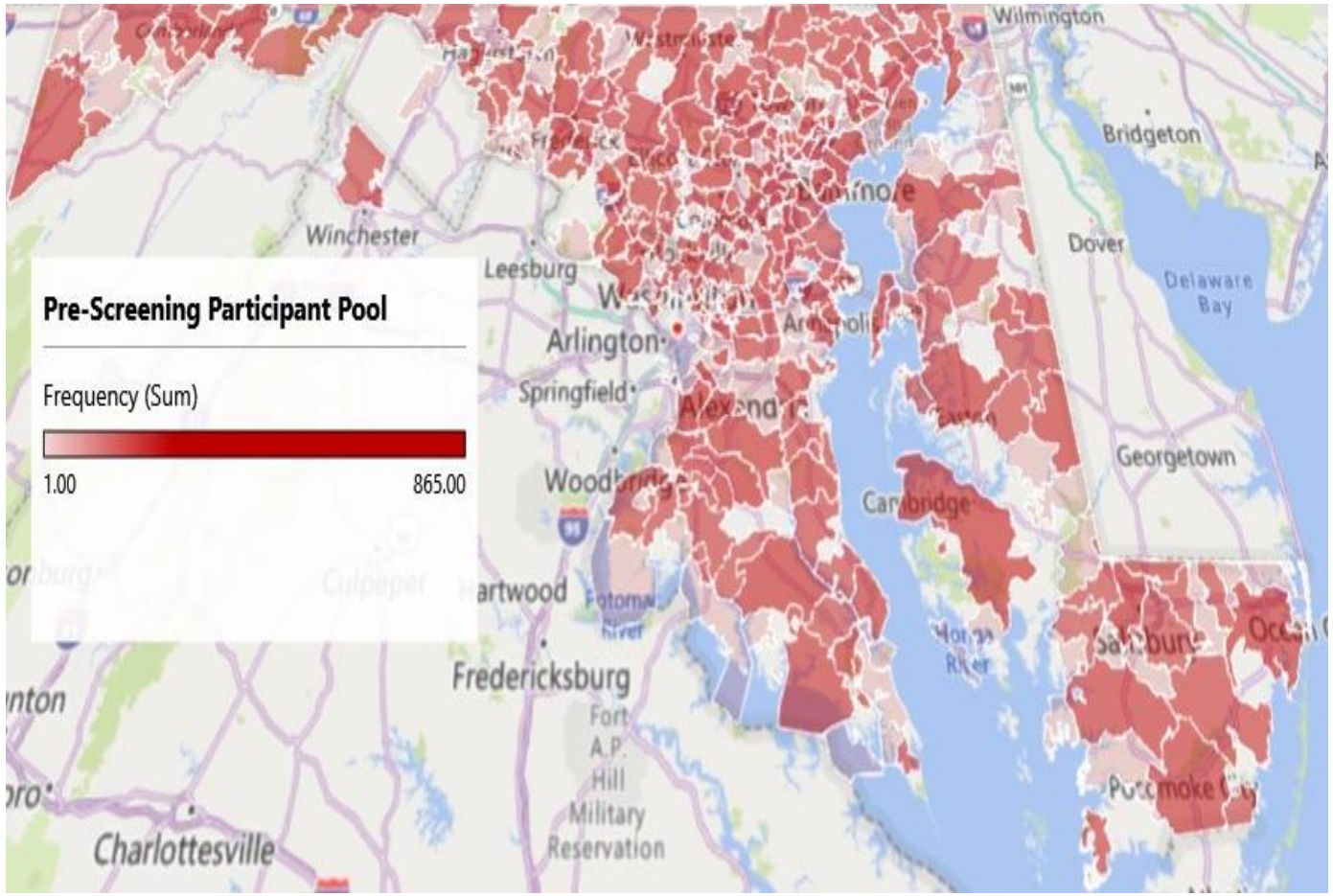
Section 1. Research Design

Methods provided a representative sample and additional confidence in empirical findings

The current study is the first ***empirical*** study in Maryland to assess, quantify and predict cannabis demand.



4,619 Marylanders Screened

Across 413 Maryland zip codes using 49 unique research panels

2,147 Responses Completed

With 919 respondents reporting cannabis use in the past year

95% Match Rate

Demographic distribution of the sample collected corresponded with that of the state

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Section 2. Maryland Cannabis Consumption

Consumption trends observed in Maryland match national data sets with two deviations; grams & safety

43%

Past-Year Cannabis Use Prevalence

43% of Marylanders have used cannabis within the past year, consistent with national prevalence at 46% (RDCOS 2022).

19%

Daily or Almost Daily Cannabis Use Prevalence

A significant portion of past month consumers (36%) report daily or almost daily cannabis use.

25.4 grams

Average Monthly Grams

The average monthly grams for states with legal cannabis programs is lower than Maryland at 20.2 grams (RDCOS 2022).

Safety Virtually Tied With Price

National data shows that price is consistently the #1 factor associated with importance associated with regulated purchasing. Safety is ranked #4 (RDCOS 2022).

Key

- Consistent with national data
- Deviation from national data

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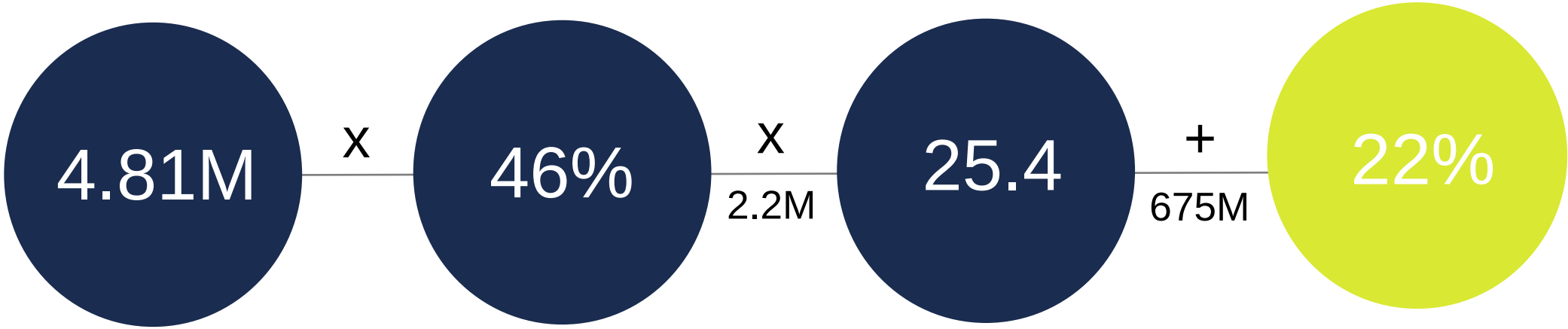
Section 3. Maryland Cannabis Demand

Total cannabis demand across all sources equates to approximately 824M grams (of flower)



Cannabis demand in Maryland is observed to be approximately 824M grams, or 1.8M lbs. *This demand is observed across all cannabis sources.*

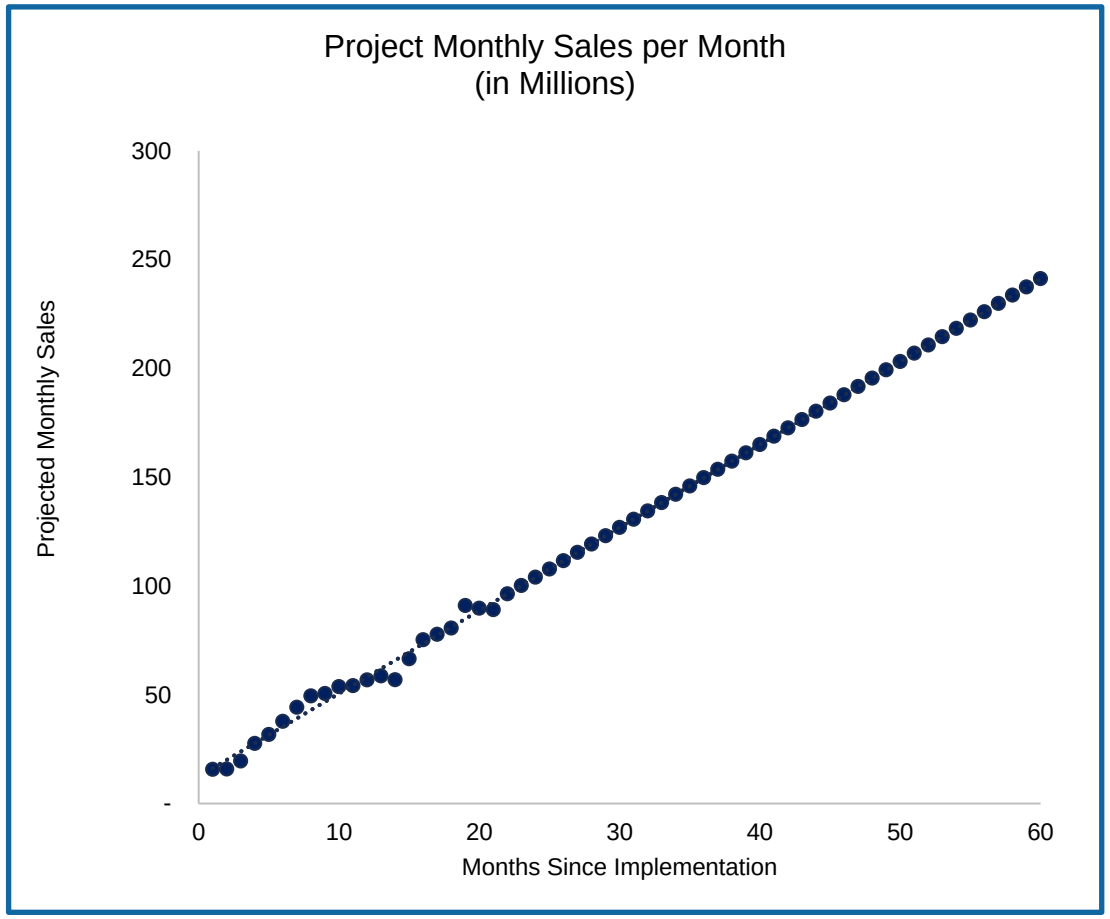
Key

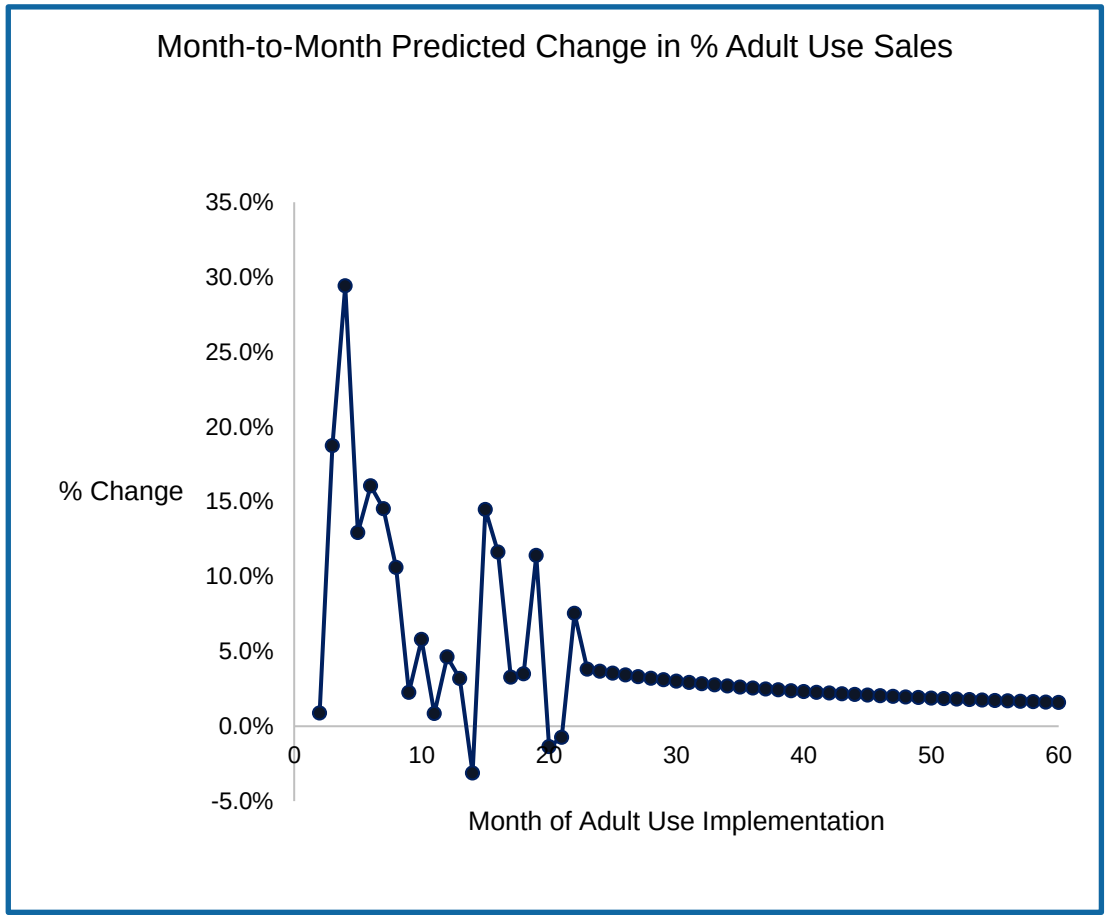
Empirically derived data

Assumed data

Section 4. Predicted Adult Use Sales

Adult use cannabis sales in Maryland will total $1B cumulative sales at month 20, with months 6-7 the most flexible in terms of potential for change





- Linear growth in sales that will reach over $240 million per month
- Predictive model fits the data at 99%

- Sales become more stable around year 3 with a resurgence of opportunity at 1.5 years, consistent with what has been observed across other markets

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Section 5. Taxation and Market Share Modeling

Effective tax rate should be no more than 15-20%, and dispensaries should be no less than 300

Three critical considerations that interact over time to affect market capture:

1. Number of regulated adult use dispensaries
2. Time (months) after beginning adult use implementation
3. Taxation % as a function of total price

Predicted Percentage of Cannabis Market Share That Will Be Illicit

Number of Dispensaries	Effective Tax Rate	Month of Implementation			Number of Dispensaries	Effective Tax Rate	Month of Implementation			Number of Dispensaries	Effective Tax Rate	Month of Implementation		
		1 – 4	5 - 8	9 - 12			25 – 28	29 - 32	33 – 36			49 - 52	53 - 56	57 - 60
100-250	10%	43%	42%	41%	100-250	10%	38%	37%	36%	100-250	10%	33%	32%	31%
	15%	45%	44%	43%		15%	40%	39%	38%		15%	35%	34%	34%
	20%	47%	46%	46%		20%	42%	42%	41%		20%	38%	37%	36%
	25%	49%	49%	48%		25%	45%	44%	43%		25%	40%	39%	38%
	30%	52%	51%	50%		30%	47%	46%	45%		30%	42%	41%	41%
260-500	10%	38%	37%	36%	260-500	10%	33%	32%	31%	260-500	10%	28%	27%	26%
	15%	40%	39%	38%		15%	35%	34%	33%		15%	30%	29%	29%
	20%	42%	41%	41%		20%	37%	37%	36%		20%	33%	32%	31%
	25%	44%	44%	43%		25%	40%	39%	38%		25%	35%	34%	33%
	30%	47%	46%	45%		30%	42%	41%	40%		30%	37%	36%	36%
500-800	10%	33%	32%	31%	500-800	10%	28%	27%	26%	500-800	10%	23%	22%	21%
	15%	35%	34%	33%		15%	30%	29%	28%		15%	25%	24%	24%
	20%	37%	36%	36%		20%	32%	32%	31%		20%	28%	27%	26%
	25%	39%	39%	38%		25%	35%	34%	33%		25%	30%	29%	28%
	30%	42%	41%	40%		30%	37%	36%	35%		30%	32%	31%	31%

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Section 6. Drivers of Demand

Willingness to Travel, Willingness to Pay, and Delivery all proven important for growing regulated market share

Willingness to Travel

- Consumers are willing to travel up to 11-20 minutes to purchase cannabis.
- This is roughly equates to walking 1 mile which provides important context for urban vs rural dynamics in dispensary density.

Willingness to Pay

- Median willingness to pay per gram of adult use cannabis is $14, which is very high compared to other legal cannabis states.
- Upon reaching $10 per gram pricing, between 75%-90% of all cannabis accessed in Maryland will be through regulated sources

Delivery

- Demand for cannabis delivery represents a 13% increase in the percent of regulated sales **after** launching the cannabis market.
- This shows promise for potentially opening the market with delivery, a recent trend in attempting launch markets quickly.

Section 7. Supply

Supply should not aim to meet *all* cannabis demand in Year 1, and should scale up over the years to match predicted consumer transitions

There is no *validated* methodology on how to arrive at an "optimal" supply figure. Importantly, flooding the market with supply too quickly with the goal of matching demand (100%) has detrimental long-term market consequences. Similarly, having too limited of supply can result in both short-term and long-term market consequences. **As such, having the "optimal" quantity of supply is not nearly as important as incorporating production management policy levers to allow regulators to be *proactive* instead of *reactive*.**

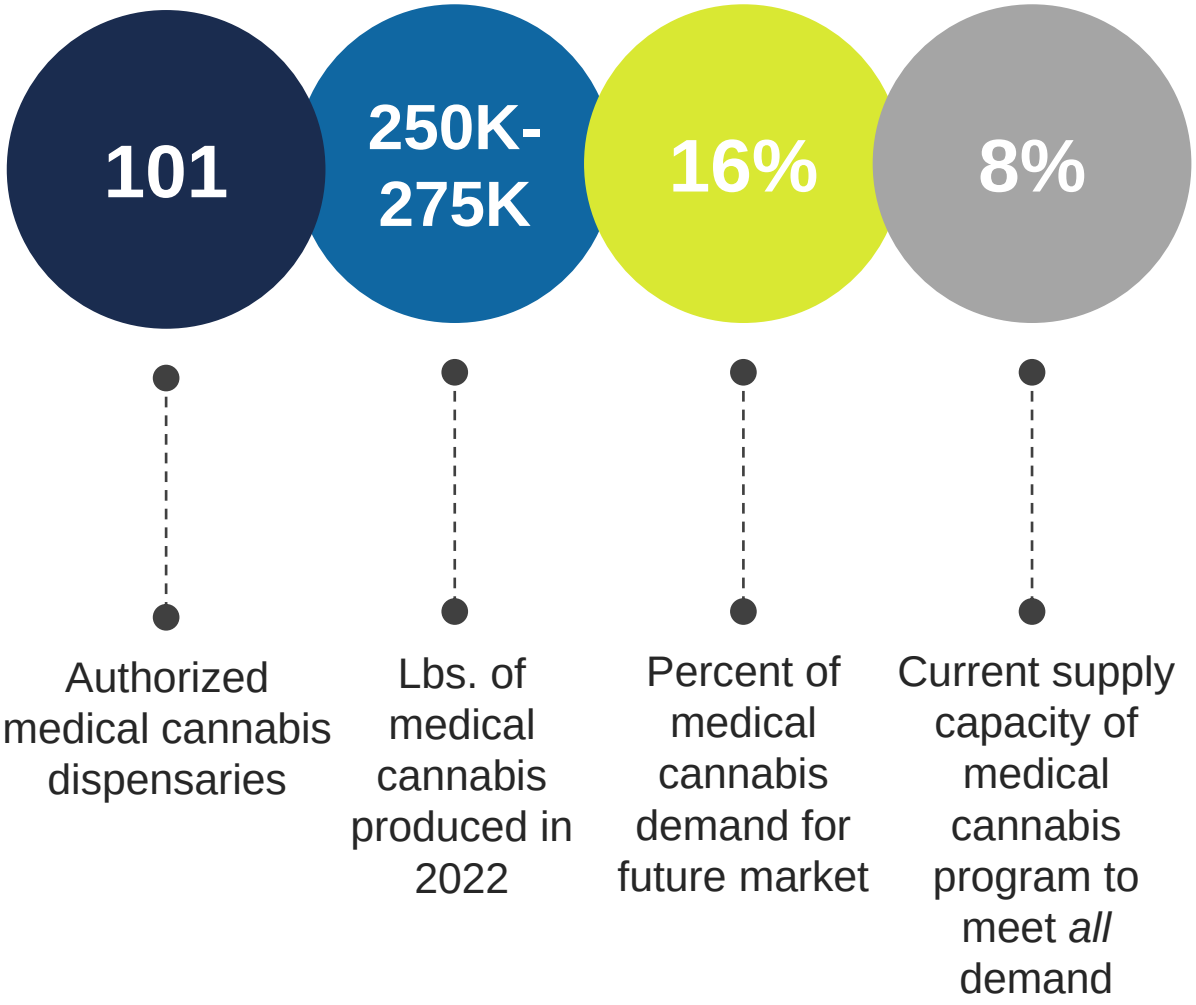
	Year 1	Year 2	Year 3	Year 4	Year 5
Total Demand (g)	824M	824M	824M	824M	824M
AU Demand	264M	321M	404M	453M	470M
AU Sold as Proportion of All Cannabis Sources	32%	39%	49%	55%	57%
Minimum AU Supply (2x Demand) in Total Harvested Plants	1.5M	1.9M	2.4M	2.7M	2.8M
Minimum AU Supply (2x Demand) in Mature Plants at Any Given Time	375K	475K	600K	675K	700K
Assumed Mature Plant Canopy (SqFt) to meet AU Demand	915K	1.16M	1.46M	1.65M	1.7M

Methods Overview

- Identify scalable market capture based on predictive modeling and real-world experience
- Double the supply for that identified percentage of demand
- Assume 1.33 plants is required to create 1-pound of cannabis*
- Assume 4 harvest cycles for each harvested plant*
- Assume 2.44 square feet/plant to arrive at presumed canopy*

Section 7. Supply

Current and existing medical cannabis capacity would not suffice for the total future adult use market and is likely needing to increase for medical cannabis patients in general.



- While it is common for states to allow a dual licensing opportunity for medical and adult use cannabis, the current existing medical market will not suffice for the total future adult use market based on year end data provided by the Maryland Medical Cannabis Commission.
- Additionally, it appears that there is a shortage of medical cannabis supply and products in the current medical market. This has been validated by a separate survey commissioned by the Maryland Medical Cannabis Commission.

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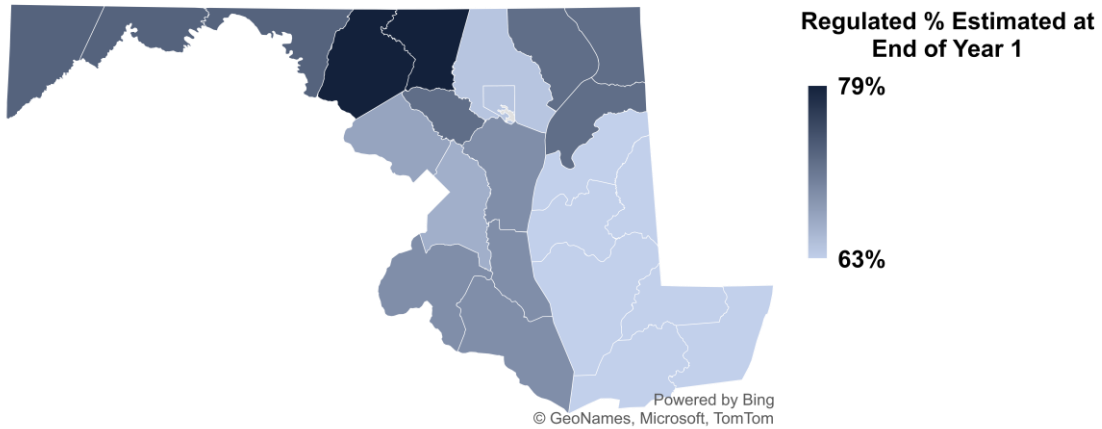
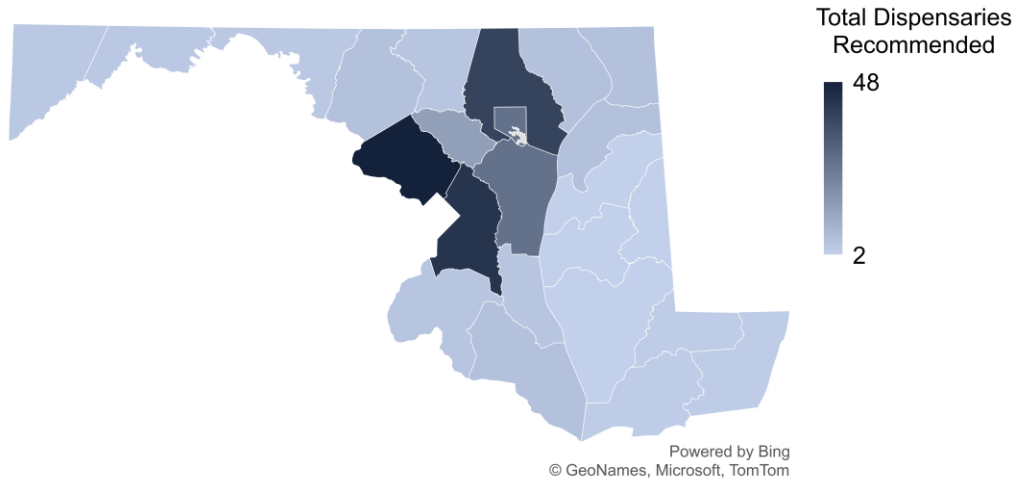
Section 7. Supply

The regulated industry can quickly capture market share through dispensary optimization, growing the total number of dispensaries from approx. 300 to 500 over the first several years

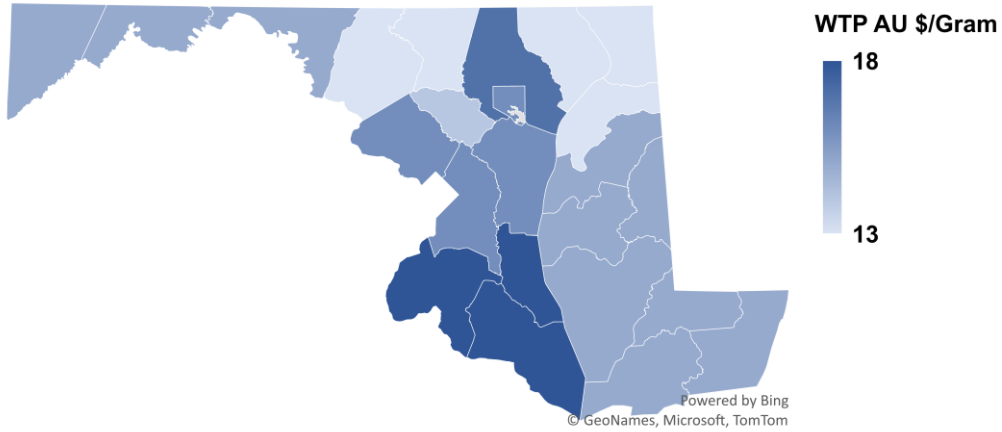
Regulated % by MD County End of Year 1 of AU



Recommended Total Dispensaries in MD for AU Sales



Estimated Willingness to Pay Per Gram of AU Cannabis



- Determined a ratio of 17,000 residents per dispensary
- The counties with the highest total recommended number of dispensaries are in Montgomery County (48), Prince George's County (43), Baltimore County (39) and Anne Arundel County (27).
- It is important to note that **one additional** dispensary was added to our recommendations in Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Worcester, and Somerset counties to assist in shifting individuals to the regulated market in these areas

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Section 7. Supply

The optimization of dispensaries as well as the scalability of their implementation should NOT add notable public health risks

- When extrapolating to use patterns upon implementation of adult use, the number of dispensaries recommended (300) did not negatively impact risks of cannabis-related public health harms

- Several findings corroborate **that greater illicit access is linked to** such **negative cannabis-related outcomes** whereas **anticipated regulated use** from medical and adult use sources **is either unrelated or is related to a lesser extent**

- Additionally, this data shows that **for every gram of adult use cannabis anticipated to be consumed**, **there are significantly lower risks of problematic cannabis use and cannabis related hospitalization**.

- Even if this data proves only correlational and not causation, it is still encouraging for adult use legalization and reducing harms.

Section 8. Public Health and Safety Outcomes

The optimization of dispensaries as well as the scalability of their implementation should NOT add notable public health risks

- Majority of the cannabis-related public health outcomes evaluated in this study are comparable to 25 states surveyed in April of 2022 (illicit, medical-only, and adult use states).
- However, there is significant room for improvement on these outcomes
- May of these outcomes may be addressed and improved through dedicated education and outreach campaigns

Driving under the influence of cannabis

37% of cannabis consumers report having driven under the influence in the past month, averaging 11 days per month

Problematic Cannabis Use

38% of cannabis consumers demonstrated problematic cannabis use patterns

Consume Cannabis Before or During Work

36% of cannabis consumers report consuming cannabis before or during work hours

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Questions?

Thank you!