

Utah Medical Cannabis Patient Demand Study

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Overview

Cannabis Public Policy Consulting (CPPC) was tasked by the Utah Department of Agriculture and Food with estimating patient demand parameters in Utah's medical cannabis market. To complete these tasks, CPPC drew upon three survey waves of the Regulatory Determinants of Cannabis Survey (RDCOS) and supply data provided by the Utah Department of Agriculture and Food. The three RDCOS survey waves employed recruited patients throughout the duration of the months of March, June, and September of 2023. Subsequently, this data was compiled across survey waves to engage in inferential and descriptive statistical analysis of the Utah medical cannabis market and medical cannabis patient market behavior.

Methodology

Sample

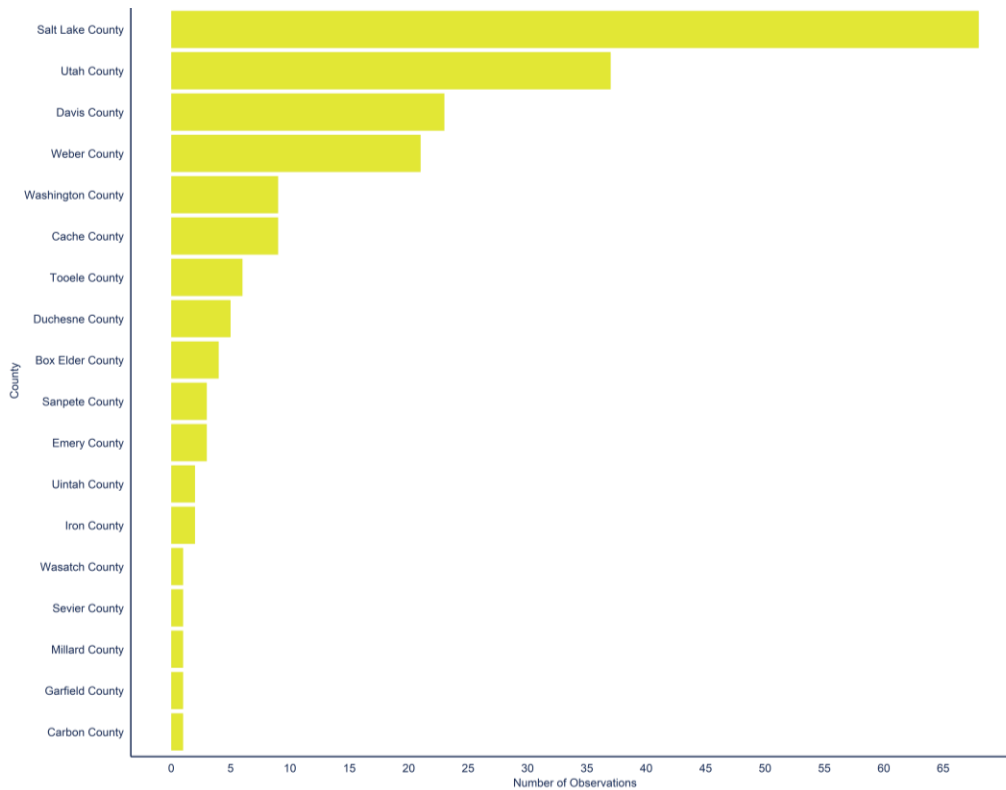
During 2023, CPPC recruited 197 participants that had indicated they were currently or previously enrolled in the Utah medical cannabis program. Based on recent data released by the Utah Department of Health and Human Services, Utah has approximately 79,475 medical cannabis patients.¹ Our sample size provides a 90% confidence interval, with a 6% margin of error, suggesting that the current sample size is sufficient.² In total, CPPC recruited participants from 18 of the 29 counties in the state of Utah. Following state population patterns, CPPC recruited most prominently from Salt Lake County, Utah County, Davis County, Weber County, Washington County, and Cache County. These six counties alone were represented by 84% of the participants who participated in our surveys. Notably, these six counties are the only counties in Utah that have a population greater than 100,000 persons, strengthening our sample and subsequent findings. In Figure 1 below, the exact distribution of participants per county is represented in descending order of value.

To provide further robust statistical tests, CPPC implemented guidance on regional groupings from the Utah Association of Governments (AOG) to group Utah counties into regions. Due to the distribution of our current sample population and statistical necessity to find robust results, these regions were further grouped into categories best suited to statistical testing for the questions being posed, and do not entirely describe their exact geographic location.

¹ <https://medicalcannabis.utah.gov/wp-content/uploads/January-2024-Monthly-Report.pdf>

² <https://www.qualtrics.com/blog/calculating-sample-size/>

Figure 1. Figure 1. Number of Observations by County



Regional Grouping

The Northwest Utah region included Salt Lake County, Davis County, Morgan County, Weber County, Tooele County, Box Elder County, Cache County, and Rich County. According to the AOG, this would describe the Bear River Region and Wasatch Front Region. Our North Central region included Utah County, Wasatch County, and Summit County. According to the AOG, this is the Mountainland region. The Southwest region includes Juab County, Millard County, Sevier County, Sanpete County, Piute County, Wayne County, Beaver County, Iron County, Garfield County, Kane County, and Washington County. To the AOG, this would include the Six County and Five County regions grouped as one. Our East Utah region included Carbon County, Emery County, Grand County, San Juan County, Uintah County, Daggett County, and Duchesne County. To the AOG, this would include the Uintah Basin and Southeastern Utah Region.

The Northwest Utah region has the most active pharmacies (7) and is nested against Nevada, a mature adult-use cannabis market. The North Central Utah region has no such border with Nevada and maintains the second most active cannabis pharmacies (5). The Southwestern region has the second least active pharmacies (2) and maintains a border with Nevada and Arizona, and is in the closest geographic proximity to Las Vegas, the largest of all cities and metropolitan areas of Nevada. Finally, the East Utah region has a long border with Colorado and border with Arizona, another two mature adult-use cannabis markets, and has the least number of active dispensaries (1).

Further exploratory data analysis was conducted on a representative sample of non-patient cannabis consumers for further insight. This sample of non-medical cannabis consumers (adult-use or non-registered patients) included 516 participants in addition to the medical cannabis consumers, for a total sample of 713 Utah residents.

Descriptive Statistics

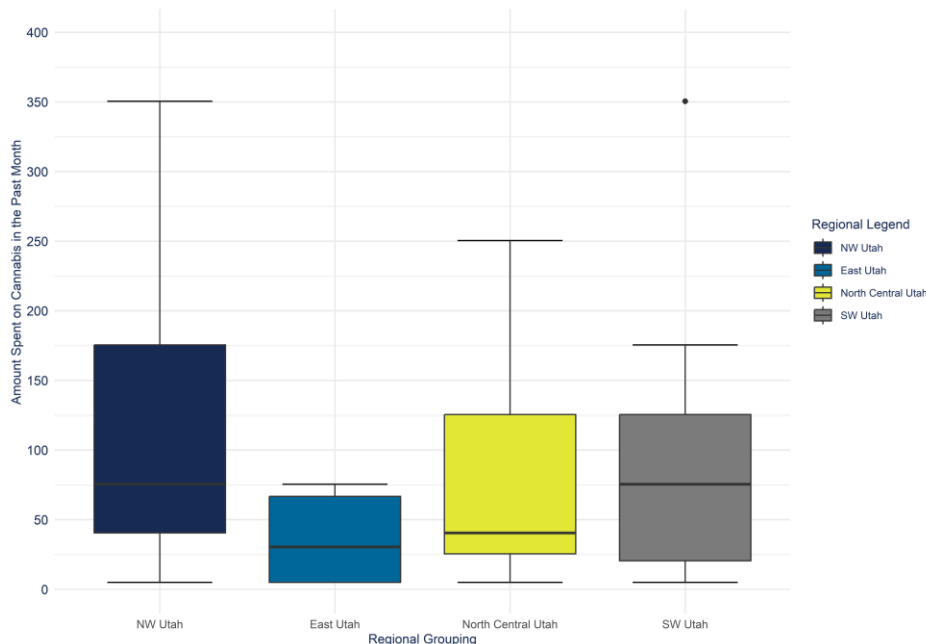
The following section provides an overview of the descriptive analytical findings of the Utah patient population provided by CPPC’s RDCOS survey waves. As described in further detail below, these findings generally include total past-month cannabis spending, sources of cannabis and vapes, time proximity to cannabis sources, the frequency of interstate travel for sourcing cannabis, and perceptions of medical cannabis supply in Utah.

Money Spent on Cannabis

Participants were asked to report how much money they spent in the past month on cannabis from all grams sourced, including regulated sources, illicit sources, and out-of-state sources. **On average, patients indicated they spent \$109.10 on cannabis in the past month.** The median price which patients reported spending on cannabis in the past month was \$75.50, with the standard deviation showing signs of overdispersion at \$107.40 spent on cannabis in the past month. This indicates that the distribution of patient’s responses was right skewed, suggesting that **a much higher frequency of patients reported spending less than the average amount.** Below, Figure 2 is a grouped box and whisker plot demonstrating the distribution of the reported amount of money spent on cannabis by patients in the past month, by region. Figure 3 describes county-level differences in patient-reported spending on cannabis, on average, and does not distinguish between the quantity of grams sourced, or cannabis sources generally. Weber County patients reported the highest average spending at \$153.57 per month, while Emery County patients reported spending

the least at \$16.83 per month.

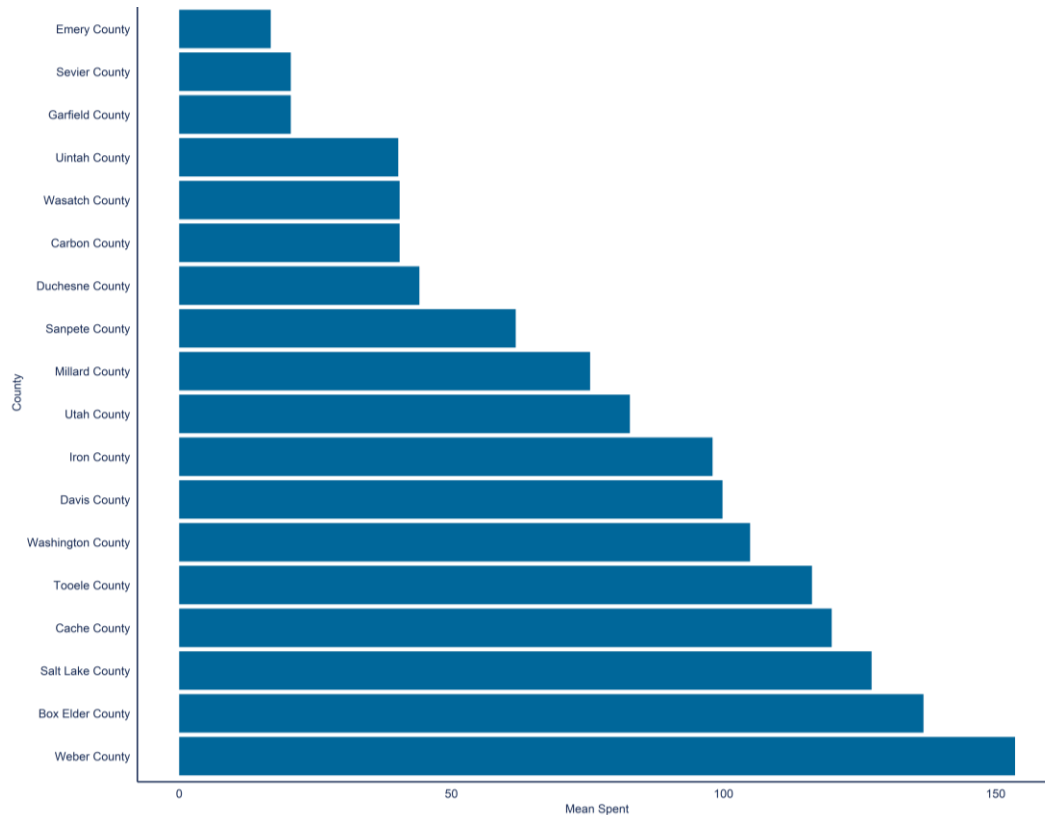
Figure 2. Amount Spent on Cannabis in the Past Month, by Regional Grouping



According to CPPC’s national RDCOS data, when compared to medical patients nested in states with adult-use and medical cannabis markets, and medical patients nested in medical cannabis market only states, Utah patients fell in the bottom ten states for amount paid

monthly on cannabis, regardless of source. Mississippi medical cannabis patients reported spending nearly the same dollar amount on cannabis (\$109.23) as Utah medical cannabis patients. Likewise, medical cannabis patients in New Hampshire reported spending an average of \$109.86 per month. The national average monthly spending reported among medical cannabis patients across the United States was \$119.00. Considering these findings, reported monthly cannabis spending in Utah, regardless of source, is comparable to the average across the United States.

Figure 3. Average Amount Spent on Cannabis by County - Past Month



Willingness to Pay

To estimate demand projections for Utah’s medical cannabis market, participants were asked to indicate the maximum amount they would be willing to pay (WTP) for a gram of cannabis from different sources. Patients reported that they would be willing to pay more for a gram of cannabis from medical cannabis pharmacies in comparison to other sources. The average response to the maximum price a patient would be willing to pay for a gram of cannabis from a medical pharmacy provider was \$12.15 a gram. Next, patients indicated they would, on average, be willing to pay a maximum price of \$10.65 for a gram of cannabis from an adult-use dispensary, followed by \$7.40 for a gram of cannabis from a dealer. According to national RDCOS data, residents of Colorado and Nevada had a much lower willingness to pay for a gram of cannabis from a medical pharmacy (\$8.37 and \$8.58 per gram of cannabis, respectively). Notably, both states, on average, were among the five lowest average willingness to pay for a gram of cannabis from a medical pharmacy in the United States. This suggests patients can obtain relatively cheap cannabis from nearby states, indicating the level of market maturity both nearby states have achieved. Further, residents of Arizona were not far behind at (\$9.37 per gram of cannabis). The national average was \$9.81 per

gram of cannabis from a medical pharmacy, indicating patients in Utah are willing to pay about \$2.34 more than the national average for a gram of cannabis from a medical pharmacy.

Willingness to pay for a gram of cannabis from medical cannabis pharmacies was generally stable across regions despite differences in access to pharmacies and under different contextual geographic conditions. Our Northwest Utah region had the highest average willingness to pay for a gram of cannabis from a medical pharmacy at \$12.52, while our North Central Utah region had the lowest with \$11.29 per gram of cannabis, but also the lowest standard deviation (\$8.75 per gram of cannabis). Below, Table 1 shows the average WTP per region, and the standard deviation for each region.

Table 1: Maximum Willingness to Pay Per Gram of Cannabis from Medical Pharmacies by Region

Region	Average Maximum WTP Per Gram from Medical Pharmacies	Standard Deviation Maximum WTP Per Gram from Medical Pharmacies
Northwest Utah	\$12.52	\$8.97
Southwest Utah	\$11.64	\$10.52
East Utah	\$11.50	\$11.41
North Central Utah	\$11.29	\$8.75

Supply Adequacy

Patients were asked to report their perceptions of adequate cannabis product supply when visiting medical cannabis pharmacies in Utah. In response, 58.20% of patients reported that there was usually plenty of supply of the medical products they wanted to purchase. In contrast, 41.80% of patients found that there was either a limited supply, or very little to no supply of the medical cannabis products they wanted to purchase. Despite this, only 6.88% of patients indicated that there was very little to no supply in comparison to the 34.92% that reported that supply was only limited.

Traveled Out of State to Source Cannabis

To better understand patterns of consumption, patients were asked to report if they had traveled to another state in the past month to obtain cannabis, and if so, which state(s) they had traveled to. Approximately 25.5% of participants responded that they had, while 74.5% said they had not. Of those that did, 58.53% reported that they had traveled to Colorado and Nevada. This is unsurprising as Colorado and Nevada, bordering Utah, have both developed mature medicinal and adult-use markets. For further context, among our sample of non-patient Utah residents, 26.6% had indicated they travel to a different state for cannabis products in the past month. **Between medical patients and non-medical patients, there was only a 1.1% difference in how frequently both groups reported travelling to a different state for cannabis, with non-patients being slightly higher. Our expectation is that there would be a starker difference between medical patients and non-patients, as there is no adult-use cannabis market and patients have access to a regulated medical cannabis market.** In our national sample of RDCOS medical patients, 22.12% of medical patients had indicated they traveled to a different state for cannabis, with substantial state variances dependent on market structure, geographic contextual factors, and whether adult-use cannabis was legal. Below, Table 2 lists which states patients reported travelling to and Figure 4 reports how frequently patients reported visiting these states, by county, to obtain cannabis. In

Figure 4, yellow shading indicates that our survey did not recruit participants from the counties listed.

Table 2: Where Patients Traveled out of State for Cannabis

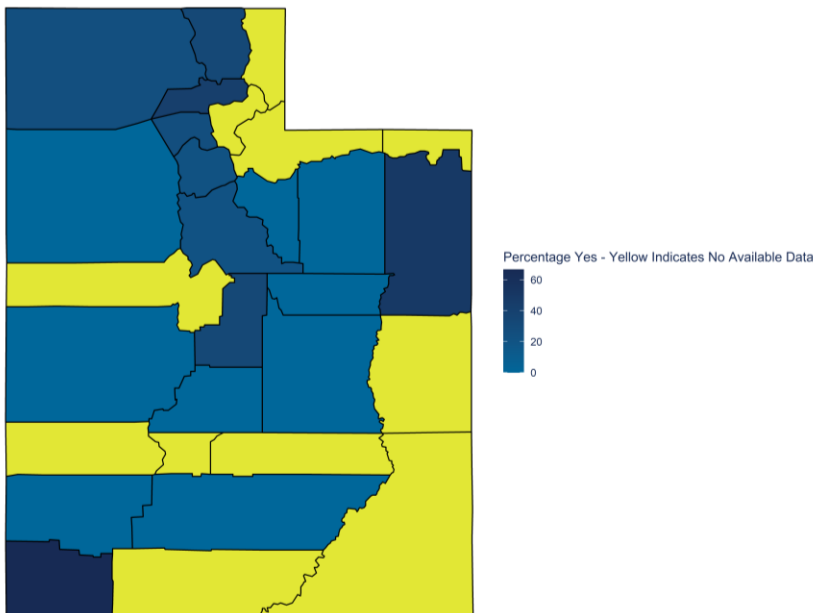
State Traveled to For Cannabis	% of Patients Traveled to State for Cannabis
Colorado	24%
Nevada	24%
California	8%
Arizona	4%
Idaho	4%
Florida	4%

*Percentages are based on the number of respondents who had indicated they travelled to a different state for cannabis (n = 50).

*States with a single observation were excluded from the table, but included: Connecticut, Delaware, Hawaii, Kentucky, Massachusetts, Ohio, Wyoming.

*Percentages are rounded up or down, bolded percentages represent the highest frequency of responses.

Figure 4. Utah Counties by % Traveling to a Different State for Cannabis - Past Month



Perceptions of Source Characteristics

Patients were asked to rank a list of characteristics about their sources of cannabis to better understand purchasing behavior when attempting to access cannabis; these responses were ranked from most important to least important. Among respondents, the most frequently cited, most important characteristic for how a patient decides where to access cannabis was **price**, with 28% of respondents selecting this answer. The second most frequently cited response as the most important characteristic for purchasing decisions was **THC or CBD content**, with 22% of respondents selecting this choice. Source of Cannabis and Cannabis Strain were notably behind

both options, with approximately 12% of respondent’s selecting either of these as the most important characteristic. **This suggests that when patients are seeking to purchase cannabis, they place less importance on where cannabis comes from or the type of strains available than they do the price of the item for sale, and the product’s THC or CBD content.** The most frequently cited characteristic as the second most important characteristic in purchasing decisions was the cannabis source and cannabis strain, with 19% of patients selecting this option—indicating that patients do have preferences in their cannabis sources and what type of strain they choose to purchase. Below, Table 3 lists the distributions of responses by patients from most important to least important.

Table 3. Purchase Decisions

Purchase Decisions	Price	THC/CBD	Source of Cannabis	Cannabis Strain	Safety (Tested Product)	Convenience	Delivery of Cannabis
Most Important	28%	22%	12%	12%	11%	7%	7%
Second Most Important	10%	14%	19%	19%	12%	10%	4%
Third Most Important	15%	13%	11%	13%	12%	19%	13%
Fourth Most Important	8%	11%	13%	17%	20%	16%	13%
Fifth Most Important	18%	15%	13%	13%	15%	14%	11%
Sixth Most Important	7%	15%	17%	16%	13%	18%	12%
Least Important	6%	8%	12%	10%	16%	13%	29%

*This table excludes the final decision characteristic – Legality of Cannabis, as it was only asked in the most recent RDCOS Survey (September).

*Percentages are rounded up or down and may not add up to 100%, bolded percentages represent the highest frequency of responses.

We then compared purchase decision preferences among patients who reportedly found the supply of cannabis to be limited. Among the most frequently cited responses for patients that found the supply of cannabis to be limited was, again, price and content. **Interpretations of this finding indicate that patient perceptions of limited cannabis supply could be due to perceptions that the price of cannabis products is too high, and that some segments of patients are unhappy with the THC/CBD content of products.**

We then compared patient interstate travel for cannabis and patient purchasing preferences. **Among those who indicated they had traveled to a different state for cannabis, the most frequently cited purchasing decision characteristic was price, followed by THC/CBD content. This finding suggests that patients are likely traveling to different states in search of more amenable prices and/or different THC/CBD content products. This follows trends of motivations for out-of-state sourcing found in the RDCOS national data set.**

Grams Sourced

Patients were asked to report their cannabis purchase source, with eight questions covering eight different cannabis supply sources, asking approximately how many grams were obtained from each source in the past month. On average, the most prevalent source that Utah patients reported obtaining cannabis from was medical pharmacies at 4.01 grams per month. The next most prevalent source, on average, was adult-use dispensaries, assumed as out-of-state, at 3.48 grams per month. The third most prevalent source, on average, was “dealers” at 3.02 grams per month. The fourth highest cited source was gifted cannabis at 2.87 grams per month, on average, followed by pharmacy deliveries at 2.39 grams per month, on average. The sixth highest source was grams obtained from a caregiver at 2.07 grams per month, on average. Finally, the two least-cited categories were “other” at 1.89 grams per month, and at-home cultivation at 1.38 grams a month, on average. **In total, medical cannabis patients in Utah reported sourcing 21.11 grams per month, on average.**

These results demonstrate robust diversification of cannabis sourcing with no single category surpassing 20% of total grams sourced, and approximately 40.13% of total demand being captured by sources that are considered regulated (i.e. medical pharmacy, delivery, caregivers). While diversification is expected, this number of grams obtained at regulated pharmacies for the medical cannabis patients is lower than what is expected. Caregivers in Utah can only provide cannabis to patients by accessing supply through the medical cannabis market. Because of this, an assumption is made that grams sourced from caregivers can be included as grams sourced from the regulated medical market. Despite differences in policy structure, Virginia—a medical cannabis market heavily scrutinized for limited regulated access—when making the same assumptions and including the same categories as in Utah, is capturing 33.6%-37% in regulated demand³. Utah’s medical cannabis market on the other hand, is capturing 40.13% of total demand in the regulated cannabis market. This data point and comparison suggests that Utah’s medical cannabis program is more competitive, in terms of capturing demand than some states, but still may have issues competing with out-of-state adult-use markets and state-based illicit markets. Provided that price continues to be the most relevant purchasing factor, and that Utah is surrounded by three states with mature adult-use cannabis markets, it is likely that the price of cannabis is influencing this low utilization rate.

Table 4. Cannabis Grams Sourced by Source Type

Cannabis Source Type	Grams Sourced	Percentage of Total Grams
Medical Pharmacy	4.01g	~ 18.99%
Adult-Use Dispensary (assumed majority from out of state)	3.48g	~ 16.49%
Dealer	3.02g	~ 14.31%
Gifted	2.87g	~ 13.60%
Delivered	2.39g	~ 11.32%
Caregiver	2.07g	~ 9.80%
Other	1.89g	~ 8.95%
Homegrown	1.37g	~ 6.48%

³ https://www.cca.virginia.gov/sites/default/files/11.27.2023_FINAL_An%20Examination%20of%20the%20VA%20Medical%20Cannabis%20Market.pdf

**Percentages are rounded up or down and may not add up to 100%, bolded percentages represent the highest frequency of responses.*

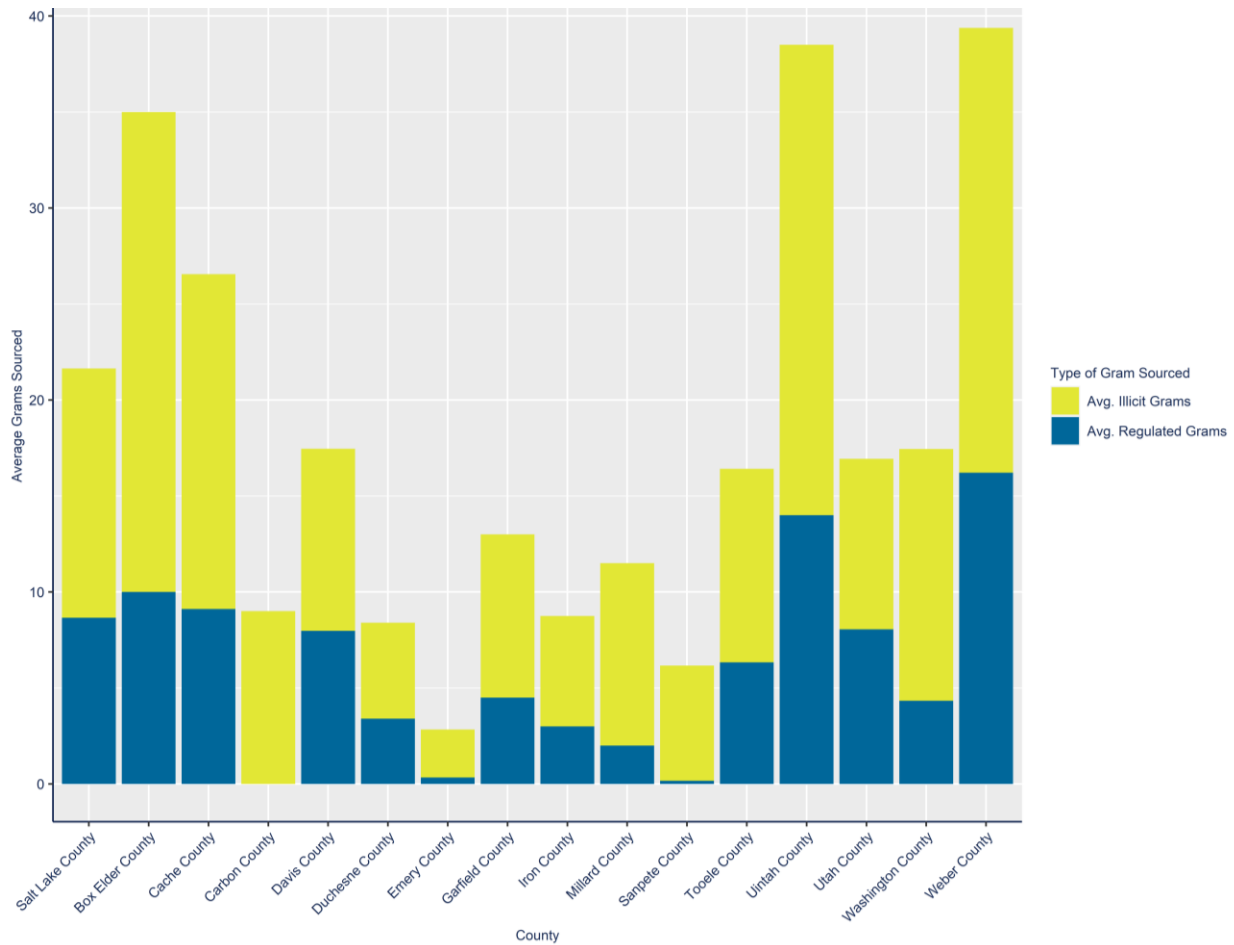
In the survey questionnaire, no distinction is made between deliveries from adult-use dispensaries and medical pharmacies and patients are not asked where their caregivers obtained cannabis. Subsequently, two assumptions were made during this analysis. The first, is that all grams sourced via caregiver were obtained from a medical cannabis pharmacy. Second, an assumption is made that patients indicating they obtained cannabis via delivery is solely sourced from medical pharmacies. If this were not the case, the amount of regulated cannabis sourced would be positively biased, leading to an overestimation of the amount of regulated gram sourced. Under our assumptions, sourcing grams from medical cannabis pharmacies via delivery, in-person, or by caregiver can be treated as the same category, as regulated medical cannabis demand. These categories will be grouped in such a way to describe approximately how much of total cannabis demand is being captured by Utah's regulated medical cannabis market. As such, a new set of variables were created from the data collected on grams sourced: one variable indicating regulated consumption, and another variable indicating illicit consumption. The first variable, regulated grams, was created by adding grams sourced in the past month from medical pharmacies, caregivers, and grams purchased online for delivery. Because all other sources of obtaining cannabis are illicit under Utah law, all regulated grams sourced are indicators of sourcing cannabis from a medical cannabis pharmacy.

The second variable, illicit grams, was created by adding grams sourced in the past month from adult-use dispensaries, grams gifted for free from friends and family, grams purchased from a dealer, grams sourced from a home grow, and "other". There is a notable limitation to the illicit variable in that, potentially, grams sourced from out of state adult-use dispensaries are likely to have been purchased out of state, making their purchase legal in such states, rather than illicit. Patients were not asked if they consumed purchased adult-use cannabis in-state or out of state. Because of this, estimates of past-month illicit grams sourced could be skewed higher than the true number of grams patients are sourcing illicitly under Utah law.

On average, patients indicated sourcing approximately 8.47 grams per month from regulated sources in the state of Utah, and approximately 12.64 grams in the past month from illicit sources. **According to these findings, approximately 59.87% of total grams sourced are from illicit sources.** This is high as, conversely, only 40.13% of total grams sourced in the past month were from regulated sources. Figure 5 describes county-level differences, on average, of regulated and illicit grams sourced in the past month. Weber County had the most regulated grams sourced in the past month, while Box Elder County had the most illicit grams sourced in the past month. **Among our patient sample, only 8% of patients indicated that they exclusively obtain grams sourced from the regulated medical cannabis market in the past month.**

According to national RDCOS data, Utah medical cannabis patients' source among the least amount of cannabis in the United States in comparison to medical cannabis patients in other states. Only South Dakota's medical cannabis patients reported using less cannabis monthly (19.48g). Compared to the national average for medical cannabis patients (33.18g), Utah's medical cannabis patients reported sourcing drastically less grams per month.

Figure 5. Average Grams Sources, Regulated and Illicit Use Per County - Past Month



Products Sourced

Patients were asked to report where they had sourced their vape products in the past week. Among participants, the most frequently reported category of response was from a medical cannabis pharmacy, with 41% responding as such. The next highest category was from an adult-use dispensary, at 27%. Approximately 20% of respondents had answered that they had been gifted a vape from a family or friend. Finally, only 8% of patients had reported they obtained a vape from a dealer, with nearly none reporting they obtained a vape from a home grow (3%) or from a caregiver (1%).

These findings would suggest that vape pens—a typically high potency product—are likely influencing utilization of the regulated market. This data point, coupled with the second highest importance factor of sourcing cannabis (THC/CBD content) suggests that medical cannabis patients may be utilizing the regulated market for higher potency products as opposed to all product types. These products are typically more challenging to obtain from illicit sources. Below, Table 5 lists the distribution of responses of where patients had sourced a vape from in the past week.

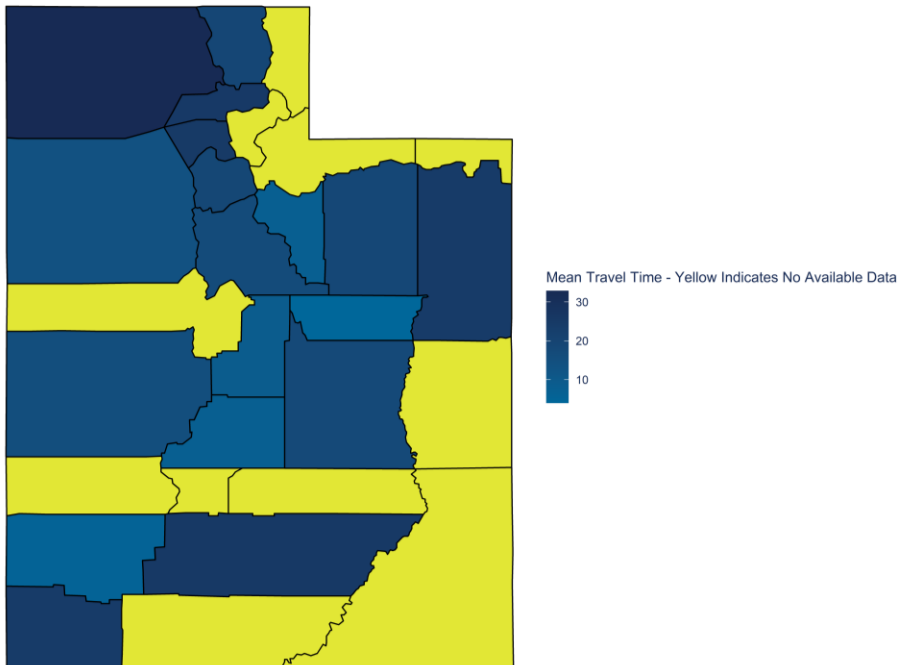
Table 5. Vape Sources

Vape Source	Percentage of Patients Reported Source
Medical Pharmacy	~ 41%
Adult-Use Dispensary (<i>assumed out of state</i>)	~ 27%
Given for Free or Purchased from Friends or Family	~ 20%
Dealer	~ 8%
Obtained from Homegrow	~ 3%
Caregiver	~ 1%

*Percentages are rounded up or down and may not add up to 100%, bolded percentages represent the highest frequency of responses

Proximity-Time to a Cannabis Source

Figure 6. Utah Counties by Mean Travel Time to A Cannabis Source - Past Month



To better understand how proximity-times to cannabis pharmacies were associated with other variables of interest, survey respondents were asked how long it takes for them to arrive at their cannabis source, considering their transportation mode and regardless of the type of source. On average, patients indicated that it took them 19.83 minutes to arrive at their cannabis source, one way. At the median, 50% of values were higher than 15.50 minutes in one-way travel time. For a round trip, patients on average reported that they traveled nearly 40 minutes (39.66) to purchase cannabis. Below, in Figure 6, the average time patients reported traveling to a cannabis source is listed by county. Patients in Box Elder County reported spending an average of 1 hour and 4 minutes (32 minutes one-way) on their round trip to obtain cannabis. In Figure 6, yellow shading indicates that our survey did not recruit participants from the counties listed.

Among medical cannabis patients nationally, Utah's medical cannabis patients fall close to the average (18.43 minutes) in the time they need to spend to obtain cannabis. Among medical patients

in states with greater access to medical cannabis, such as medical patients in Oklahoma (12.10 minutes) or Maine (14.41 minutes) or Nevada (16.71 minutes), the minutes travelled to a cannabis source, on average, is lower. These findings demonstrate that Utah’s medical cannabis patients are spending approximately the expected amount of time traveling to obtain cannabis we would expect.

Alternative Cannabinoids: Hemp-Derived Products

To better contextualize patient consumer behavior in Utah, patients were asked to report their most frequently used alternative cannabinoid (hemp-derived products) and the source they most recently purchased their hemp-derived products from. Among patients, approximately 76% of patients had indicated they used a cannabis product with at least one alternative cannabinoid in their cannabis products in the past month. **Patients reported that they most frequently used products containing CBD (37%), and among patients who indicated using hemp-derived products, patients most frequently reported obtaining hemp-derived products from a legal dispensary (55%).** Our survey question gauging these topics did not distinguish between adult-use cannabis dispensaries and medical cannabis pharmacies. As Utah does not have any adult-use cannabis dispensaries, this may positively bias the results and overestimate the percentage of patients obtaining alternative-cannabinoid products from a medical pharmacy. Table 6 shows the most frequently reported, most consumed, hemp-derived product and Table 7 show the most frequently cited recent source patients indicated that they obtained hemp-derived products from.

Table 6: Most Frequently Consumed Alternative Cannabinoid

Alternative Cannabinoid	% Reported Most Frequently Used
CBD	~ 37%
Delta-8	~ 23%
None of These	~ 14%
Delta-8 or Delta-9 THCO	~ 9%
Delta-10	~ 9%
THCP	~ 5%
THCV	~ 3%

*Percentages are rounded up or down, bolded percentages represent the highest frequency of responses.

Table 7: Most Frequent Source of Alternative Cannabinoid

Source of Alternative Cannabinoid	% Reported
Legal Dispensary	~ 55%
Smoke-Shop	~ 15%
Gas Station / Grocery Store / Convenience Store	~ 10%
Dealer	~ 7%
Friends / Family	~ 6%
Online	~ 4%
Another Type of Store	~ 3%

*Percentages are rounded up or down, bolded percentages represent the highest frequency of responses.

*Percentages are based on if a patient indicates they have used alternative-cannabinoid products (n = 149).

Inferential Statistics

This section describes the results of statistical modeling and takes a deeper exploration into the relationships between variables in our patient sample. These models, at different times, account for county and regional differences and are specified as such. Control variables are frequently included in the models to ensure that findings are accurate and generalize across varying models. As with all statistical research, there are limitations to the practices employed in this research. Findings are subject to limitations based on patient sampling, model specification, and regional distributions of the patient sample that was recruited and of the distribution of the responses we observed in the data. Likewise, statistical analysis of survey questions involves interpreting the patient's perception of the responses selected. Extensive effort was employed to ensure the robustness of the findings presented below to maximize the public policy benefit of these findings. Finally, Salt Lake City and the Northwest region is commonly referred to as the reference group, this means that county or regional results are compared to them, statistically. It is common in social sciences to use the largest grouping in a sample as the reference group when comparing differences across groups. Likewise, we chose the same strategy for analyzing our data.

Proximity of Time to a Cannabis Source

Generalized linear regression models with fixed effects for counties and regions tested if there were statistical differences in proximity of time between counties and regions. Salt Lake County was utilized as the reference group. On average, Box Elder County ($p < 0.05$), Davis County ($p < 0.10$), and Weber County ($p < 0.10$) had a positive and statistically significant association with proximity of time to a cannabis source, in comparison to Salt Lake County. This means that on average, **these three counties had a statistically higher proximity of time to a cannabis source than patients in Salt Lake County**. Also in the county model, Utah County had a statistically significant and negative relationship with proximity-time, meaning that on average, **patients in Utah County had a lower proximity of time to a cannabis source in comparison to patients in Salt Lake County**. This latter finding matched our regional model, that found patients in the North Central region had statistically lower proximity time to a cannabis source.

To test if proximity-time to a cannabis source was statistically associated with patients sourcing cannabis from outside the regulated medical cannabis pharmacy market, we tested if there was an association between the time it took to obtain cannabis and illicit grams sourced, further controlled for by income and willingness to pay for a gram of medical cannabis. **The results found that as proximity-time to a cannabis source increased, the amount of illicit cannabis sourced also increased ($p < 0.001$)**. To check for county differences, a multilevel generalized linear regression model utilizing fixed effects controlling for the county of which a respondent was located in and utilizing Salt-Lake County as the reference group, found that the relationship between proximity-time to a source of cannabis and amount of illicit cannabis grams sourced held and maintained a positive association, despite county differences ($p < 0.01$). **This means the finding can be generalized across the state of Utah**. Furthermore, patients located in Weber County, in comparison to Salt Lake County, had a statistically significant positive relationship with sourcing illicit cannabis, holding all other variables constant ($p < 0.05$). Further models showed that patients in Weber County were also statistically associated with purchasing more regulated cannabis ($p < 0.05$) as well as illicit cannabis. This finding indicates that, on average, patients in Weber County were consuming higher amounts of total cannabis than patients in other counties. A final set of models showed that

proximity of time, controlled for by county and regional differences, was statistically associated with purchasing regulated cannabis ($p < 0.05$). **In short, proximity of time was associated with buying higher amounts of regulated and illicit cannabis.** Finally, when modelling differences in legal cannabis sourcing by region, **the Southwest region was statistically associated with sourcing less regulated grams ($p < 0.05$), on average, in comparison to Salt Lake County,** holding all other variables constant. This model controlled for income, proximity of time to a cannabis source, and willingness to pay for a gram of cannabis from a medical dispensary.

Regional Differences in Traveling Out of State to Source Cannabis

We found that proximity of time to a cannabis source was positively and significantly associated with the likelihood that a patient travels to different state for cannabis ($p < 0.001$), holding all other factors constant. These results make sense, as patients traveling to other states would quite likely have to travel greater distances to obtain their cannabis. Second, a model removed pharmacies per county and instead employed a by-region effect with Northwest Utah as the reference group and tested if this finding varied by region. Again, proximity of time to a cannabis source was positively and significantly associated with the likelihood of traveling to a different state for cannabis ($p < 0.001$), holding all other variables constant. In this model, **patients in Southwest Utah crossed the threshold of statistical significance and was positively associated with the likelihood of traveling to a different state for cannabis ($p < 0.10$), holding all other variables constant.** Indicating potential differences between this region and the Northwest region of Utah. Notably, this region is the closest spatially to Las Vegas. No other control variables crossed the threshold of statistical significance.

Traveling Out of State and Perceptions of Supply

Due to the findings described in the previous paragraph, the regional model was further segmented into a county-level model. Salt Lake County was used as a reference. In this model, **reporting that a patient was in Washington County was positively and statistically associated with the likelihood of traveling to a different state for cannabis in comparison to Salt Lake County ($p < 0.05$),** holding all other variables constant. No other county crossed this threshold. Washington County is the closest county geographically to Las Vegas, which by all accounts is a mature adult-use cannabis market. Again, proximity of time to a cannabis source, when controlling for county residence, was positively and significantly associated with the likelihood of traveling to a different state for cannabis ($p < 0.001$), holding all other variables constant. Notably, in this model, **perceptions of either limited or little to no supply in a respective medical cannabis pharmacy, in comparison to satisfaction with such supply of cannabis, was positively and slightly significantly associated with traveling to a different state for cannabis ($p < 0.10$).** This finding controlled for income, county of residence, proximity of time to a cannabis source, and willingness to pay for a gram of cannabis from a medical cannabis pharmacy. Interestingly, this can be interpreted as a generalized trend across the state, as it controls for county differences within the model, and remains statistically significant. Despite this finding, further models showed that, on average, **there were not regional or county differences with dissatisfaction with the supply of cannabis, indicating that dissatisfaction with supply was not geographically focused in any area.**

Cannabis Spending Regionally

We found that on average, being a patient in Utah County in comparison to Salt Lake County,

was slightly significantly and negatively associated with reported monthly cannabis spending ($p < 0.05$), holding all other variables constant. This is noteworthy, as Utah County has one more medical cannabis pharmacy than Salt Lake County, but a much lower pharmacy-to-patient ratio. When examining differences in monthly amount spent on cannabis by region, the North Central Utah region was negatively and slightly significantly associated with less monthly spending on cannabis in comparison to the Northwest region of Utah ($p < 0.10$). This matches the initial county model, as Utah County is located within our North Central Utah region. As expected, all models indicated that reporting more grams sourced either through regulated or illicit sources was positively and significantly associated with the amount of money spent on cannabis monthly. **In other words, as the number of grams a patient secured from either a regulated or illicit source increased, the amount they reported spending also increased, although at different rates.** Likewise, income was positively and significantly associated with more reported monthly spending on cannabis, indicating that patients with more disposable income are likely purchasing more expensive cannabis products, on average.

Pharmacy Density

Additional models formally tested the association between pharmacies per county and a variety of outcomes. **The number of pharmacies per county was not associated with finding supply limited. The expectation is that patients in counties with more pharmacies should be less likely to find the supply limited, but this was not the case.**

The second model tested the association between pharmacies per county and the percentage of regulated cannabis a patient used monthly. **Again, the number of pharmacies per county had no statistical association with the amount of regulated cannabis a patient used. In turn, this finding shows that an increase in pharmacies had no relationship with how much regulated cannabis patients were sourcing.**

A third model tested if there was an association between pharmacies per county and the likelihood of purchasing a vape from a medical pharmacy. **Again, the number of pharmacies per county had no statistical association with the likelihood of purchasing a vape from a medical pharmacy. This means there was no relationship between the number of pharmacies per county and the likelihood a patient purchased a vape from a medical pharmacy.**

A fourth model tested if there was an association between traveling to a different state and the number of pharmacies located in a county. **Patients located in counties with one pharmacy, in comparison to those with none, had a statistically significant association with the likelihood of traveling to another state to obtain cannabis ($p < 0.10$), while patients who live in a county with more than one pharmacy in comparison to no pharmacies did not.** These results suggest two alternative hypotheses. First, patients in counties with one pharmacy, in comparison to no pharmacies, have access to medical cannabis, but not to some of the specific products they wish to purchase, making them more likely to seek out these specific products in comparison to those with no pharmacies or more than one pharmacy. Second, those patients could be in more rural areas, further away from more population-dense counties with access to more pharmacies carrying the products they want, or with prices they prefer, and closer to adult-use markets.

Purchase Decisions for Traveling Out of State

Interestingly, those **finding the supply of cannabis was at least somewhat limited was positively and significantly associated with the likelihood of traveling to a different state for cannabis. We also found that rating price, THC/CBD, or cannabis strain as the most important aspect of purchasing decisions in comparison to safety (laboratory tested products), source of cannabis, convenience, if the source was legal, and if it can be delivered was significantly and positively associated with the likelihood of travelling to another state for cannabis (p < 0.10).** Upon further inspection of the descriptive statistics, counties bordering adult-use markets were among the highest percentage of patients that responded they had traveled to another state for cannabis in the past month, and many of these counties, like Box Elder County and Washington County, have medical pharmacies located in-county. Furthermore, in the same model, **patients in Washington County, the closest county to Las Vegas, in comparison to Salt-Lake County, were positively and significantly associated with the likelihood of traveling to a different state for cannabis (p < 0.05), on average and holding other variables constant.**

Overview of Findings

Local Illicit Market and Out of State Regulated Markets Are Compromising Utilization of the Utah Medical Cannabis Market

Among recent studies into medical cannabis markets CPPC has engaged in, Utah's medical cannabis market is uniquely situated. First and foremost, Utah borders three adult-use cannabis markets, one of them being a premier adult-use cannabis market (Colorado), and two others (Nevada and Arizona) being mature adult-use cannabis markets. Only two other medical cannabis states, New Hampshire and Pennsylvania have a similar number of borders with such legal availability.

Second, **sourcing of cannabis outside the regulated cannabis market is higher in Utah than what we would expect in medical cannabis states.** There are two primary reasons for this. First, **there is likely a dearth of cannabis markets competing with the regulated medical cannabis market in Utah, both in the form of out of state markets, and illicit sources. It is also likely that demand for hemp-derived products is driving demand away from the regulated medical cannabis market.** These markets strip demand from regulated sources in the form of price competition, as the regulated medical cannabis market only has a limited number of patients in which it can provide cannabis for. **In short, Utah's regulated medical cannabis market is losing patients to other markets.** Importantly, sources that are commonly categorized as legal in other medical states (homegrown cultivation and gifted cannabis) are considered illicit within Utah. This fact skews the reported amount of regulated cannabis consumption lower than what we would expect.

Low Medical Cannabis Consumption Coupled with Competing Markets has Likely Influenced the High Prices of Regulated Medical Cannabis

Despite this, it is clear that Utah's medical cannabis patients utilize the regulated cannabis market as their primary source of cannabis products. Across the product categories observed (flower and vapes), **regulated medical cannabis pharmacies are the plurality, but not the most major source of cannabis product sourcing.** An important point to note is that the percent of demand captured by the regulated medical cannabis market for cannabis flower (40.13%) and the percent of

demand captured by the regulated medical cannabis market for cannabis vapes (42%) is nearly identical. This highlights that the medical cannabis market is likely the plurality for all types of products, and not just specific types of cannabis products. In a medical cannabis market with limited access and a relatively low number of patients, such as Utah has, this has two effects. **Prices must remain higher for medical pharmacies to sustain sufficient revenue levels to stay in business. This is similar to our past findings in Virginia—however in this case, the effect is likely magnified by multiple shared borders with adult-use states, and the existence of one of the lowest cannabis consumption rates in the nation.**

Patients are Generally Satisfied with Medical Cannabis Products in the Regulated Market, But Satisfaction is Likely Linked to Product Type

This is exemplified by three of our findings. Patients that traveled outside of the state for cannabis rated price or THC/CBD content as their most important purchasing criteria for sourcing products. Likewise, there was a statistically significant relationship between rating price, THC/CBD content, or cannabis strain as the most important consideration in purchasing cannabis products, and the likelihood of traveling outside of the state for cannabis sourcing. Furthermore, patient perception of supply limitations was also associated with the likelihood of traveling outside of the state for cannabis products. **These results suggest that patients are generally satisfied with the cannabis products and prices found in Utah’s medical cannabis market but will diversify their sources to lower the overall amount they spend, or to find specific products.** If this were not the case, we would have expected our models to show regional differences, or county differences, in perceiving that the supply of cannabis products was limited. This was not the case. This can also be inferred by the fact that patients still opt to utilize the regulated market for a plurality of their cannabis products. **It is important to note that this is not uncommon in medical cannabis markets.**

Cross-Price Pressures are Being Put on the Regulated Medical Market, Making it Challenging to Obtain Additional Gains

There were regional differences in the likelihood of utilizing the regulated medical cannabis market, but it is likely the case that this is due to proximity to cheaper adult-use market prices and illicit cannabis market prices, and not a lack of access. For example, no county or regional differences appeared statistically significant in finding the supply of cannabis products limited. Another point of reference is the difference between the maximum willingness to pay for a gram of cannabis from a medical pharmacy (\$12.15) and the illicit cannabis market (\$7.40). Likewise, the difference between the maximum amount patients are willing to pay for a gram of cannabis from a medical pharmacy and the maximum residents are willing to pay for a medical gram of cannabis in Colorado (\$8.37), Nevada (\$8.58), and Arizona (\$9.37). **This finding indicates cross-price pressures on the regulated cannabis market in Utah that are difficult to compete with.**

Access of Supply (Pharmacies) is Likely Adequate, but Additions May Add Value if Strategically Placed

In addition, adding more pharmacies may not decrease the likelihood of traveling outside the state for cannabis or increasing regulated use of cannabis. This is evidenced by the fact that nearly all models with pharmacy-per-county as the main explanatory variable had null results. Additionally,

when comparing medical patients to non-medical patients, they travel to different states at nearly the same rates, despite having access to a regulated medical cannabis market. This suggests that there is a general trend of lower prices in other states capturing demand, rather than it being specific to medical cannabis patients. **Strategic placement of additional access points for medical cannabis in Utah may have the intended effect of lowering the rates of travel outside of the state for cannabis or increasing regulated cannabis use. It is also important to mention that this should be done with caution, as medical cannabis businesses within the state are likely already operating at thin margins due to the limited number of patients, multiplied by a lower-than-expected patient demand, and higher price points are a result of this.** It is also likely that more rural counties are underserved.

Patients Appear to Be Satisfied with Products, but Are Motivated by Lower Prices

Similar to situations in many other medical cannabis states, the illicit market and out-of-state adult-use markets are out-competing regulated medical pharmacies—creating a cyclical process. Cheap illicit markets and adult-use cannabis markets pull demand away from medical cannabis pharmacies, and to ensure business solvency, medical pharmacies pick a price point that ultimately reflects these reductions in demand by medical patients. In turn, other patients find this new price too high and search out cheaper, unregulated alternatives, and the cycle ebbs and flows alongside market conditions. Magnifying this is the fact that Utah borders three mature adult-use cannabis markets, with one of them being a premier adult-use market on the national level, Colorado. Utah is nearly unique in this aspect, as only New Hampshire additionally shares a border with three adult-use cannabis markets, while Pennsylvania shares a border with four adult-use cannabis markets. **Despite this, a segment of patients, if not all patients, purchase at least some of their cannabis products from medical pharmacies, indicating that patients are satisfied with the quality of products produced by medical pharmacies.**

Supply (Products) is Likely Adequate, but Additions May Add Value if Additions in Supply Bring Down Price

Similar to our recent findings in Virginia, an increase in regulated retail access and supply could drive more demand to medical cannabis pharmacies, but only if this is a mechanism to reduce prices. In this specific situation, it is unlikely medical cannabis pharmacies can compete with the price point of the illicit market and nearby adult-use markets without a dramatic increase in access to new stores. Further complicating this, the medical cannabis market in Utah is relatively small in comparison to other states across the country. Businesses are already likely facing highly pressured margins, meaning any increase in supply through new regulated access points must be handled with informed decision making and seek to strategically fill gaps in access.