Cannabis and Cannabinoid Research
Volume X, Number X, 2022

DOI: 10.1089/can.2022.0079

Delta-8 THC Retail Availability, Price, and Minimum Purchase Age

Matthew E. Rossheim,[1,*] Cassidy R. LoParco,[1] Andrew Walker,[2] Melvin D. Livingston,[2] Pamela J. Trangenstein,[3] Sofia Olsson,[4] Kayla K. McDonald,[5] Robert A. Yockey,[6] Justin M. Luningham,[6] Amanda Y. Kong,[7,8] Doug Henry,[9] Scott T. Walters,[1] Dennis L. Thombs,[1] and David H. Jernigan[10]

Abstract

Background: Retail sales of Delta-8 tetrahydrocannabinol (THC) products have increased in the U.S. market since the passing of the 2018 Farm Bill, and there is currently little regulation of marketing/sales and limited related safety standards in many states. After thousands of calls to poison control centers (40% for individuals under 18 years old and 70% requiring health care facility evaluation), the Food and Drug Administration issued warnings on Delta-8 THC products, stating their psychoactive effects and that some manufacturers may synthesize Delta-8 using unsafe household chemicals. The current study describes the Delta-8 THC retail sales environment in Fort Worth, Texas. Given its relatively inexpensive manufacturing and that low prices are a major determinant of cannabis use, the price of Delta-8 THC products was examined. This study also examined whether retail outlets in areas with greater socioeconomic deprivation had higher odds of selling Delta-8 THC products. This is important because if Delta-8 THC retailers are disproportionately located in more socioeconomically deprived communities, residents of these communities can more easily access these products and may have higher risk of adverse consequences.

Methods: Potential Delta-8 THC retailers were selected by identifying lists of current retail locations with alcohol, cannabidiol, and/or tobacco licenses in Fort Worth. Trained research assistants called outlets in September and October 2021 to query about sales of products containing Delta-8 THC. The response rate was 69% ($n = 1,223$). Outlets' 9-digit zip codes were merged with Area Deprivation Index scores. Products and purported minimum age were described. Chi-squared and Student's *t*-tests were used.

Results: Eleven percent of outlets ($n = 133$) reported selling Delta-8 THC. Ninety-six percent sold vapes and/or "flower" (i.e., hemp leaves coated with Delta-8 THC distillate) and 76% sold edibles. Among the least expensive products available, edibles cost, on average, $8.58 less than flower/vapes ($p < 0.001$). Outlets that sold Delta-8 THC were located in areas with greater deprivation ($p = 0.02$). Most reported a minimum purchase age of 21; however, 4% reported 18 years or no minimum age.

Conclusions: Delta-8 THC retail outlets were disproportionately located in areas with more socioeconomic deprivation. Legal intervention such as zoning, minimum age, and tax laws may help reduce Delta-8 THC-related disparities.

Keywords: cannabis; marijuana; retail stores; dispensaries; 2018 Agriculture Improvement Act; 2018 Farm Bill

[1]Department of Health Behavior and Health Systems, University of North Texas Health Science Center, Fort Worth, Texas, USA.
[2]Department of Behavioral, Social, and Health Education Sciences, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA.
[3]Alcohol Research Group, Emeryville, California, USA.
[4]School of Medicine, Texas Christian University, Fort Worth, Texas, USA.
[5]Department of Global and Community Health, George Mason University, Fairfax, Virginia, USA.
[6]Department of Biostatistics and Epidemiology, University of North Texas Health Science Center, Fort Worth, Texas, USA.
[7]Department of Family and Preventive Medicine, The University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, USA.
[8]TSET Health Promotion Research Center, Stephenson Cancer Center, The University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, USA.
[9]Department of Anthropology, University of North Texas, Denton, Texas, USA.
[10]Department of Health Law, Policy & Management, School of Public Health, Boston University, Boston, Massachusetts, USA.

*Address correspondence to: Matthew E. Rossheim, PhD, Department of Health Behavior and Health Systems, University of North Texas Health Science Center, 3500 Camp Bowie Boulevard, EAD620S, Fort Worth, TX 76107-2644, USA, E-mail: matthew.rossheim@unthsc.edu, matthewrossheim@gmail.com

Introduction

Cannabis is one of the most widely used psychoactive substances in the United States.[1] Federally, cannabis is classified as a Schedule I drug, meaning it is considered to have no accepted medical use and a high potential for "abuse."[2] Thus, the federal government aims to limit access to cannabis' psychoactive compounds, including Δ-9-tetrahydrocannabinol (Delta-9 THC), the psychoactive compound most prevalent in cannabis crops.

Regardless, there is economic value from cannabis' nonpsychoactive elements (e.g., hemp, cannabidiol [CBD]).[3] Through the 2018 federal Agriculture Improvement Act (i.e., Farm Bill), U.S. regulators attempted to legislate a balance between cannabis' economic and medical pros and cons. It therefore allowed for industrial hemp production, defined as containing less $< 0.3\%$ Delta-9 THC by dry weight.[4]

However, the Farm Bill inadvertently created a loophole that gave rise to Delta-8 THC products. Delta-8 THC is another psychoactive compound nearly identical in chemical structure to Delta-9 THC, but its concentrations in cannabis flower are so low that it is economically impractical to harvest.[5] Consequently, Delta-8 THC is now being synthetically derived from CBD and sold for human consumption in the cannabis market with little regulation of marketing and sales and limited safety standards in most states.[6]

Following the Farm Bill, Google Trends data indicate that the frequency of internet searches for Delta-8 THC increased rapidly, roughly sevenfold in the United States from 2020 to 2021.[7,8] This surge in Google searches was highest in states where nonmedical cannabis use is illegal.[7,8] These findings suggest that people may be looking to Delta-8 as a legal THC product.

Delta-8 THC is a psychoactive substance, and the related products sold are often synthesized using potentially harmful chemicals.[5] Some notable adverse experiences reported to the U.S. Food and Drug Administration include confusion, hallucinations, vomiting, and loss of consciousness.[5] Moreover, Delta-8 THC synthesis and sales have little regulation in most states, allowing manufacturers and retailers to sell without a required minimum purchasing age or packaging and labeling standards.[6]

Consequently, the packaging and labeling of these products may be especially appealing to children, which may help explain why a high percent of Delta-8 THC exposure cases reported to poison control centers were of pediatric patients.[5]

A 2021 study commissioned by the CBD industry tested 51 Delta-8 THC products and found that 76% had Delta-9 THC levels above the legal limit of 0.3% by weight (range 0.4% to 23.17%, average of 6.6%).[9] This means these products met the federal definition of nonmedical cannabis and are thus subject to related state laws regarding their marketing and sale.[9]

Jurisdictions with legalized cannabis markets have established certifying agencies to test products for potency, consistency, and known contaminants.[10] Moreover, some jurisdictions impose rules about product packaging that can range from childproof or -resistant packaging to restrictions on imagery that is attractive to minors such as cartoons or images resembling candy.[10] However, without such marketing and sales regulations, some Delta-8 retailers may currently sell THC products that are designed and marketed to appeal to children.

In states with legalized nonmedical cannabis, localities often use local ordinances and zoning restrictions to regulate where and how cannabis can be sold, if at all.[11] Additional issues likely arise from selling Delta-8 THC without such regulations. For example, if Delta-8 THC retailers are disproportionately located in more socioeconomically deprived communities, residents of these communities can more easily access the products and may have higher risk of adverse consequences.

There is a long pattern of historically disenfranchised communities having disproportionately higher exposure to outlets that sell harmful products. This includes a greater density of tobacco and alcohol retailers and point-of-sale marketing in neighborhoods with lower socioeconomic status and greater proportions of some racial and ethnic groups.[12–16] Moreover, a recent study conducted in Washington state (where adult nonmedical cannabis sales are legalized) showed that greater socioeconomic deprivation was associated with a greater density of licensed cannabis retailers.[17]

Despite the growing interest in and potential harm from use of Delta-8 THC products, relatively little is known about the availability of these products in the retail environment. As such, the current study had three aims.

The first was to identify characteristics of outlets that sell products containing Delta-8 THC, including their location relative to socioeconomically disadvantaged areas. Based on research documenting inequities in the availability of alcohol, tobacco, and cannabis products,[12–17] we hypothesized that outlets located in areas with higher levels of socioeconomic disadvantage would be more likely to sell Delta-8 THC products.

The second aim was to describe the types of products containing Delta-8 THC that were for sale and their retail prices. Delta-8 THC can be created at a much lower financial cost relative to growing Delta-9 THC and, as a result, may be sold for low retail prices.[18] For alcohol and tobacco, the strong association between price and prevalence of use, especially among young people, is the reason increasing the price is a best practice for community-level prevention and control programs.[19,20] Similarly, cannabis research shows that price is one of the strongest determinants of use.[21–25] For these reasons, it is critical to better understand the price of Delta-8 THC products being sold.

The third aim was to examine minimum age restrictions reportedly required for purchase of Delta-8 THC products. Given the lack of related regulation and that nearly 40% of Delta-8 THC exposure cases reported to U.S. poison control centers involved patients under 18 years old,[5] we hypothesized that there would be inconsistencies in the reported minimum age for purchase.

Materials and Methods

Overview

This study used a telephone survey to examine the Delta-8 THC retail environment in the City of Fort Worth, Texas, the 12th largest city in the United States based on population.[26] Fort Worth's population is comparable with the general U.S. population in terms of housing, household size, education, and economic conditions.[27] Data were collected between September 8 and October 14, 2021, during which time retail sale of Delta-8 THC had little regulation in Fort Worth.

Specifically, the Texas Department of State Health Services (DSHS) required licensing of retail outlets selling consumable hemp products.[28] Among registrants, DSHS randomly selects stores to have samples of their products tested for compliance with the legal limit of 0.3% Delta-9 THC by dry weight.[28]

This study was determined to not be human subjects' research by the University of North Texas Health Science Center's Institutional Review Board.

Sampling frame and analytic sample

The Texas Alcoholic Beverage Commission, Comptroller, and DSHS provided lists of current alcohol, tobacco, and CBD licenses as of September 1, 2021, respectively. Licensing records contained information regarding business names, retail outlet addresses, and licenses held. There were 3,084 nonexclusive retail sales licenses in Fort Worth (Fig. 1).

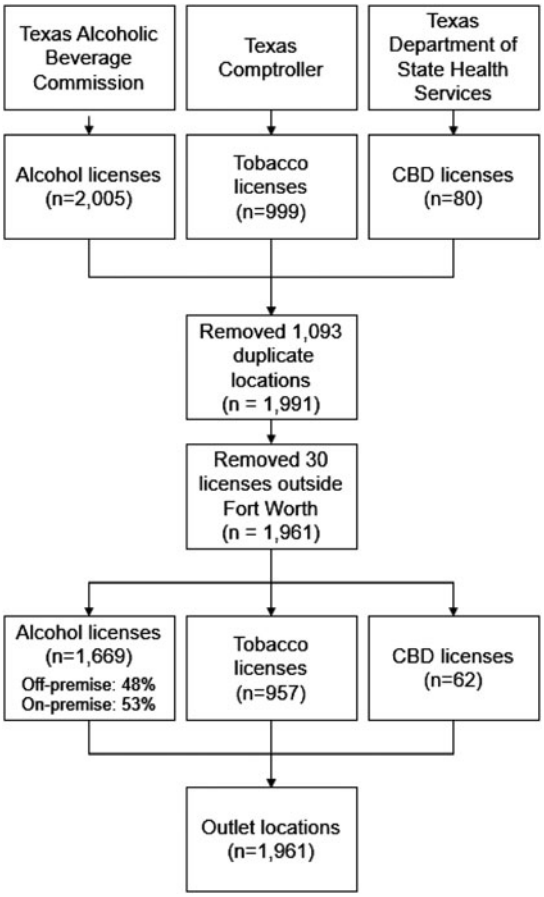

FIG. 1. Flow diagram of the sampling frame for potential Delta-8 tetrahydrocannabinol retailers.

After removing duplicate licenses for each retail outlet location ($n = 1{,}093$) and licenses for outlets located outside Fort Worth ($n = 30$), there were 1,961 total unique outlet locations included in the sampling frame. Phone numbers could not be identified for 184 outlets. Among the remaining 1,777 retail outlets called, 69% ($n = 1{,}223$) answered the phone and the question about Delta-8 THC product availability.

Data collection procedures

Google was used to obtain telephone numbers for each retail location. Trained graduate student research assistants called retailers between September 8 and October 14, 2021. Outlets were called three times during normal business hours; if there was no response each time, they were classified as nonresponders. The first question the

student researchers asked retailers was "*Do you sell Delta-8?*" The call ended if the retailer did not sell Delta-8 THC products.

Outlet audit measures

Delta-8 THC products. Availability of *Delta-8 THC edibles* was assessed by asking, "*Do you sell any Delta-8 stuff I could eat or drink?*" Availability of Delta-8 THC products intended for smoking/vaping was assessed by asking, "*Do you have any Delta-8 stuff I could smoke or vape?*" The edibles and smoking/vaping questions were coded as two binary (yes/no) variables. The researchers probed to obtain a list of the types of edibles and smoking/vaping products sold at each outlet.

Delta-8 THC pricing. Researchers asked, "*What's the least expensive way I could try it?*" and recorded both the product type and the associated cost in dollars. A *least expensive product category* variable was created to distinguish whether the least expensive product reported was an edible (1) or a product designed for smoking/vaping (0).

Minimum purchase age. The last question researchers asked was "*Do you have to be a certain age to buy it?*" Responses were dichotomized (yes/no), and the *minimum reported purchase age in years* was reported if the clerk said there was one.

Area Deprivation Index

To estimate relative neighborhood disadvantage, we used the Area Deprivation Index (ADI), v3.1, a validated measure of neighborhood disadvantage available from the Neighborhood Atlas at the 9-digit zip code level.[29,30] Recent research conducted in Washington state showed that greater socioeconomic deprivation, measured using ADI scores, was associated with a greater density of licensed cannabis producers, processors, and retailers in those areas.[17]

ADI scores are calculated by weighting data for 17 indicators of socioeconomic context by their factor score coefficient derived from the long-form census and American Community Survey 5-year estimates.[30,31] The final ADI was scaled as a state-level decile rank relative to all Texas 9-digit zip codes, with a score of 1 representing the most advantaged areas and 10 the most disadvantaged areas.[29,30] Each outlet location ($n = 1{,}223$) was linked with its 9-digit zip code, using the U.S. Postal Service online tool "Look Up a ZIP Code," and then linked with their estimated 2019 ADI scores.

Statistical analyses

To assess Aim 1 (availability), two sets of analyses were conducted. First, we examined the frequency of each type of license that outlets held, by whether they sold Delta-8 THC, and used chi-squared tests of association to describe differences in the types of retailers that carried these products.

Second, we used *t*-tests to assess whether outlets that sold Delta-8 THC differed from outlets that did not in the level of deprivation in the surrounding area. To assess the potential for nonresponse bias, we compared the level of deprivation surrounding outlets included in the analytic sample with those that could not be contacted.

To assess Aim 2 (products), we first described the types of Delta-8 THC products sold, including edibles. Second, we used a *t*-test to examine whether outlets that sold edibles were in zip codes with greater socioeconomic deprivation than outlets that did not sell edibles and chi-squared tests to examine differences between types of products sold and retail licenses held.

Third, we summarized the price of the least expensive Delta-8 THC product sold in each outlet and used bivariate tests to examine potential associations between the lowest available price and (a) the type of retail license held by the outlet, (b) the ADI of the outlet's zip code, and (c) whether or not the least expensive product was an edible.

To assess Aim 3 (age), we summarized the purported minimum age for purchase.

The sample size for each analysis varied slightly because some retailers refused to provide certain information through telephone; 6 employees refused to provide information regarding the types of products sold and 24 would not provide price information. For bivariate tests, sensitivity analyses were conducted, which accounted for nesting within zip codes, and results were similar.

Analyses were conducted using Stata 17 (StataCorp LLC, College Station, TX).

Results

Aim 1: Delta-8 THC product availability

Among the 1,223 outlets contacted, 11% ($n = 133$) reported selling Delta-8 THC products. Outlets with a CBD license were the most likely to sell Delta-8 THC products: 72% versus 22% of tobacco outlets and 6% of alcohol outlets. However, 92% of outlets that reported selling Delta-8 THC products held a retail tobacco license, 45% held a retail alcohol license, and

16% held a retail CBD license. Furthermore, among outlets that *only* had a retail alcohol license (i.e., they had neither tobacco nor CBD license), only 0.6% sold Delta-8 THC products.

Results from a *t*-test showed that outlets that sold Delta-8 THC products were in areas with significantly higher ADI scores ($t = 2.3$, $p = 0.02$, mean = 5.6 vs. 5.0), indicating that they were in more socioeconomically disadvantaged neighborhoods than outlets that did not sell Delta-8 THC products. Results from another *t*-test showed that outlets that answered their telephones were in areas with significantly lower ADI scores than outlets that did not answer their phones ($t = 8.9$, $p < 0.0001$, mean = 5.0 vs. 6.4).

Thus, outlets that could be contacted tended to be in more economically advantaged neighborhoods. Table 1 summarizes findings related to Aim 1.

Aim 2: Delta-8 THC product types and pricing

Nearly all outlets that sold Delta-8 THC products (96%) carried product types that were intended to be smoked or vaped, and three of four outlets (76%) sold edibles. There was no statistically significant association between whether an outlet sold edibles and their location's ADI score (mean ADI = 5.4 vs. 6.5, $t = 1.8$, $p = 0.07$). Retailers with a CBD license were *more* likely to sell edibles (95% vs. 72%; $X^2 = 4.8$, $p < 0.03$) than retailers without a CBD license, whereas retailers with a tobacco (73% vs. 100%; $X^2 = 3.9$, $p < 0.05$) or alcohol license (56% vs. 91%; $X^2 = 21.2$, $p < 0.001$) were *less* likely to sell edibles.

Among outlets that sold edibles, most employees (86%) agreed to describe the types of edibles they sold ($n = 83/96$). The most commonly reported edibles (80%, $n = 66/83$) were gummies, including apple rings, gummy bears, Gushers, and Starbursts. Other ingestible Delta-8 THC products included energy bars, brownies, candies, cereals, cereal treats, Cheetos, granola bars, chips, chocolates, cookies, fries, gum, juices, M&Ms, mints, pizza, seltzers, shots, soft gel capsules, syrups, teas, and tinctures. Products sold for smoking/vaping included disposable vape pens, vape cartridges, prerolled joints or blunts, and flower (i.e., hemp leaves sprayed or dipped with Delta-8 THC distillate).

Table 1. Delta-8 Tetrahydrocannabinol Product Availability

	Sold Delta-8 THC
Overall ($n = 1,223$)	11%
Alcohol license(s) ($n = 1,069$)	6%
Tobacco license ($n = 547$)	22%
CBD license ($n = 29$)	72%
ADI score	5.6 vs. 5.0 $t = 2.3$, $p = 0.02$

ADI, Area Deprivation Index; CBD, cannabidiol; THC, tetrahydrocannabinol.

Overall, 82% ($n = 109/133$) of outlets provided price data. The average price of the least expensive Delta-8 THC product sold at each outlet was $21.71 (median = $20, range = $2.99–$50). There were no statistically significant associations between price and (a) the type of retail license held by the outlet or (b) the ADI of the outlet's zip code. However, there was a large difference between the price of the least expensive product that was an edible (mean = $15.39) and a product intended for smoking or vaping (mean = $23.97, $t = 4.1$, $p < 0.001$).

Aim 3: Purported minimum age for purchase

When asked if there was a minimum age for purchasing Delta-8 THC products, 96% reported that customers needed to be 21 years or older or the "same age as drinking or smoking." However, 4% ($n = 5/122$) reported that the minimum age was 18 or that there was no minimum age for purchasing Delta-8 THC products. Among the five outlets that purportedly allowed purchases among people 18 or younger, two locations only had a CBD license, two had both tobacco and alcohol licenses, and one had only a tobacco license. The one store that reported having no minimum purchase age held only a tobacco license.

Discussion

This is the first study to document characteristics of the retail sales environment related to Delta-8 THC products. The current study showed that Delta-8 THC products could be purchased throughout the city at a variety of outlets that held several different license types. Most stores with a CBD license (72%) sold Delta-8 THC products; however, 92% of outlets that reported selling Delta-8 THC products held a retail tobacco license.

Given previous studies showing that tobacco, alcohol, and cannabis retailers are disproportionately located in neighborhoods with lower socioeconomic status and a greater proportion of some racial and ethnic groups,[12,14–17,32] there is the potential for geographic disparities in access to Delta-8 THC products. This notion is further supported by the current study finding that retailers selling Delta-8 THC products were disproportionately located in more socioeconomically deprived areas. Accordingly, municipalities may consider

passing ordinances or zoning restrictions to regulate where and how Delta-8 THC products can be sold.

Beyond the widespread and disparate physical availability at retail outlets, many characteristics of Delta-8 THC products may be appealing to young people. In our survey, the sale of edible products was common. Edibles may be especially appealing to young people as they are easier to conceal and consume. Moreover, they are also more likely to be unintentionally ingested by people who mistake them for ordinary snacks or beverages.

Nearly 40% of overall Delta-8 THC exposure cases and 77% of unintentional exposure cases reported to poison control centers involved patients under 18 years old.[5] In addition to edibles being potentially more appealing to younger people, edible products were associated with lower average price points, making them more economically accessible to young people who are sensitive to cannabis pricing.[24]

Increased accessibility and appeal to young people highlight concerns from prior studies showing that the dose of THC in Delta-8 products varies widely and is often inaccurately labeled on packaging.[9] This may result in consumers ingesting more than intended. Similarly, lack of testing for contaminants may introduce problems related to poisoning, given the synthesis of Delta-8 THC.[5]

From a youth prevention perspective, it is concerning that 4% of stores reported that they would sell Delta-8 THC to patrons under 21 years old. Although our results found that the vast majority of retailers reported a minimum age of 21 years to purchase Delta-8 THC, the extent to which age was verified before purchase is unknown. Previous studies have found low rates of age verification (14%) for online sales of Delta-8 THC products.[9]

Thus, research consisting of Delta-8 THC purchase attempts among young people is warranted. Overall, the limited regulation of Delta-8 THC products introduces potential issues related to the lack of (a) minimum purchasing age requirements and verification; (b) packaging and labeling standards; (c) testing for potency, consistency, and contaminants; and (d) cannabis-specific taxes based on THC content.[6]

Limitations

Our findings should be interpreted with three limitations in mind.

First, our sample was restricted to Fort Worth, Texas, in September and October of 2021. Nevertheless, our sample size was large and relatively representative of this area. Data were collected from 69% of the nearly 1,800 retail outlets that the team attempted to contact by telephone. Given that Delta-8 THC is also available for purchase and delivery online, the brick-and-mortar retail establishments in this sample do not necessarily represent all Delta-8 THC sales in Fort Worth. Although the City of Fort Worth is economically similar to the United States overall,[27] future research should examine Delta-8 THC marketing in other consumer marketplaces, including online retail and mobile dispensaries.

Second, we relied on employee self-reports rather than in-store observations of Delta-8 THC sales. The use of telephone sampling afforded the opportunity to obtain data from many retail outlets during a short time window, which was critical given the rapidly changing regulatory landscape of Delta-8 THC sales in Texas.[33,34] Nevertheless, this method of data collection may have introduced errors that would not be present with in-person or web-based observations.

Third, given the limited time available on these calls, a limited number of questions were asked of store employees. However, these data were combined with additional data that provided information about the retail outlets and the surrounding community, including retail licenses and ADI scores. Analyses did not account for other area- or outlet-level factors.

Conclusions

This study provides initial information regarding the Delta-8 THC brick-and-mortar retail landscape during a period of limited regulation of marketing and sales. Combined with the limited marketing and sales regulations, the wide availability and affordability of Delta-8 THC products raise concerns particularly about youth access and youth-oriented products and marketing.

Furthermore, this study provides initial evidence that Delta-8 THC may be disproportionately available in retail stores located in more socioeconomically deprived areas. Additional research is needed to understand the potential adverse population-level effects associated with Delta-8 THC consumption, retail availability, and business practices.

Acknowledgment

None.

Authors' Contributions

All authors contributed to conceptualizing the study, interpreting results, and reviewing and editing

manuscript drafts. M.E.R. coordinated data collection, conducted data management and statistical analyses, and drafted the manuscript. P.J.T. created Figure 1. All authors approved the final version.

Author Disclosure Statement

A.Y.K. serves as a paid expert consultant in litigation against tobacco companies. There are no other conflicts to declare.

Funding Information

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. A.Y.K. was supported by the National Cancer Institute of the National Institutes of Health (P30CA225520) and the Oklahoma Tobacco Settlement Endowment Trust (TSET R23-02). The funders had no role in any aspect of the study design, data analysis and interpretation, writing of the manuscript, or decision to publish.

References

1. Substance Abuse and Mental Health Services Administration (SAMHSA). Key substance use and mental health indicators in the United States: Results from the 2020 National Survey on Drug Use and Health (HHS Publication No. PEP21-07-01-003, NSDUH Series H-56). Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration: Rockville, MD, USA; 2021. Available from: https://www.samhsa.gov/data/ [Last accessed: February 3, 2022].
2. United States Drug Enforcement Administration (U.S. DEA). Drug scheduling. 2021. Available from: https://www.dea.gov/drug-information/drug-scheduling [Last accessed: February 3, 2022].
3. Cerino P, Buonerba C, Cannazza G, et al. A review of hemp as food and nutritional supplement. Cannabis Cannabinoid Res 2021;6:19–27.
4. United States Food and Drug Administration (U.S. FDA). Hemp Production and the 2018 Farm Bill. Testimony of Amy Abernethy, Md, Phd., Principal Deputy Commissioner, Office of the Commissioner, Food and Drug Administration, Department of Health And Human Services before the Senate Committee on Agriculture, Nutrition, and Forestry. 2019. Available from: https://www.fda.gov/news-events/congressional-testimony/hemp-production-and-2018-farm-bill-07252019 [Last accessed: February 3, 2022].
5. United States Food and Drug Administration (U.S. FDA). 5 Things to Know about Delta-8 Tetrahydrocannabinol—Delta-8 THC. 2021. Available from: https://www.fda.gov/consumers/consumer-updates/5-things-know-about-delta-8-tetrahydrocannabinol-delta-8-thc [Last accessed: February 3, 2022].
6. Leas EC. The hemp loophole: A need to clarify the legality of delta-8-THC and other hemp-derived tetrahydrocannabinol compounds. Am J Public Health 2021;111:1927–1931.
7. Leas EC, Nobles AL, Shi Y, et al. Public interest in Δ8-tetrahydrocannabinol (delta-8-THC) increased in US states that restricted Δ9-tetrahydrocannabinol (delta-9-THC) use. Int J Drug Policy 2022;101:103557.
8. Livingston MD, Walker A, Cannell MB, et al. Popularity of delta-8 THC on the Internet across US states, 2021. Am J Public Health 2022;112:296–299.
9. Johnson L. CBD Oracle Lab study shows some delta-8 products are 7700% over the legal delta-9 THC limit. 2021. Available from: https://cbdoracle.com/news/delta-8-thc-products-market-study-consumer-safety-and-legality [Last accessed: February 3, 2022].
10. Klieger SB, Gutman A, Allen L, et al. Mapping medical marijuana: State laws regulating patients, product safety, supply chains and dispensaries, 2017. Addiction 2017;112:2206–2216.
11. Payán DD, Brown P, Song AV. County-level recreational marijuana policies and local policy changes in Colorado and Washington State (2012–2019). Milbank Q 2021;99:1132–1161.
12. Kong AY, Delamater PL, Gottfredson NC, et al. Neighborhood inequities in tobacco retailer density and the presence of tobacco-selling pharmacies and tobacco shops. Health Educ Behav 2021;49:10901981211008390.
13. Lee JGL, Henriksen L, Rose SW, et al. A systematic review of neighborhood disparities in point-of-sale tobacco marketing. Am J Public Health 2015;105:e8–e18.
14. Lee JP, Ponicki W, Mair C, et al. What explains the concentration of off-premise alcohol outlets in Black neighborhoods? SSM Popul Health 2020;12:100669.
15. Rodriguez D, Carlos HA, Adachi-Mejia AM, et al. Retail tobacco exposure: Using geographic analysis to identify areas with excessively high retail density. Nicotine Tob Res 2014;16:155–165.
16. Schwartz E, Onnen N, Craigmile PF, et al. The legacy of redlining: Associations between historical neighborhood mapping and contemporary tobacco retailer density in Ohio. Health Place 2021;68:102529.
17. Amiri S, Monsivais P, Amram O. Availability of licensed cannabis businesses in relation to area deprivation in Washington state: A spatiotemporal analysis of cannabis business presence between 2014 and 2017. Drug Alcohol Rev 2019;38(7):790–797.
18. King S. How Some THC Is Legal—For Now. 2021. Available from: https://www.rollingstone.com/culture/culture-features/delta-8-thc-legal-weed-explained-1113859/ [Last accessed: August 24, 2022].
19. Centers for Disease Control and Prevention. Best Practices for Comprehensive Tobacco Control Programs—2014. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health: Atlanta, GA, USA; 2014. Available from: https://www.cdc.gov/tobacco/stateandcommunity/best_practices/pdfs/2014/comprehensive.pdf [Last accessed: February 4, 2022].
20. Community Preventive Services Task Force. The Community Guide. Preventing Excessive Alcohol Consumption. What Works. Evidence-Based Interventions for Your Community. 2015. Available from: https://www.thecommunityguide.org/sites/default/files/assets/What-Works-Factsheet-Alcohol.pdf [Last accessed: February 4, 2022].
21. Gallet CA. Can price get the monkey off our back? A meta-analysis of illicit drug demand. Health Econ 2014;23:55–68.
22. Pacula RL. Examining the Impact of Marijuana Legalization on Marijuana Consumption: Insights from the Economics Literature. RAND Corporation: Santa Monica, CA; 2010.
23. 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 Health Rev 2014;35:1–18.
24. van Ours JC, Williams J. Cannabis prices and dynamics of cannabis use. J Health Econ 2007;26:578–596.
25. Williams J, Pacula RL, Chaloupka FJ, et al. Alcohol and marijuana use among college students: Economic complements or substitutes? Health Econ 2004;13:825–843.
26. United States Census Bureau. City and Town Population Totals: 2010–2020. 2021. Available from: https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates/2020-evaluation-estimates/2010s-cities-and-towns-total.html [Last accessed: February 3, 2022].
27. United States Census Bureau. QuickFacts. Fort Worth city, Texas; Texas; United States. 2021. Available from: https://www.census.gov/quickfacts/fact/table/fortworthcitytexas,TX,US/PST045219 [Last accessed: February 3, 2022].
28. Texas Department of State Health Services. DSHS Accepting Applications to Manufacture or Sell Consumable Hemp Products. 2020. Available from: https://www.dshs.texas.gov/news/releases/2020/20200803.aspx#:~:text=As%20of%20August%202%2C%20a,year%2C%20is%20%24258%20per%20facility [Last accessed: August 24, 2022].

29. Kind A, Buckingham WR. Making neighborhood-disadvantage metrics accessible—the neighborhood atlas. N Engl J Med 2018;378:2456–2458.
30. University of Wisconsin School of Medicine Public Health. 2015 Area Deprivation Index v2.0. 2015. Available from: https://www.neighborhoodatlas.medicine.wisc.edu/ [Last accessed: February 3, 2022].
31. Singh GK. Area deprivation and widening inequalities in US mortality, 1969–1998. Am J Public Health 2003;93:1137–1143.
32. Morrison C, Gruenewald PJ, Ponicki WR. Race, ethnicity, and exposure to alcohol outlets. J Stud Alcohol Drugs 2016;77:68–76.
33. Jordan JR. Delta 8 temporarily removed from Texas' list of controlled substances, judge rules. Chron; 2021. Available from: https://www.chron.com/news/houston-texas/article/delta-8-texas-ban-lawsuit-update-16596426.php [Last accessed: February 5, 2022].
34. Texas Department of State Health Services. Consumable Hemp Program. 2022. Available from: https://www.dshs.texas.gov/consumerprotection/hemp-program/default.aspx [Last accessed: February 5, 2022].

Cite this article as: Rossheim ME, LoParco CR, Walker A, Livingston MD, Trangenstein PJ, Olsson S, McDonald KK, Yockey RA, Luningham JM, Kong AY, Henry D, Walters ST, Thombs DL, Jernigan DH (2022) Delta-8 THC retail availability, price, and minimum purchase age, *Cannabis and Cannabinoid Research* X:X, 1–8, DOI: 10.1089/can.2022.0079.

Abbreviations Used

ADI = Area Deprivation Index
CBD = cannabidiol
DSHS = Department of State Health Services
THC = tetrahydrocannabinol