

ORIGINAL PAPER OPEN ACCESS

Self-Reported Cannabis Prices and Expenditures From Legal and Illegal Sources Five Years After Legalisation of Non-Medical Cannabis in Canada

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Received: 2 April 2025 | **Revised:** 2 July 2025 | **Accepted:** 2 July 2025

Funding: This work was supported by the Canadian Institutes of Health Research Project Grant (PJT-153342) and Canadian Institutes of Health Research Project Bridge Grant.

Keywords: cannabis | illegal market | legal market | price | quantity

ABSTRACT

Introduction: The price of cannabis has important implications for many outcomes discussed in legalisation debates. This paper reports on legal and illegal prices of different cannabis products.

Methods: National surveys were conducted in 2022 and 2023 among Canadians aged 16–65 years as part of the International Cannabis Policy Study. Self-reported price, purchase quantity and legal versus illegal source of the ‘last’ cannabis purchased was examined from 2686 respondents who used cannabis in the past 12 months for nine cannabis product types.

Results: On average, consumers report that 78% of all their cannabis came from legal sources in the past year. Differences in the self-reported price paid between legal and illegal purchases varied by product type. Price per unit was higher from legal sources for dried flower (+23.8%, $p < 0.001$), vapes (+18.7%, $p = 0.006$) and hash (+38.4%, $p < 0.001$), and lower for capsules (–28.4%, $p = 0.008$). No statistically significant difference was found for drops (–3.3%, $p = 0.76$), edibles (+3.9%, $p = 0.49$), cannabis drinks (–8.8%, $p = 0.21$), concentrates (+13.8%, $p = 0.15$) and tinctures (–17.0%, $p = 0.28$). Substantial quantity discounts for dried flower were observed from both legal and illegal sources.

Discussion and Conclusion: Differences between legal and illegal cannabis prices have narrowed considerably, likely due to declines in the price of cannabis from legal stores since the opening of legal markets in Canada. Some differences are expected across the two markets considering differences in standard quantities purchased and the presence of quantity discounts in these markets. Analyses omitting purchase quantity may overestimate the price differential between legal and illegal sources.

1 | Introduction

Prior to the legalisation of nonmedical (i.e., recreational) cannabis in 2018, Canada had well-established medical and illegal cannabis markets which included websites, street dealers and unregulated store fronts [1, 2]. A primary objective of the

Cannabis Act was to create a quality-controlled legal cannabis market with the goal of displacing the illegal market [3, 4].

Cannabis sales from legal retail sources have steadily increased since legalisation, reaching \$4.7 billion in the 2022–2023 fiscal year [3, 5]. Results from the Canadian Cannabis

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Summary

- Reporting the legal and illegal prices of different cannabis products in Canada.
- Seventy-eight percent of all consumers of cannabis came from legal sources in the past year.
- Price-per-unit was higher from legal sources for dried flower, vapes and hash.
- Price-per-unit was lower from legal sources for cannabis capsules.
- Substantial quantity discounts were observed from both legal and illegal sources.

Survey (CCS)—Canada's national monitoring survey on cannabis—estimate that in 2023, 73% of past 12-month consumers report legal retailers as their usual purchasing source [6]. Similarly, the International Cannabis Policy Study (ICPS) has documented the legal market capture of cannabis since legalisation. In 2019, the year after cannabis legalisation, data from the ICPS suggested that 45.7% of past year purchasers of dried flower, the most popular form of cannabis, purchased their product(s) from a legal source during their last purchase [7, 8]. More recently, a report was published utilising ICPS data which suggests that in 2023, 84% of past 12-month consumers reported purchasing all of their cannabis products in the past year from legal sources [9].

Despite multiple jurisdictions legalising some form of cannabis supply globally, few studies have examined the factors associated with consumer transitions from the illegal to legal retail market following legalisation. Price, convenience and access to legal stores have been identified by consumers as the most important factors impacting their decision to purchase cannabis from legal versus illegal retail sources [10–13]. One study also found that as the legal retail market developed, the importance of price increased, highlighting the importance of 'time since legalisation' in evaluating market indicators such as price and retail accessibility, which undergo rapid change in newly legal cannabis markets [13].

Legal markets provide a reliable means of monitoring the price of cannabis from legal retail sources, though there is very little evidence on how they compare with illegal prices. Research from Canada indicates that the price of cannabis from legal sources was substantially higher than the price from illegal sources immediately following legalisation in 2018. For instance, in 2019, Statistics Canada reported that the average price per gram of legal dried flower was \$9.99, which was considerably higher than the average price per gram of illegal dried flower, which was \$6.37 [14]. However, legal dried flower prices have decreased with reported estimates of \$10.00 and \$9.22 CAD per gram (excluding sales tax) in 2019 and 2023, respectively [1, 8, 15]. Cannabis prices also vary based on purchase quantity, which in Canada is limited to 28g of cannabis that can be purchased during one transaction. An analysis of retail sales from licenced sources in Washington state estimated a discount elasticity of -0.06 [16]. Given the inherent challenges of monitoring illegal drug markets, there is less information available

on the price of illegal cannabis. Moreover, virtually all estimates to date have focused on dried flower even though cannabis products have diversified in recent years [17]. Non-flower products, including edibles, vapes and oral liquids, now account for 40% of the expenditures in the legal Canadian cannabis market. Little to no literature exists on the legal prices of these cannabis products and even less documentation on their associated illegal prices. Additionally, there are virtually no data on whether the legal market capture varies across different product forms, some of which require more sophisticated manufacturing and higher shipping costs [18].

Characterising prices for all cannabis products from legal and illegal sources is urgently needed. This information is critically important to help regulators assess the price differential between legal versus illegal cannabis sources, guiding decisions on cannabis taxes and maximising the legal market capture. The current study utilises population-level data to examine the price, quantity and legality of cannabis purchases among past 12-month cannabis consumers approximately 4–5 years following legalisation of recreational cannabis in Canada.

2 | Methods

2.1 | Respondents and Procedures

The current study uses cross-sectional data from the 2022 and 2023 Canadian waves of the ICPS collected in September and October of the respective years. The surveys were offered in English and French and include a detailed set of questions related to cannabis use frequency, quantity and types of cannabis products consumed, sourcing of cannabis products, price during last purchase (collected separately as amount spent and quantity) and total money spent per product type in the past 12 months. As documented in ICPS Technical Reports [19, 20] respondents aged 16–65, recruited through the Nielsen Consumer Insights Global Panel and partner's panel, completed a self-report online survey with a median survey time of approximately 35 min. Attention checks, 'trap' questions and monetary incentives were used to ensure data quality and integrity while decreasing response bias. A total of 12,686 respondents reported purchasing at least one cannabis product in the past 12 months, 10,515 of whom were included in the analytic sample after exclusions for missing data and outliers, as described below.

2.2 | Measures

2.2.1 | Socio-Demographics

Respondents provided demographic information including age, sex-at-birth, gender, sexuality, ethnicity and race, education level, income adequacy and province of residence.

2.2.2 | Cannabis Products Used

Respondents who indicated that they used cannabis in the past 12-months were asked what cannabis products they used (e.g., 'Have you used marijuana in any of the following ways?').

Response options included dried herb, cannabis oils or liquid drops taken orally, oral capsules, cannabis oils or liquids for vaping, edibles, drinks, concentrates (e.g., wax, shatter, etc.), hash/kief or tinctures. For each product type, respondents could endorse any lifetime use and/or past 12-month use.

2.2.3 | Legal Source at Last Purchase

For each cannabis product the respondent purchased in the last 12 months, respondents were asked ‘The last time you bought [cannabis product] where did you buy it?’ Response options included ‘From a family member or friend’, ‘From a dealer (in person)’, ‘Internet delivery service or mail order (delivered to me)’, ‘From a store, co-operative or dispensary (in person/curbside)’, ‘Other’, ‘Don’t know’, ‘Refuse to answer’. If ‘Internet delivery service or mail order’ or ‘From a store, co-operative or dispensary’ was selected, respondents were asked whether it was an authorised, legal or unauthorised, illegal website/store. An indicator variable was created indicating whether the respondent’s last purchase was from a legal or illegal source. Legal sources included legal, authorised internet delivery services and stores and were only legal if the respondent was of legal age to purchase their goods in their province of residence.

2.2.4 | Cannabis Price

For each product used, past 12-month cannabis consumers were asked to report the price and quantity purchased during their *last* purchase. Subsequently, respondents were asked to confirm that they paid \$[X] price for \$[X] unit of cannabis (see Table 2 for the corresponding unit for each product). The price-per-unit was then calculated for each of the product categories. For example, a price-per-gram was calculated based on each respondent’s price and quantity of last purchase of dried flower. Price-per-unit data was then separated into two groups based on whether they purchased from a legal or illegal source at last purchase and each product was cleaned in two stages (see Table S1). First, to address extreme values, prices above and below the 99th and 1st quartile were removed ($N=189$ across all products), then prices were winsorised to the 95% percentile. Second, a brief retail scan of licenced cannabis stores was conducted in five Canadian provinces (British Columbia, Ontario, Alberta, Quebec and Nova Scotia) to determine the lowest and highest price-per-unit of each cannabis product (see Tables S1 and S2). The minimum and maximum retail price-per-unit were then multiplied by 0.5 and 1.5, respectively, to allow for greater variation in price-per-unit that was observed at the time of the retail scan. Self-reported prices outside of these parameters were considered implausible and were excluded from the analysis ($N=1017$ across all products). The majority ($>75\%$) of price-per-unit values were retained across all cannabis products including more than 90% of legal dried flower, drops, capsules, vapes, hash and concentrates. All prices were in Canadian dollars (\$CAD) and include excise taxes; after reporting price, respondents were asked if they included sales tax, shipping or delivery costs.

To determine the mean sales-weighted price-per-unit, hereinafter referred to as price, of each cannabis product, respondents’ individual price-per-unit was then multiplied by their individual

quantity purchased at last purchase. A sales-weighted ratio was then created for each cannabis product based on the average price-per-unit divided by the average quantity purchased at last purchase.

2.2.5 | Cannabis Expenditures From Legal Sources in the Past 12-Months

Respondents were asked ‘Overall, how much of the marijuana that you used in the past 12 months was purchased from legal/authorised sources’, where respondents could enter percentages between 0 and 100. The question was also asked for each product type. Respondents were reported as missing if they only used one cannabis product and their responses were discrepant (i.e., the percentages for overall and the product weren’t the same; $N=1078$ across all products).

2.2.6 | Cannabis Expenditures

Past 12-month consumers were asked ‘We’d like to know how much money you’ve spent on all [cannabis product] in the past 12 months’. Expenditures by product were summed to create a ‘sum of all products’ and were cleaned by applying a 99% winsorisation.

2.2.7 | Legal Sources of Cannabis Products in the Past 12 Months

The percentage of all cannabis products purchased in the last 12-months from a legal source was calculated using an approach akin to a ‘sales-weighted’ average within each product category. Respondents’ cannabis expenditures in the past 12 months were divided by the sum of all cannabis expenditures across participants and then multiplied by respondents’ percent purchased from legal sources. Percentages across all participants were then summed to estimate the percentage of all products purchases in the last 12-months from a legal source for each category.

2.3 | Statistical Analyses

All analyses were conducted using post-stratification sample weights based on Canadian census estimates. Respondents were classified into age-by-sex-by-province, education and age-by-smoking status groups. A raking algorithm was applied to the sample to compute weights that were calibrated to these groupings. Weights were rescaled to the sample size. See the ICPS Technical Reports for further detail [18].

Stata survey procedures were utilised to test the difference between legally versus illegally sourced price-per-unit ratios. The percent of individuals purchasing from legal sources is presented in two ways. First, we calculated the mean percentage of consumers who reported using a legal source at last purchase for each product category. Second, we calculated the percentage of all cannabis expenditures over the past 12-months that were purchased from legal sources within each product category, using the ‘sales-weighted’ method described above.

A logistic regression examined if the quantity of dried flower purchased was associated with the legal status of the last purchase source, adjusting for age, sex-at-birth, sexuality, ethnicity, education level, income adequacy and province of residence. Adjusting for the same demographic variables, an additional linear regression examined differences in the price-per-gram of dried flower by the quantity of flower bought at last purchase and legal versus illegal purchase source. Quantity of flower at last purchase was analysed as a categorical variable based on typical retail sale amounts (< 1, 1–3.49, 3.50–27.99 g and 1 oz (28 g) or more). All analyses were conducted using SAS (SAS version 3.81, SAS Institute Inc., Cary, NC, USA) and Stata 15.1.

3 | Results

3.1 | Sample Characteristics

Table 1 shows the profile of the total analytic sample of past 12-month cannabis consumers living in the 10 Canadian provinces ($N = 12,686$).

3.2 | Cannabis Prices by Product Type

Table 2 shows the mean sales-weighted price-per-unit for cannabis products overall, and from legal and illegal retail sources. Purchase prices for dried flower (\$1.49/g, $p < 0.001$), vapes (\$6.97/g, $p = 0.006$) and hash (\$6.20/g, $p < 0.001$) were less expensive when purchased from illegal versus legal retail sources, whereas cannabis capsules ($-\$0.56/g$, $p = 0.008$) were cheaper from legal retail sources. There was little evidence of different purchase prices for other products.

3.3 | Cannabis Purchased From Legal vs. Illegal Retail Sources

Overall, 69.1% of respondents reported purchasing from a legal source at last purchase. Averages differed between cannabis products, ranging from a low of 55.6% for hash to a high of 80.2% for drinks (see Table 3). Respondents also reported the percentage of products that came from legal sources in the past 12-months resulting in an average of 78.4% of 'all cannabis' products used in the last 12 months coming from a legal source. Table 3 also shows the percentage of expenditures from legal sources for all products purchased in the past 12-months which ranged from a low of 56.6% for hash to a high of 84.2% for drinks.

3.4 | Differences in Purchase Quantities Between Legal and Illegal Sources

Figure 1 shows the purchase quantities of dried flower at the last purchase. As previously mentioned, quantities of cannabis were categorised based on common purchasing amounts: less than 1, 1.00–3.49, 3.49–27.99 and 28 g (an ounce) or more. Based

TABLE 1 | Weighted demographic characteristics of past 12-month cannabis consumers in the 2022 and 2023 waves of the International Cannabis Policy Study ($N = 12,686$).

Characteristic	Weighted, % (n)
Age	
16–25 years	18.0% (2281)
26–35 years	28.5% (3617)
36–45 years	23.0% (2914)
46–55 years	16.2% (2056)
56–65 years	14.3% (1819)
Sex-at-birth	
Female	45.8% (5806)
Male	54.2% (6880)
Gender	
Woman	45.0% (5708)
Man	52.8% (6700)
Transwoman	0.4% (46)
Transman	0.3% (43)
Gender diverse (non-binary, queer, etc.)	0.3% (33)
Unstated (don't know/refuse to answer)	1.2% (154)
Ethnicity	
White/Caucasian	71.7% (9100)
Other/mixed/unstated	28.3% (3586)
Sexuality	
Heterosexual/straight	84.4% (10,709)
Gay or lesbian	4.2% (536)
Bisexual	7.8% (994)
Other	1.2% (147)
Don't know/refuse to answer	2.4% (300)
Education	
Less than high school	13.8% (1747)
High school diploma or equivalent	28.4% (3599)
Some college/university and technical certificate	32.8% (4164)
Bachelor's degree or higher	24.0% (3043)
Don't know/refuse to answer	1.1% (134)
Income adequacy	
Very difficult	12.7% (1616)
Difficult	24.4% (3097)
Neither easy nor difficult	33.4% (4242)
Easy	18.1% (2298)
Very easy	8.5% (1075)
Don't know/refuse to answer	2.8% (358)

TABLE 2 | Mean, sales-weighted price-per-unit of cannabis products at last purchase ($N = 10,515$).^{a,b}

Product type (unit, N^c)	All products mean \$ ^d (SE)	Legal price mean \$ (SE)	Illegal price mean \$ (SE)	Difference (legal vs. illegal sources) mean \$ (% different)	<i>t</i>	<i>p</i>
Dried flower (grams; $n = 4479$)	\$5.75 (0.11)	\$6.25 (0.13)	\$4.76 (0.19)	\$1.49 (+23.8%)	6.42	< 0.001
Drops (mL; $n = 651$)	\$1.49 (0.06)	\$1.48 (0.06)	\$1.53 (0.16)	−\$0.05 (−3.3%)	0.30	0.764
Capsules (capsules; $n = 304$)	\$1.49 (0.06)	\$1.41 (0.06)	\$1.97 (0.20)	−\$0.56 (−28.4%)	2.66	0.008
Vapes (grams; $n = 1011$)	\$35.80 (0.88)	\$37.35 (0.87)	\$30.68 (2.28)	\$6.97 (+18.7%)	2.74	0.006
Edibles (per product; $n = 2179$)	\$3.57 (0.08)	\$3.61 (0.09)	\$3.47 (0.18)	\$0.14 (+3.9%)	0.70	0.487
Drinks (per product; $n = 846$)	\$7.55 (0.14)	\$7.49 (0.14)	\$8.21 (0.56)	−\$0.72 (−8.8%)	1.26	0.209
Hash (grams; $n = 457$)	\$11.77 (1.16)	\$16.13 (0.88)	\$9.93 (1.46)	\$6.20 (+38.4%)	3.65	< 0.001
Concentrates (grams; $n = 382$)	\$25.17 (1.40)	\$27.21 (1.58)	\$23.45 (2.09)	\$3.76 (+13.8%)	1.44	0.150
Tinctures (mL; $n = 206$)	\$1.57 (0.10)	\$1.47 (0.08)	\$1.77 (0.27)	−\$0.30 (−17.0%)	1.08	0.283

^aNote that these prices may or may not include tax and shipping. Respondents were first asked to report the price they paid for a specific amount of cannabis at the last purchase. The next two questions asked whether their reported price included tax and shipping.

^bSample size is weighted using post-stratification sample weights based on Canadian census estimates as described in the statistical analysis section in text.

^c N for each cannabis product is based on the number of respondents (unweighted) who input a price for the respective cannabis product regardless of the legality of the source.

^dAll prices are sales weighted, meaning that they are weighted based on the quantity that is purchased at the time.

TABLE 3 | Legal sourcing from past 12-month consumers based on last purchase and past year sales weighted expenditures ($N = 10,515$).^a

Product type	Percentage of respondents who reported a legal retail source for last purchase ^b	Percentage of all products purchased from legal sources ^{c,d}
All products ($n = 8880$) ^e	69.1% ($n = 6136$) ^f	78.4% ($n = 9100$) ^f
Dried flower ($n = 6225$)	74.2% ($n = 4616$)	70.1% ($n = 3788$)
Drops ($n = 1134$)	75.5% ($n = 856$)	75.6% ($n = 911$)
Capsules ($n = 657$)	73.0% ($n = 480$)	84.2% ($n = 466$)
Vapes ($n = 2107$)	73.1% ($n = 1541$)	76.1% ($n = 1426$)
Edibles ($n = 3594$)	75.3% ($n = 2708$)	72.9% ($n = 2428$)
Drinks ($n = 1539$)	80.2% ($n = 1234$)	78.2% ($n = 956$)
Hash ($n = 1010$)	55.6% ($n = 561$)	56.6% ($n = 623$)
Concentrates ($n = 887$)	57.2% ($n = 507$)	66.3% ($n = 546$)
Tinctures ($n = 545$)	59.7% ($n = 326$)	71.2% ($n = 376$)

^aSample size is weighted using post-stratification sample weights based on Canadian census estimates as described in the statistical analysis section in the text.

^bMean percent of past 12-month consumers who purchased from a legal source at last purchase.

^cPercent of 'sales-weighted' expenditures that were purchased among past 12-month consumers through legal sources.

^dThis is the percent of 'all products' purchased through legal sources. For the first row, this indicates the percent of all cannabis products, across all product forms, purchased through the legal market. Below the first row, this becomes product specific. For example, for dried herb, this is the percent of all dried herb that came from legal sources.

^e N for each cannabis product in column 1 is the total number of people who purchased each product from either a legal or illegal source.

^fSample sizes in columns 2 and 3 represent the weighted number of individuals who purchased via a legal source in each category.

on the adjusted logistic regression, consumers who purchased an ounce or more had higher odds of purchasing from an illegal source than from a legal source (AOR: 1.02, 95% CI: 1.01, 1.03, $p < 0.001$). Particularly, approximately twice the percentage of consumers reported buying an ounce or more of dried flower from illegal (27.0%) versus legal retail sources (14.6%).

Figure 2 shows the price-per-gram of dried flower purchased from legal and illegal sources, stratified by purchase quantity. Few

differences were observed in the price of legal vs. illegal sources after accounting for purchase quantity. In the adjusted linear regression, legal status was not a significant predictor of price-per-gram ($\beta = -0.09$, 95% CI: $-0.82, 0.63$, $p = 0.80$) but purchase quantity was ($F = 573.37$, $p < 0.0001$). Compared to purchases of dried flower which were less than a gram, prices were lower for quantities between 1.00 and 3.49 g ($\beta = -10.67$, 95% CI: $-12.76, -8.55$, $p < 0.001$), 3.50–27.99 g ($\beta = -16.83$, 95% CI: $-18.89, -14.78$, $p < 0.001$) and an ounce or more ($\beta = -21.33$, 95% CI: $-23.38, -19.28$, $p < 0.001$).

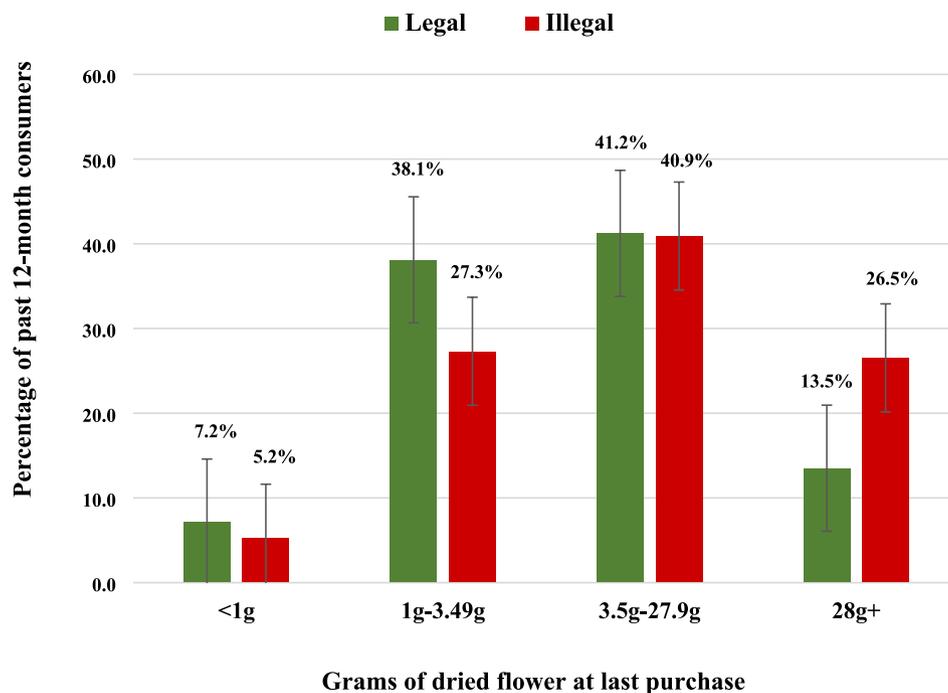


FIGURE 1 | Quantity of dried flower at last purchase by legal versus illegal purchase source among past 12-month consumers with associated 95% confidence intervals ($N=4479$).

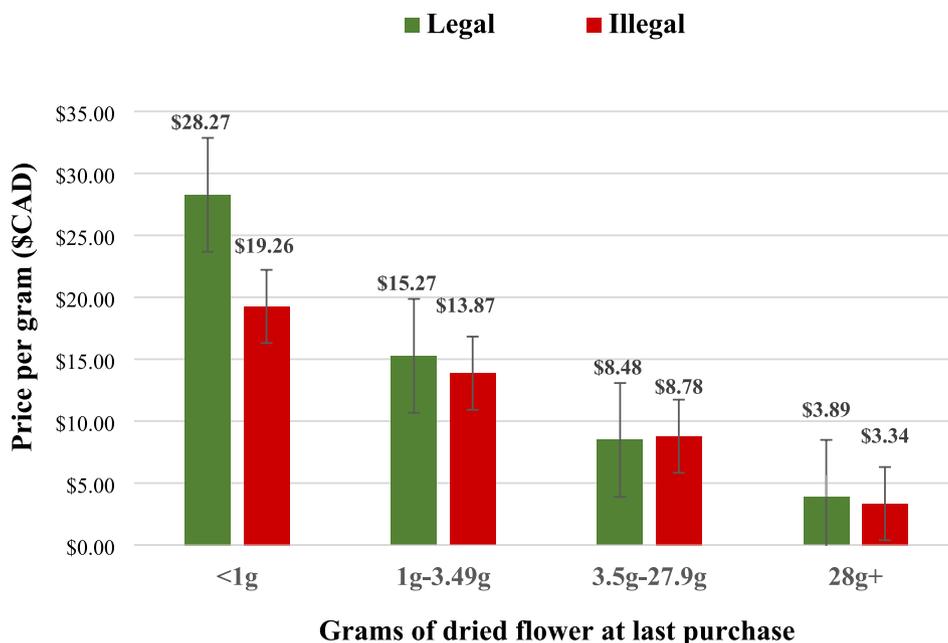


FIGURE 2 | Past 12-month consumers last purchased price-per-gram based on quantity purchased and the legality of the purchase source with associated 95% confidence intervals ($N=4479$).

4 | Discussion

The current study is among the first to report on the price of cannabis products from legal and illegal sources in a jurisdiction that has legalised ‘recreational’ cannabis. The study has four primary findings. First, consumers reported obtaining approximately three-quarters of all their cannabis products from legal retail sources. This represents an increase from estimates in earlier years from the same study [8] and is consistent with trends in legal retail sales from federal monitoring data: in 2023, 73% of consumers reported

a legal source as their usual purchase source in the past year, an increase from 53% in 2021 and 61% in 2022 [6, 21–23]. These findings demonstrate a consistent and substantial transition to legal retail sources in Canada over the first 5 years of legalisation.

Second, estimates of legal market capture differed based on the type of cannabis product. Consumers were most likely to report purchasing all their capsules and drinks from legal retail sources in the past year, potentially due to their sophisticated manufacturing processes and costly shipping expenses. Consumers

were least likely to report purchasing hash and concentrates from legal sources at last purchase, as reported elsewhere [24]. Hash and other solid concentrates are typically higher delta-9-tetrahydrocannabinol (THC) products and are commonly used by frequent consumers, who may be more price-sensitive [14] and have more established contacts with illegal sources.

Third, to our knowledge, the current study provides the most comprehensive assessment of cannabis prices from legal and illegal sources to date. Following legalisation, consumers reported that higher prices in the legal market deterred their transition from the illegal market [6, 8]. The current findings suggest that, although legal prices remained higher for most products, prices of both legal and illegal cannabis products have decreased since legalisation, the latter likely to stay competitive with the legal market. Particularly, the average self-reported price for dried flower was approximately \$12 per gram 2 years post-legalisation, more than twice the estimate of \$5.75 in the current analysis [8]. Likewise, the price differential between flower from legal and illegal sources has narrowed considerably, from \$3.59 in 2019 and \$1.74 per gram in 2020 [8], to \$1.49 per gram in the current study. These trends in self-reported prices are consistent with reductions in prices collected directly from retail sources and reflect the aggressive price competition [6, 25].

Fourth, cannabis prices decreased as the purchase quantity increased: price-per-gram was approximately 81% and 60% less expensive when purchased in quantities of one ounce or greater or 3.50–27.99 g, respectively, compared to purchases of 1–3.49 g(s)¹. The self-reported quantity discounts reported in the current study are consistent with retail prices from legal stores in Canada. In addition, consumers who purchased larger quantities of dried flower were more likely to source their product from illegal rather than from legal sources: 27.0% of 'last purchases' from illegal stores were 28 g or more versus 14.6% from legal stores. These differences may reflect federal regulations that limit the quantity of flower purchases to 28 g per consumer [26]. Price was no longer significantly associated with legality after adjusting for the quantity of dried flower purchased; therefore, analyses omitting purchase quantity may overestimate the price differential between legal and illegal sources.

The current study addresses a notable literature gap regarding the price of cannabis products other than dried flower. Self-reported prices of vapes had the greatest absolute price differential, with vapes purchased from legal sources being \$6.97 higher than illegal sources. This difference reflects the higher unit costs of vapes, which can contain more than 900 mg of THC. The lower cost of illegally sourced vapes may offset consumers concerns about the safety of illegal vapes following the EVALI outbreak in 2019, which was traced to adulterated THC products sold through unlicensed sources [27]. In contrast, prices were similar for edibles, cannabis drinks and, to a lesser extent, for hash and concentrates. The current self-reported prices are somewhat lower but generally consistent with data from the 2023 CCS for products such as edibles (\$5.35 per serving) and concentrates (\$31.98 per gram) [6]. The narrow discrepancy of prices from legal versus illegal retail sources is plausible given increasing manufacturing capacity and efficiency in the legal cannabis market, such that it is less expensive to produce legal cannabis and helps offset costs associated with licenced sales, such as excise taxes. It is also likely that the decrease in legal prices has undercut the profitability

of diverting cannabis from US states that had legalised cannabis, which was a common source of illegal products for edibles, vapes and concentrates prior to legalisation in Canada [1]. Future research on purchasing and pricing should focus on non-flower products given the increasing diversity of the market: non-flower products account for nearly half of all cannabis sales [21].

4.1 | Limitations

The current study has several limitations, including the nature of self-reported data. Recall of price and purchase source is subject to recall biases, particularly for less recent purchases. In addition, although asked in the ICPS surveys, it is unclear whether self-reported prices include sales tax and shipping, which would apply to legally sourced products. When asked if sales tax and shipping were included in their 'last' purchase price-per-unit, 57% reported including sales tax and 79% reported including shipping or delivery costs. Sales tax differs by province in Canada ranging from 5% to 15%. Therefore, the current estimates may underestimate the legal price and the differential with illegal prices. Self-reported data on price and expenditures also require considerable data cleaning to remove implausible values (see Tables S1 and S2). Additional work and collaboration is needed to develop data cleaning protocols guided by 'objective' retail prices which incorporate THC levels in a product. Price variation within the same quantity is expected to exist if there is high variation in the amount of THC in products. The current study identified plausible prices in the legal market via a brief retail scan in several provinces. More generally, the ICPS surveys recruit participants using non-random probability samples; however, the number of consumers using each product form and frequency of use are highly consistent with CCS [26].

5 | Conclusion

Prices of legal cannabis products have decreased substantially over the first 5 years after federal legalisation in Canada, with a narrowing differential between the cost of legal and illegal products. Most consumers reported purchasing from the legal cannabis market, reflecting considerable progress towards Canada's objective of displacing illegal sources through the creation of a legal cannabis market.

Author Contributions

Each author certifies that their contribution to this work meets the standards of the International Committee of Medical Journal Editors.

Conflicts of Interest

D.H. has provided paid expert testimony on behalf of public health authorities in response to legal claims from the tobacco, vaping and cannabis industry. All remaining authors declare no conflicts of interest. The funders played no role in the conceptualisation, analysis or interpretation of the study findings.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Endnotes

¹ The current study found a discount elasticity of -1.79 where consumers purchasing 3.50 g of flower, on average, paid 47% less on a per gram basis than those purchasing 1.00 g. A very different analysis focused on Washington State produced a much lower discount elasticity but differences in data sources (i.e., self-report vs. administrative sales data) and control variables preclude direct comparisons [15].

References

1. Canadian Centre on Substance Use and Addiction, *Cannabis Legalization: Cannabis for Medical Purposes* (2023), <https://www.ccsa.ca/sites/default/files/2023-03/Cannabis-Legalization-Cannabis-for-Medical-Purposes-policy-brief.pdf>.
2. S. Mahamad and D. Hammond, "Retail Price and Availability of Illicit Cannabis in Canada," *Addictive Behaviors* 90 (2019): 402–408.
3. Canadian Centre on Substance Use and Addiction, *Cannabis Legalization: Legal Access and the Illegal Market* (2023), <https://www.ccsa.ca/sites/default/files/2023-03/Cannabis-Legalization-Legal-Access-and-Illegal-Market-policy-brief.pdf>.
4. "Cannabis Act (2018)," S.C. 2018, c. 16, <https://laws-lois.justice.gc.ca/eng/acts/c-24.5/>.
5. Statistics Canada, "Control and Sale of Alcoholic Beverages and Cannabis," 2024 April 1, 2022 to March 31, 2023, <https://www150.statcan.gc.ca/n1/daily-quotidien/240306/dq240306a-eng.htm>.
6. Government of Canada, "Canadian Cannabis Survey, 2023: Summary," 2023, <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/research-data/canadian-cannabis-survey-2023-summary.html>.
7. E. Wadsworth, P. Driezen, and D. Hammond, "Retail Availability and Legal Purchases of Dried Flower in Canada Post-Legalization," *Drug and Alcohol Dependence* 225 (2021): 108794.
8. E. Wadsworth, P. Driezen, R. L. Pacula, and D. Hammond, "Cannabis Flower Prices and Transitions to Legal Sources After Legalization in Canada, 2019–2020," *Drug and Alcohol Dependence* 231 (2022): 109262.
9. D. Hammond, D. Danh Hong, S. Rundle, and M. Iraniparast, *Estimating the Size of Illegal Cannabis Market in Canada: Findings From the International Cannabis Policy Study* (University of Waterloo, 2024).
10. S. Goodman, E. Wadsworth, and D. Hammond, "Reasons for Purchasing Cannabis From Illegal Sources in Legal Markets: Findings Among Cannabis Consumers in Canada and US States, 2019–2020," *Journal of Studies on Alcohol and Drugs* 83, no. 3 (2022): 392–401.
11. F. Fataar, S. Goodman, E. Wadsworth, and D. Hammond, "Consumer Perceptions of 'Legal' and 'Illegal' Cannabis in US States With Legal Cannabis Sales," *Addictive Behaviors* 112 (2021): 106563.
12. J. Donnan, O. Shogan, L. Bishop, M. Swab, and M. Najafizada, "Characteristics That Influence Purchase Choice for Cannabis Products: A Systematic Review," *Journal of Cannabis Research* 4, no. 1 (2022): 9.
13. D. Hammond, V. Rynard, E. Wadsworth, and S. Goodman, *Analysis of Drivers of the Illicit Cannabis Market: Findings From the International Cannabis Policy Study: 2019–2020* (University of Waterloo, 2021), <https://cannabisproject.ca/wp-content/uploads/2024/10/2021-PSC-Illicit-Cannabis-Report-Hammond.pdf>.
14. Government of Canada, "StatsCannabis data availability: Crowdsourced cannabis prices, first quarter 2019," 2020, <https://www150.statcan.gc.ca/n1/daily-quotidien/190410/dq190410c-eng.htm>.
15. Headset.io, "Ontario Cannabis Sales," 2024, Seattle, US, <https://www.headset.io/markets/ontario>.
16. R. Smart, J. P. Caulkins, B. Kilmer, S. Davenport, and G. Midgette, "Variation in Cannabis Potency and Prices in a Newly Legal Market:

Evidence From 30 Million Cannabis Sales in Washington State," *Addiction* 112, no. 12 (2017): 2167–2177.

17. D. Hammond, S. Goodman, E. Wadsworth, et al., "Trends in the Use of Cannabis Products in Canada and the USA, 2018–2020: Findings From the International Cannabis Policy Study," *International Journal of Drug Policy* 105 (2022): 103716.
18. E. Wadsworth, V. Rynard, P. Driezen, et al., "Legal Sourcing of Ten Cannabis Products in the Canadian Cannabis Market, 2019–2021: A Repeat Cross-Sectional Study," *Harm Reduction Journal* 20, no. 1 (2023): 19.
19. D. Corsetti, M. Iraniparast, V. Rybard, R. Burkhalter, and D. Hammond, *International Cannabis Policy Study Technical Report – Wave 5* (2022) (University of Waterloo, 2022), <http://cannabisproject.ca/methods/>.
20. M. Iraniparast, V. Rynard, R. Burkhalter, D. Corsetti, and D. Hammond, *International Cannabis Policy Study Technical Report – Wave 6* (2023) (University of Waterloo, 2023), <http://cannabisproject.ca/methods/>.
21. Government of Canada, "Cannabis Data Overview: Inventory, Sales and Licensed Area," 2024, <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/research-data/market.html>.
22. Government of Canada, "Canadian Cannabis Survey 2021: Summary," 2021, <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/research-data/canadian-cannabis-survey-2020-summary.html>.
23. Government of Canada, "Canadian Cannabis Survey, 2022: Summary," 2022, <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/research-data/canadian-cannabis-survey-2022-summary.html>.
24. D. Hammond, D. Hong, S. Rundle, M. Iraniparast, B. Kilmer, and E. Wadsworth, "Legal Market Capture in Canada Following Cannabis Legalization," 2025 (under review).
25. Government of Canada, "Legislative Review of the Cannabis Act: Final Report of the Expert Panel," 2024, <https://www.canada.ca/en/health-canada/services/publications/drugs-medication/legislative-review-cannabis-act-final-report-expert-panel.html>.
26. Ontario Cannabis Store, 2024, <https://ocs.ca/>.
27. B. C. Blount, M. P. Karwowski, P. G. Shields, et al., "Vitamin E Acetate in Bronchoalveolar-Lavage Fluid Associated With EVALI," *New England Journal of Medicine* 382, no. 8 (2020): 697–705.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1.** Supporting Information.