



Parliamentary Budget Office

# Cannabis consumption in Victoria

Value of the illicit cannabis market

OFFICIAL

## Parliamentary Budget Office

We provide independent fiscal, economic and financial advice to all members of the Parliament of Victoria. Our objective is to inform policy development and public debate in parliament and the community.

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## In brief

Cannabis (marijuana) comes from the cannabis plant, in particular the 2 species *Cannabis sativa* and *Cannabis indica*. Hybrid forms of these species also exist that comprise various strains of cannabis with differing ratios of tetrahydrocannabinol (THC) and cannabidiol (CBD). THC is responsible for the “high” and euphoric feeling produced when consuming cannabis. CBD does not produce a “high” when consumed, but may provide therapeutic benefits for various medical and psychiatric conditions.

Cannabis is most commonly smoked in a rolled cigarette or water pipe, often in combination with tobacco. It may also be added as an ingredient to food and eaten.

Laws related to the consumption of cannabis in Australia vary across each state or territory. In Victoria, the use, possession, cultivation, and trafficking of recreational cannabis is a criminal offense. However, doctors in Victoria can prescribe legal cannabis products for medicinal use.

In this advice, we estimate the value of the illicit cannabis market in Victoria. We do not consider the legal medicinal cannabis market.

We derive estimates of the total quantity consumed and average street price of cannabis in Victoria using the:

- Australian Institute of Health and Welfare (AIHW) National Drug Strategy Household Survey for information on the frequency of illicit use of cannabis
- National Drug and Alcohol Research Centre’s (NDARC) Ecstasy and Related Drugs Reporting System for information on the average street price of cannabis.

Illicit drug markets are, by definition, unregulated, unaccountable and unpredictable. First-hand data on drug consumption can be difficult to obtain. Research on illicit drug consumption often relies on self-reporting or other indirect measures. As a result, our estimate of the value of the cannabis market is subject to uncertainty.

**Figure 1 – Value of the illicit cannabis market in Victoria**

	Unit	2018	2019	2020	2021	2022
Quantity of cannabis consumed	Kilograms	82,300	83,700	83,500	82,700	84,700
Price of a quarter ounce of cannabis	\$ per gram	12	12	12	12	12
Price of an eighth ounce of cannabis	\$ per gram	15	15	15	15	15
Market value (lower estimate)	\$ billion	0.99	1.00	1.00	0.99	1.02
Market value (upper estimate)	\$ billion	1.23	1.26	1.25	1.24	1.27

Notes: An eighth ounce is equivalent to 3.5 grams of cannabis. A quarter ounce is equivalent to 7 grams of cannabis. The difference between the upper and lower estimates for the market value reflect uncertainty over patterns of consumption – how much cannabis is sold in the average transaction. Quantity figures are rounded to the nearest hundred. Figure may not sum due to rounding.

Source: Parliamentary Budget Office.

We estimate that the amount of cannabis consumed in Victoria in 2022 was around 84,700 kilograms.

Based on cannabis markets locally and in other jurisdictions, we understand that cannabis is most commonly purchased in the following quantities:

- an eighth of an ounce, which is equivalent to 3.5 grams.
- a quarter of an ounce, which is equivalent to 7 grams.

NDARC survey data reports that the street price of cannabis in Victoria in 2022 was around \$15 for a gram of cannabis. Based on the quantity discounts exhibited in other jurisdictions, we estimate that the average cost per gram of:

- an eighth ounce of cannabis is equal, or similar, to a single gram of cannabis at \$15 per gram
- a quarter ounce of cannabis is around \$12 per gram.

We estimate that the value of the illicit cannabis market in Victoria was between \$1.02 billion and \$1.27 billion in 2022. The lower estimate reflects the price per gram of a quarter ounce of cannabis (\$12 per gram), and the higher estimate reflects the price of an eighth ounce of cannabis (\$15 per gram). This range reflects the uncertainty surrounding purchasing patterns of cannabis sales.

# Context

## Request

On 29 March 2023, Ms Rachel Payne MP, Member for the South-Eastern Metropolitan Region, asked the Parliamentary Budget Officer to provide independent advice about the scale of the illicit cannabis market in Victoria.

## Scope

In this advice, we consider the value of the cannabis market in Victoria based on estimates of the total quantity consumed and street price of cannabis.

## Limitations

We have relied on publicly available information to derive our estimates of the value of the Victorian cannabis market. Illicit drug markets are, by definition, unregulated, unaccountable and unpredictable. Available first-hand data on drug consumption can be difficult to attain. Research on illicit drug consumption often relies on self-reporting or other indirect measures. As a result, our estimate of the value of the cannabis market is subject to significant uncertainty.

The Australian Criminal Intelligence Commission's National Wastewater Drug Monitoring Program provides information on the level of drug consumption across each Australian jurisdiction. The latest wastewater report (Report 19) released in July 2023 included, for the first time, a standard dose amount for cannabis. Whereas previous reports described cannabis consumption in terms of daily *mass amounts* of ingested active ingredient in milligrams, the latest report describes this in terms of daily *doses* of the ingested active ingredient consumed. Converting to daily doses provides a standardised unit that allows cannabis consumption levels to be compared with other illicit drugs. However, the report did not provide an estimate of the total kilograms of cannabis consumed as it had done so for other illicit drugs in previous reports. It also did not contain sufficient information that would allow us to convert the daily dose amounts into kilograms consumed for cannabis.

In addition, the latest report increased the rate of drug excretion (known as the excretion factor) for cannabis from 0.6% to 10%. The excretion factor is the fraction of the drug that is excreted in urine and faeces as the unchanged drug or its metabolites after consumption. Estimating drug consumption levels through wastewater analysis is highly sensitive to the excretion factor chosen. There is some uncertainty in the literature as to which excretion factor is most appropriate for cannabis. The large increase in the excretion factor for cannabis in the latest report produced results that varied considerably from previous reports, resulting in some uncertainty around the latest figures.

Furthermore, ACIC notes that cannabis consumption is not regularly reported in other countries where wastewater is routinely conducted. One of the reasons is that the target THC metabolite is known to adsorb to various surfaces, including sewer infrastructure. This means that sewer design and collection methods may impact reportable levels of the target metabolite in the wastewater.

For these reasons we do not use the information in ACIC's wastewater reports in our advice.

We prepared this advice on 22 August 2023.

## Background

The cannabis plant belongs to the family Cannabaceae. There are 2 species – *Cannabis sativa* and *Cannabis indica* – that produce the flower used in cannabis consumption. Cannabis plants can grow in a range of climates, as well as indoors through hydroponic cultivation.

The main forms of cannabis are:

- herbal cannabis – comprising the dried flowers and leaves of the plant and usually smoked
- cannabis resin – is a compressed solid produced from the resinous parts of the cannabis plant
- cannabis oil – an oil created by extracting cannabinoids from a cannabis plant
- cannabis concentrates – a highly concentrated cannabis extract often referred to as ‘wax’ for its sticky consistency and dark amber color.

Cannabis contains the psychoactive substances tetrahydrocannabinol (THC) and cannabidiol (CBD). Various strains of cannabis exist, comprising of different ratios of THC and CBD.

THC is primarily concentrated in the leaves and flowering head of the plant and is responsible for the “high” and euphoric feeling produced when consuming cannabis. Unlike THC, CBD does not produce a high when consumed because it does not readily bind with the relevant cannabinoid receptors in the brain. It does, however, interact with the opioid, serotonin, and cannabinoid systems throughout the body, and may provide therapeutic benefits to users.

In 2021–22, cannabis was the third most common drug of concern for people seeking treatment for substance addiction in Australia. This has remained relatively consistent across the 10 years to 2021–22. Prior to the COVID-19 pandemic, survey data collected from cannabis users showed no significant changes in the perceived availability and potency of cannabis in Australia.

# Quantity of cannabis consumed

**In this section** In this section, we outline our estimate of the quantity of cannabis consumed in Victoria.

The Australian Institute of Health and Welfare (AIHW) conducts the National Drug and Strategy Household Survey, which provides research and information on illicit drug use in Australia. The survey provides information on the recent use of illicit cannabis for individuals 14 years and older. The survey defines 'recent use' as being within the previous 12 months.

The AIHW released the latest iteration of the survey in 2019. The survey indicated that 11.6% of Australians reported the recent use of illicit cannabis. This figure is similar for Victoria, with 11.5% of respondents in the state reporting the recent use of illicit cannabis.

Of the recent cannabis users in Australia, the survey indicated users could be split into 2 representatively similar groups – those that used cannabis less than monthly and those who used more frequently. The largest cohorts of users consumed cannabis either:

- once a week or more; or
- once or twice a year.

**Figure 2 – Frequency of illicit cannabis use amongst recent users in Australia**

Frequency	Percentage	Use days	Grams per use day
Every day	14%	365.0	1.6
Once a week or more	23%	208.0	1.0
About once a month	13%	12.0	0.4
Every few months	18%	6.5	0.3
Once or twice a year	32%	1.0	0.3

Note: 'Use day' refers to the average number of days per year a user consumes cannabis across each frequency category. 'Grams per use day' refers to the average grams of cannabis consumed per 'use day' across each frequency category. Data on use days and grams per use day are PBO estimates based on previous research on the subject matter.

Source: Parliamentary Budget Office

The AIHW did not provide state-specific data on the frequency of use of cannabis. Given that Victorians consume cannabis at a similar rate to all Australians, we expect that the distribution of frequency of use in Victoria would be the in line with the national average. As such, we derive our estimates of the total cannabis consumption in Victoria using the Australia-wide frequency rates.

**Figure 3 – Estimated annual consumption of cannabis**

	Unit	2018	2019	2020	2021	2022
Victoria	Kilograms	82,300	83,700	83,500	82,700	84,700
Australia	Kilograms	321,800	326,600	328,000	325,200	334,200

Notes: Figures are rounded to the nearest hundred.

Source: Parliamentary Budget Office.

We estimate that the total quantity of cannabis consumed in Victoria in 2022 was 84,700 kilograms. Our estimates reflect the latest survey data on the recent illicit use of cannabis in Victoria and accounts for the frequency of use amongst recent users, including the average grams consumed across each frequency group.

# Street price of cannabis

**In this section** In this section, we use survey data from cannabis users to estimate the street price of cannabis in Victoria.

The cost of an illicit drug varies at each point of its supply chain. Like most illicit drugs, the cannabis supply chain can generally be differentiated between the wholesale and retail (street) levels:

- Wholesale level – measured as the price per kilogram of cannabis, which reflects the cost of cannabis at a commercial drug-trafficking level.
- Street level – measured as the price per eighth ounce (3.5 grams) or per quarter ounce (7 grams) of cannabis, both of which are indicative of the cost of cannabis at a street deal level.

### Pricing at the street level

Drug prices are highest at the street level due to the higher risk to retailers (drug dealers) involved at this point of the supply chain. Furthermore, like most goods, an inverse relationship exists between the average unit cost of cannabis and the quantity purchased: the average unit cost decreases as the total quantity purchased increases. Drug users tend to purchase small quantities of cannabis at a time and therefore pay a higher average unit cost.

Cannabis users typically purchase either an eighth of an ounce or a quarter of an ounce of cannabis in each transaction. This means the median street price paid for cannabis is somewhere between the per gram price paid when purchasing an eighth ounce and a quarter ounce.

### Price estimates

The National Drug and Alcohol Research Centre (NDARC) maintains the Ecstasy and Related Drugs Reporting System (EDRS) and releases findings based on surveys and interviews of adults who regularly consume illicit drugs. The latest report, released in 2023, uses data collected in mid-2022 to provide an estimate of the average price of cannabis at the street level.

The EDRS data indicated that it costs around \$15 for one gram of cannabis in Victoria, with prices remaining broadly stable over the past 5 years, including prior to, and throughout, the COVID-19 pandemic. We have used this information to provide estimates of the average price per gram of cannabis for the most commonly purchased quantities – an eighth ounce and a quarter ounce.

**Figure 4 – Estimated price of cannabis in Victoria**

Price (\$)	2018	2019	2020	2021	2022
Quarter of an ounce of cannabis	12	12	12	12	12
Eighth of an ounce of cannabis	15	15	15	15	15

Note: An eighth ounce is equal to 3.5 grams. A quarter ounce is equal to 7 grams.

Source: Parliamentary Budget Office.

Based on the quantity discounts from other jurisdictions, we estimate that the price per gram of:

- an eighth of an ounce of cannabis is around \$15 per gram - the price of a single gram
- a quarter of an ounce of cannabis costs around \$12 per gram, reflecting the inverse relationship between unit cost and quantity sold.

# Value of the cannabis market in Victoria

## In this section

In this section, we use our quantity and price estimates to calculate a value range for Victoria's illicit cannabis market.

Given the uncertainty surrounding the purchasing patterns of cannabis users, it is not possible to determine the average unit street price of cannabis.

We estimated a range for the value of Victoria's illicit cannabis market, which reflects the uncertainty over the average price and patterns of consumption. The upper and lower bounds of the range are based on:

- our estimate for the quantity of cannabis consumed
- the price per gram for eighth ounce and quarter ounce quantities.

We expect that the average unit street price paid is between the price of an eighth ounce and the price of a quarter ounce, meaning that the market value is more likely within the boundaries of the range.

**Figure 5 – Estimated value of the cannabis market in Victoria**

(\$ billion)	2018	2019	2020	2021	2022
Lower estimate	0.99	1.00	1.00	0.99	1.02
Upper estimate	1.23	1.26	1.25	1.24	1.27

Source: Parliamentary Budget Office.

We estimate that the value of the cannabis market in Victoria in 2022 was between \$1.02 billion and \$1.27 billion. Both estimates are based on Victorian consumption of 84,700 kilograms of cannabis, but our:

- lower estimate reflects the street price of a quarter ounce of cannabis, at \$12 per gram
- higher estimate reflects the street price of an eighth ounce of cannabis at \$15 per gram.

There is a relatively high degree of uncertainty in estimating the value of a market for an illegal good. Our range estimate represents our expectation of the most likely value of the Victorian cannabis market, however we have considered additional scenarios as illustration of the sensitivity of our estimates to alternative assumptions in Attachment A.

# Attachment A – Sensitivity analysis

## In this section

There is significant uncertainty surrounding the illicit cannabis market, including the potential for underreporting in survey data. In this section we provide additional estimates of the value of the illegal cannabis market under:

- a 'high price' scenario
- 'low consumption' and 'high consumption' scenarios.

## Price scenario analysis

Our range estimate for the average price per gram of cannabis in Victoria in 2022 is between \$12 and \$15, where:

- \$12 per gram is based on our derived estimates accounting for the quantity discount when purchasing a quarter ounce.
- \$15 per gram is based on the Victorian average price as suggested in the Ecstasy and Related Drugs Reporting System (EDRS).

We consider an additional 'high price' scenario using \$20 per gram based on the EDRS national average price per gram of cannabis in 2022. We applied this price to our estimate of the total quantity of cannabis consumed in 2022 (84,700 kilograms).

**Figure 6 – Estimated value of the cannabis market at various pricing points in 2022**

Average price of cannabis	Value of the market
\$12 per gram	\$1.02 billion
\$15 per gram	\$1.27 billion
\$20 per gram	\$1.69 billion

Source: Parliamentary Budget Office.

Based on a 'high price' scenario of \$20 per gram, we estimate that the size of the Victorian illegal cannabis market in 2022 was \$1.69 billion.

## Consumption scenario analysis

Our central estimate for the total quantity of cannabis consumed in Victoria is 84,700 kilograms. This is based on usage rates in the Australian Institute of Health and Welfare's (AIHW) National Drug and Strategy Household Survey for Victoria, and accounts for the frequency of cannabis use and average cannabis consumption for each frequency group.

We consider 2 additional scenarios:

- 'Low consumption' – based on the estimated total cannabis consumption in Canada prior to legalisation, adjusted for differences in population and usage rates between Canada and Victoria. This estimate does not consider the frequency of use.

Cannabis consumption in Victoria

- ‘High consumption’ – which adjusts for the potential underreporting in the AIHW National Drug and Strategy Household Survey, based on the 5-percentage point increase in reported use of cannabis in Canada post-legalisation. Like our central case, we account for the frequency of use and average grams of cannabis consumed across each frequency group. This approach assigns all the increase in reported use of cannabis in Canada to underreporting prior to legalisation, and none of the increase to higher cannabis consumption.

We applied these consumption rates to our range estimate for the average price per gram (\$12 to \$15 per gram).

**Figure 7 – Estimated value of the cannabis market at various usage rates in 2022 (\$ billion)**

Scenario	Value of the market	
	\$12 per gram	\$15 per gram
‘Low consumption’	0.82	1.03
Central estimate	1.02	1.27
‘High consumption’	1.46	1.82

Source: Parliamentary Budget Office.

In 2022, we estimate that the size of the illegal cannabis market in Victoria was between:

- \$0.82 billion and \$1.03 billion under the ‘low consumption’ scenario
- \$1.46 billion and \$1.82 billion under the ‘high consumption’ scenario.

# Attachment B – Assumptions and approach

## Assumptions

When preparing this advice, we made the following assumptions:

1. The percentage of the population that is 14 years and over will remain constant.
2. The percentage of Victorians that have used cannabis in the last 12 months will remain constant.
3. The frequency of cannabis use amongst recent users would be the same between Victoria and Australia.

## Approach

When preparing this advice, we:

- determined the annual quantity of cannabis consumed in Victoria
- determined the annual average unit price of an eighth ounce and a quarter ounce of cannabis in Victoria
- estimated the value of the cannabis market in Victoria by applying the quantity of cannabis consumed in Victoria by:
  - the price per gram when purchasing an eighth ounce for our upper estimates
  - the price per gram when purchasing a quarter ounce for our lower estimates.

We rounded the total consumption figures to the nearest hundred.

## Attachment C – Data sources

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