

High THC cannabis products

CONSUMER USE, ADVERSE OUTCOMES,
AND IMPLICATIONS FOR POLICY



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DISCLOSURES

 **NO INDUSTRY FUNDING OR INTERESTS TO DECLARE.**

CONSULTANT / PAID SPEAKER / ADVISORY COMMITTEES

- Regulatory agencies e.g., Canada, Australia, UK, EC, US CDC, etc.
- Non-governmental associations e.g., CCSA, CCS, Heart & Stroke Foundation
- International public health authorities e.g., WHO

PAID EXPERT TESTIMONY - PUBLIC HEALTH LITIGATION

Tobacco

- Canada, Norway, Australia, UK, Ireland, Uruguay, Uganda, NB, AB, Class actions

Vaping

- US States, Canada

Cannabis

- Quebec, Canada

Food & beverage

- San Francisco



Born gentle

PROUD mothers, please forgive us if we too feel something of the pride of a new parent. For new Philip Morris, today's Philip Morris, is delighting smokers everywhere. Enjoy the gentle pleasure, the *fresh unfiltered flavor*, of this new cigarette, born gentle, then refined to special gentleness in the making. Ask for new Philip Morris in the smart new package.

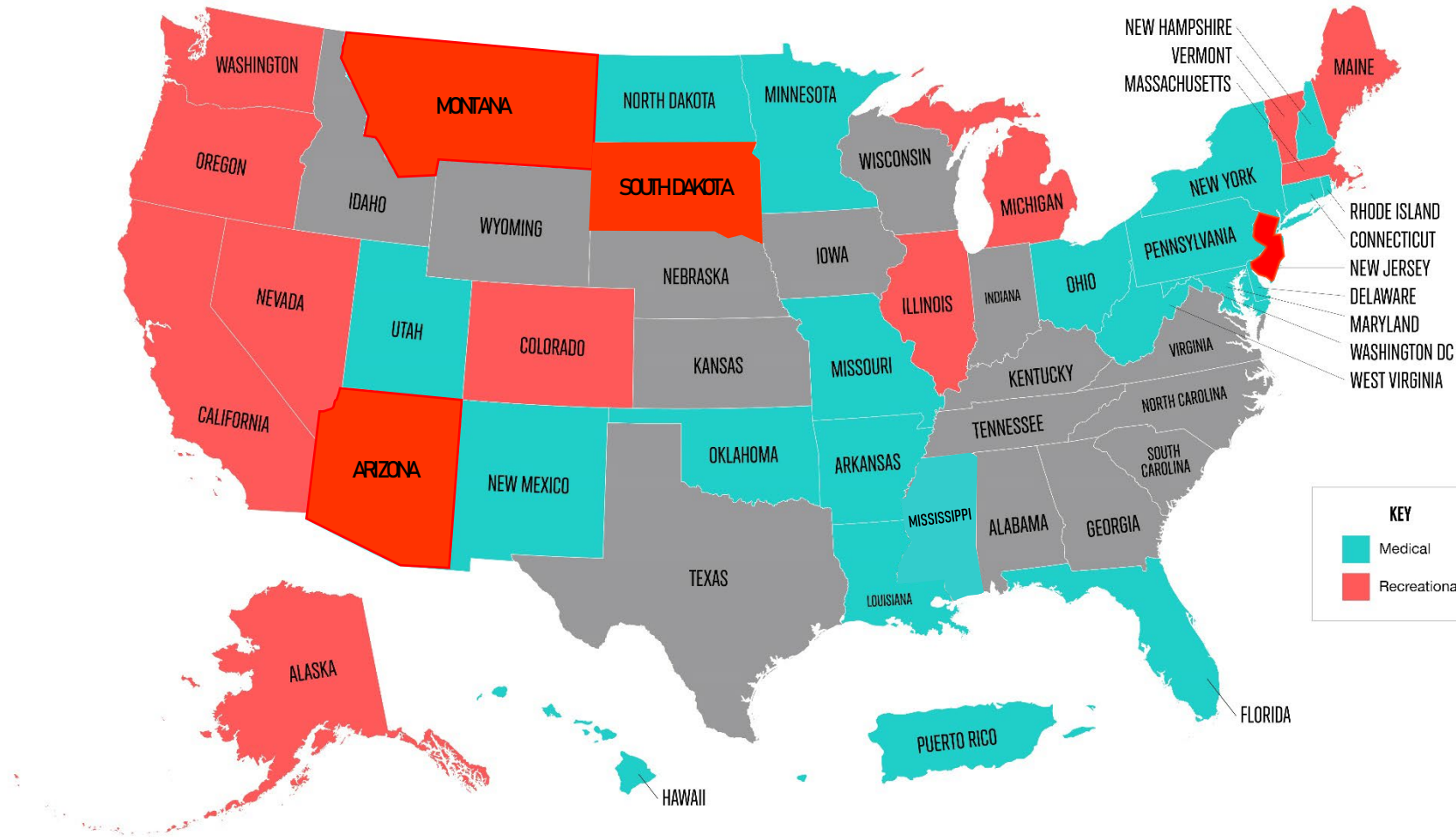


New Philip Morris...gentle for modern taste

CANNABIS POLICY

Public health impact depends on how cannabis is regulated in legal markets.

What is the optimal regulatory framework?




ADAPTED FROM: [HTTPS://WEEDMAPS.COM/LEARN/LAWS-AND-REGULATIONS/](https://weedmaps.com/learn/laws-and-regulations/)

Product standards

Vermont Lawmakers At Odds Over THC Limit on Cannabis Concentrates

Some members of the Vermont state Senate are upset over a 60% cap proposed by their colleagues in the House.

 BY THOMAS EDWARD · MAY 11, 2022



SOURCE: [HTTPS://HIGHTIMES.COM/NEWS/VERMONT-LAWMAKERS-AT-ODDS-OVER-THC-LIMIT-ON-CANNABIS-CONCENTRATES/](https://hightimes.com/news/vermont-lawmakers-at-odds-over-thc-limit-on-cannabis-concentrates/)

Product labeling & warnings

Washington



California



Colorado



Contains Marijuana. Keep away from children.

Mass.& Maine



Michigan



Oregon



Canada
OCTOBER 2018





- Detailed population-based data
- Policy-specific measures
- Same methods, multiple time points, multiple jurisdictions



Methods

- Repeat cross-sectional surveys
- Annual data collection 2018-2022...
- Ages 16-65
- Same methodology across jurisdictions



USA

'Illegal'

'Medical'

'Adult legal'



CANADA

Adult legal



AUSTRALIA

Medical





New Zealand

Medical

Sample

- Nielsen commercial panel
- Fall (Sept-Oct)
- Data integrity checks
- Weighted on sex, age, region, race, smoking, education

	2018	2019	2020	2021
	10,057	15,256	15,780	16,952
	17,112	30,479	29,900	30,081
	27,169	45,735	45,680	47,033

'Legal' states over-sampled

Washington

2021 CANNABIS REPORT

























MAY 2022

Washington sample

	2018 n=1,157	2019 n=2,359	2020 n=1,976	2021 n=1,799
Sex				
Female	571	1,164	974	885
Male	586	1,195	1,003	914
Age group				
16-25	165	456	385	329
26-35	321	541	452	435
36-45	203	483	380	354
46-55	247	429	383	342
56-65	222	450	376	339
Ethnicity				
White	948	1,944	1,589	1,472
Am. Indian or Alaskan Native	10	36	19	25
Asian	92	120	124	110
Black or African American	39	74	106	78
Native Hawaiian or Pac Islander	5	12	9	12
Other/2+ races/Unstated	63	172	130	104
Education level				
<High school	82	143	129	171
High school	242	448	364	312
Some college	597	965	801	702
Bachelor's degree	235	794	659	598
Income adequacy				
Very difficult	113	256	167	161
Difficult	240	551	356	336
Neither easy nor difficult	379	736	634	578
Easy	248	471	452	392
Very easy	146	276	301	264

Detailed measure on consumption and use.

On the last day you used dried herb, how much did you use over the ENTIRE DAY?

- | | | |
|--|--|--|
| <input type="radio"/>  
1/8 (one eighth) gram or less | <input type="radio"/>  
2 grams | <input type="radio"/>  
½ (half) ounce (14 g) |
| <input type="radio"/>  
¼ (one quarter) gram | <input type="radio"/>  
3 grams | <input type="radio"/>  
¾ (three quarters) ounce (21 g) |
| <input type="radio"/>  
½ (half) gram | <input type="radio"/>  
1/8 (eighth) ounce (3.5 g) | <input type="radio"/>  
1 ounce (28 g) |
| <input type="radio"/>  
¾ (three quarters) gram | <input type="radio"/>  
¼ (quarter) ounce (7 g) | <input type="radio"/> More than one ounce (>28 g) |
| <input type="radio"/>  
1 gram | <input type="radio"/> More than ¼ (quarter) ounce (7 g) | |

Detailed measure on consumption and use.

**Please choose the joint that is closest
to the size you normally smoke**

PAST 12-MONTH USERS OF DRIED HERB WHO REPORTED IN JOINTS

1.2 g 

1.0 g 

0.8 g 

0.6 g 

0.5 g 

0.4 g 

0.2 g 



Problematic Use Indicators

TYPE OF USER

- Early age initiation of cannabis use
- During pregnancy
- Susceptibility to psychosis

TYPE OF USE

- Daily or near-daily use
- High THC or THC:CBD ratio
- Synthetic cannabinoids
- Smoke inhalation

SETTING

- Cannabis-impaired driving
- Workplace

Policy-specific measures

- Advertising & promotion
- Price & taxation
- Retail & commercial environment
- Legal vs. illegal market indicators
- Product standards
- Public education
- Labelling & health warnings

'Objective' of cannabis policies.

Restrictions on cannabis marketing in states with 'legal' cannabis laws

JUNE 2022

CHANNEL	IL	MI	AK	NV	WA	NM	OR	CA	NJ	VT	AZ	CO	ME	CT	MA	VA	MT
Regular postal mail	1	1	1	1	1	2	1	3	1	2	3	3	1	1	1	3	3
Websites	1	2	3	2	1	1	3	2	2	2	3	2	3	2	3	3	1
Email/social media	1	1	1	1	3	1	3	2	3	2	3	1	1	3	1	3	3
Bars, pubs, nightclubs	1	1	1	1	2	1	1	1	1	1	1	1	2	1	3	1	3
Inside stores	2	1	1	1	1	1	1	1	1	2	1	1	1	2	3	2	3
Outside stores	2	3	2	1	2	2	1	1	1	1	2	3	1	3	2	2	3
Events & sponsorships	1	1	2	3	1	1	1	1	2	2	3	2	2	2	2	2	3
TV or radio	1	2	1	2	1	3	2	2	3	2	1	2	2	2	2	2	3
Billboards or posters	1	1	1	2	1	1	2	2	2	2	1	3	2	2	2	3	3
Print	1	2	1	1	1	1	2	2	2	2	1	2	3	2	2	2	3
Social media	1	1	2	2	3	3	2	2	2	2	1	1	3	2	2	3	3
TOTAL SCORE	13	16	16	17	17	17	19	19	20	20	20	21	21	22	23	26	31

Outline

- 1. Patterns of use**
- 2. Adverse events**
- 3. Product labelling & warnings**
- 4. Product standards**



How are patterns of cannabis use changing?



Patterns of cannabis use

International Journal of Drug Policy 105 (2022) 103716



Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo



Research Paper

Trends in the use of cannabis products in Canada and the USA, 2018 – 2020: Findings from the International Cannabis Policy Study



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ARTICLE INFO

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Cannabis
Consumption
Canada
USA
Marijuana
Substance policy

ABSTRACT

Background and Aims: There is little information on consumption patterns across the diverse range of cannabis product types. This paper examines trends in consumption patterns in Canada and the United States (US) between 2018–2020.

Design: Repeat cross-sectional surveys were conducted as part of the International Cannabis Policy Study online survey in 2018 (n=27,024), 2019 (n=45,426), and 2020 (n=45,180).

Setting: Respondents were recruited from commercial panels in Canada and US states that had and had not legalized non-medical cannabis (US 'legal' and 'illegal' states, respectively).

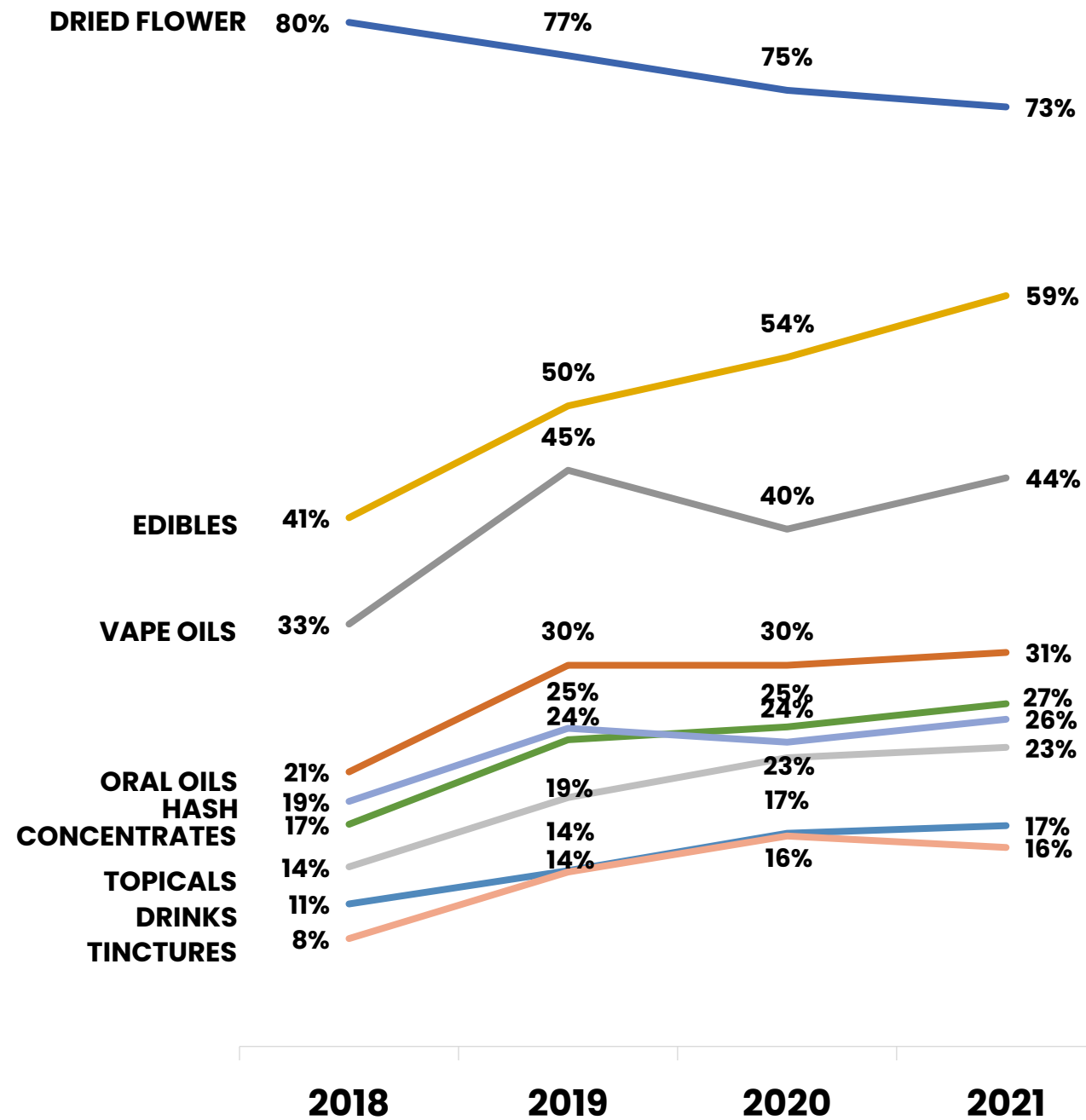
Participants: Respondents were male and female participants aged 16–65 years.

Measurements: Data on frequency and consumption amounts were collected for nine types of cannabis products, including dried flower and processed products (e.g., oils and concentrates). Consumers were also asked about mixing cannabis with tobacco. Socio-demographic information was collected.

Product use

PAST 12-MONTH CONSUMERS

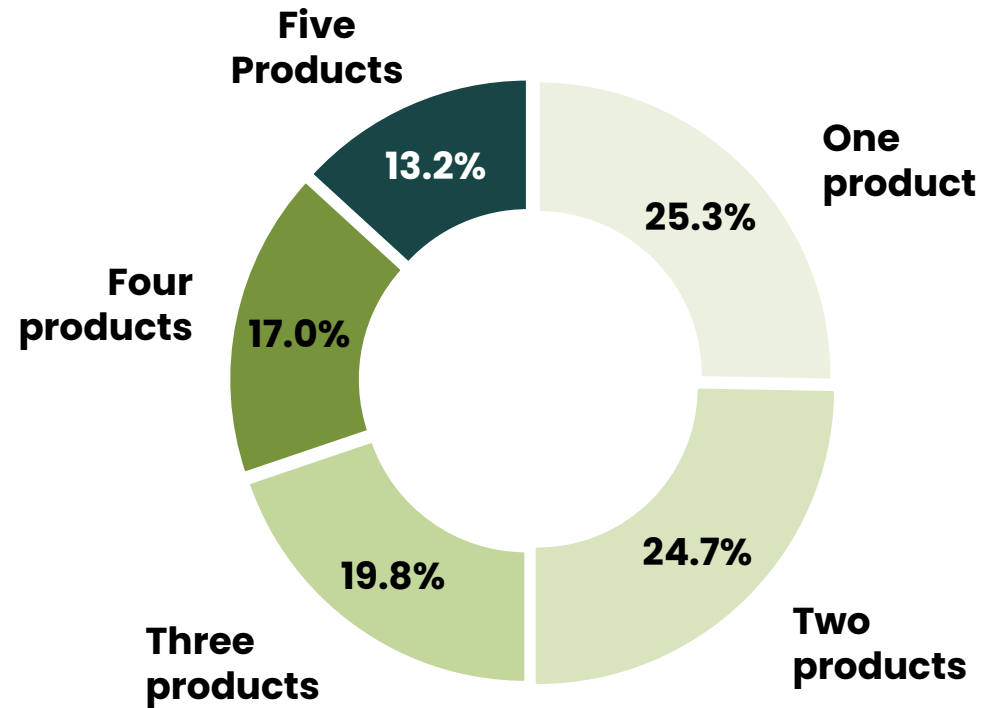
ALL US, 2021 n=107,572



Most consumers use more than one type of product.

Number of products used

U.S. PAST 12-MONTH CONSUMERS, 2021 (N=10,154)

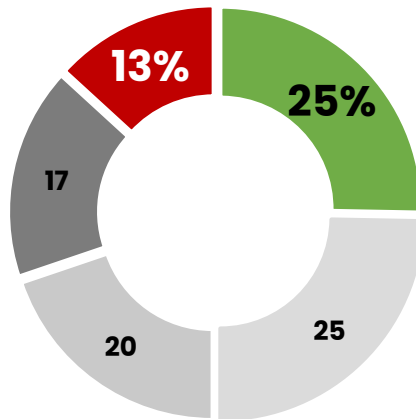


US consumers report more poly product use than in other countries.

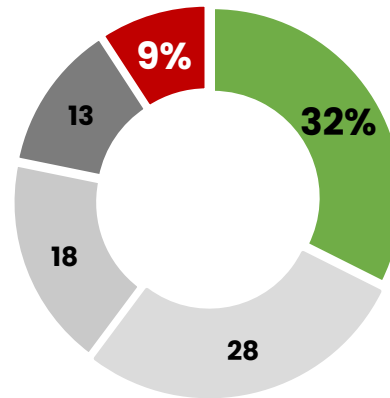
Number of products used

US PAST 12-MONTH CONSUMERS, 2021

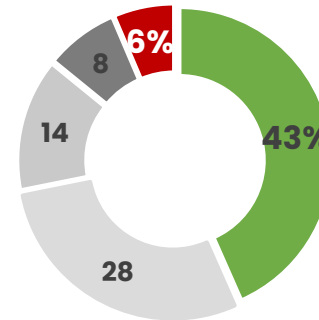
UNITED STATES



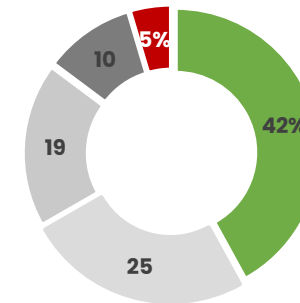
CANADA



NEW ZEALAND



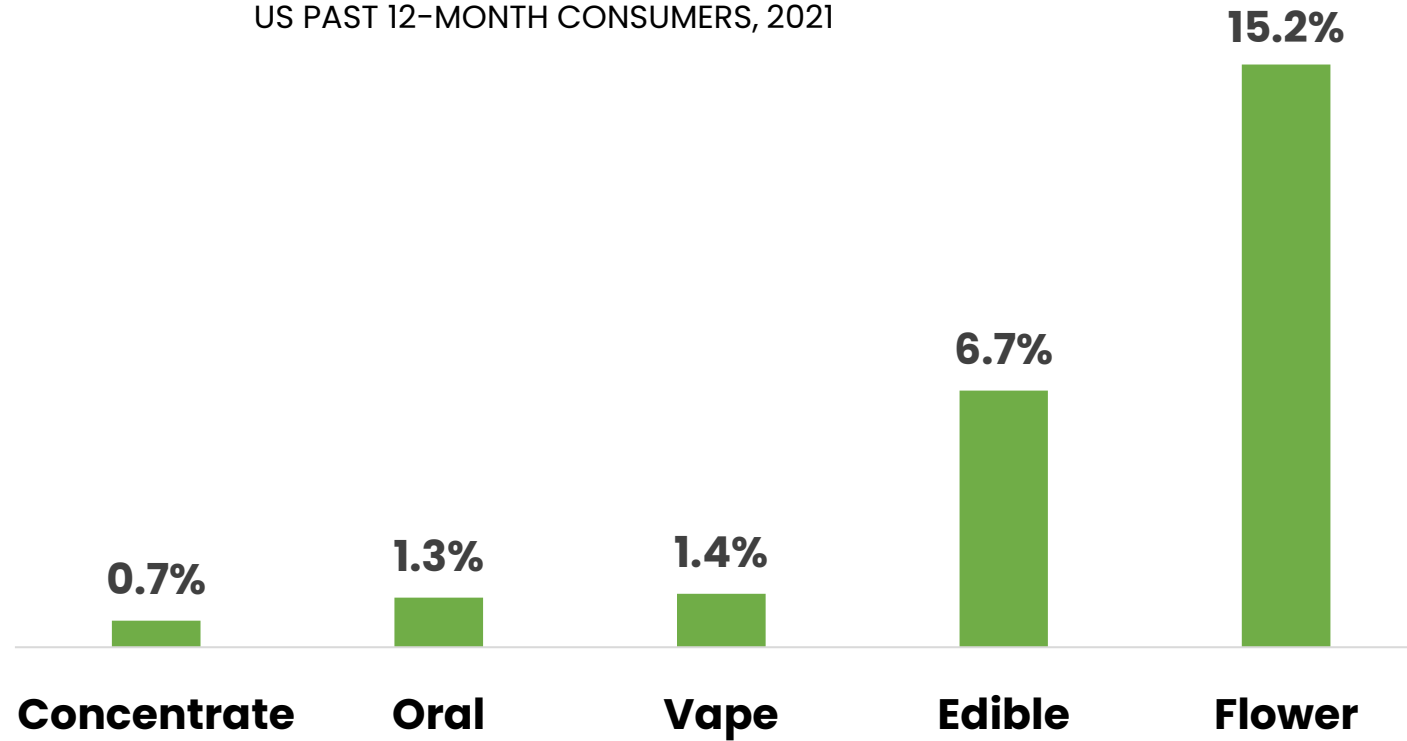
AUSTRALIA



Exclusive use of 'extracts' is very rare.

**Percentage of consumers that
exclusively use each product**

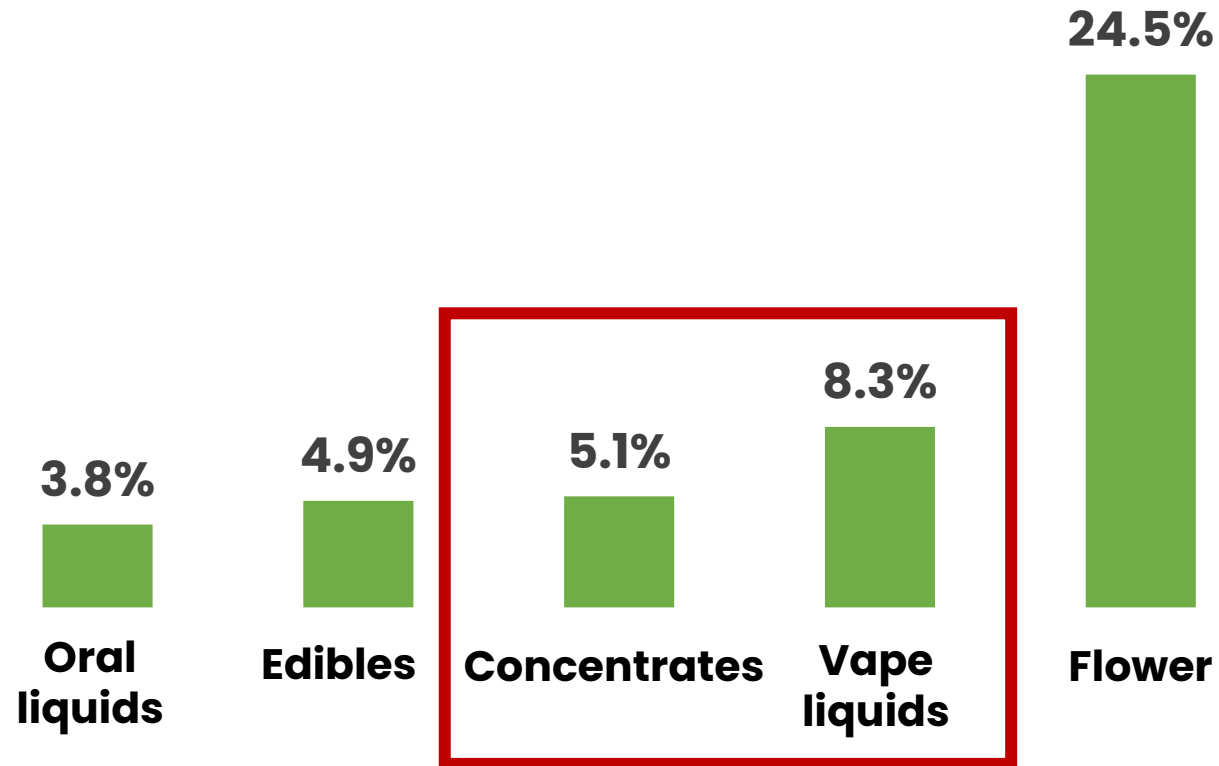
US PAST 12-MONTH CONSUMERS, 2021



Edibles are popular, but used less often.

Prevalence of daily use

AMONG PAST 12-MONTH CONSUMERS IN US, 2021 =10,361



Little data on consumption amounts.

**Usual amount (g) of dried flower
consumed per day, on days used**

2020 AMONG DRIED FLOWER CONSUMERS IN PAST 12 MONTHS, N=6,671

All consumers 1.4 g

<Monthly 0.7 g

Weekly 1.0 g

Monthly 1.1 g

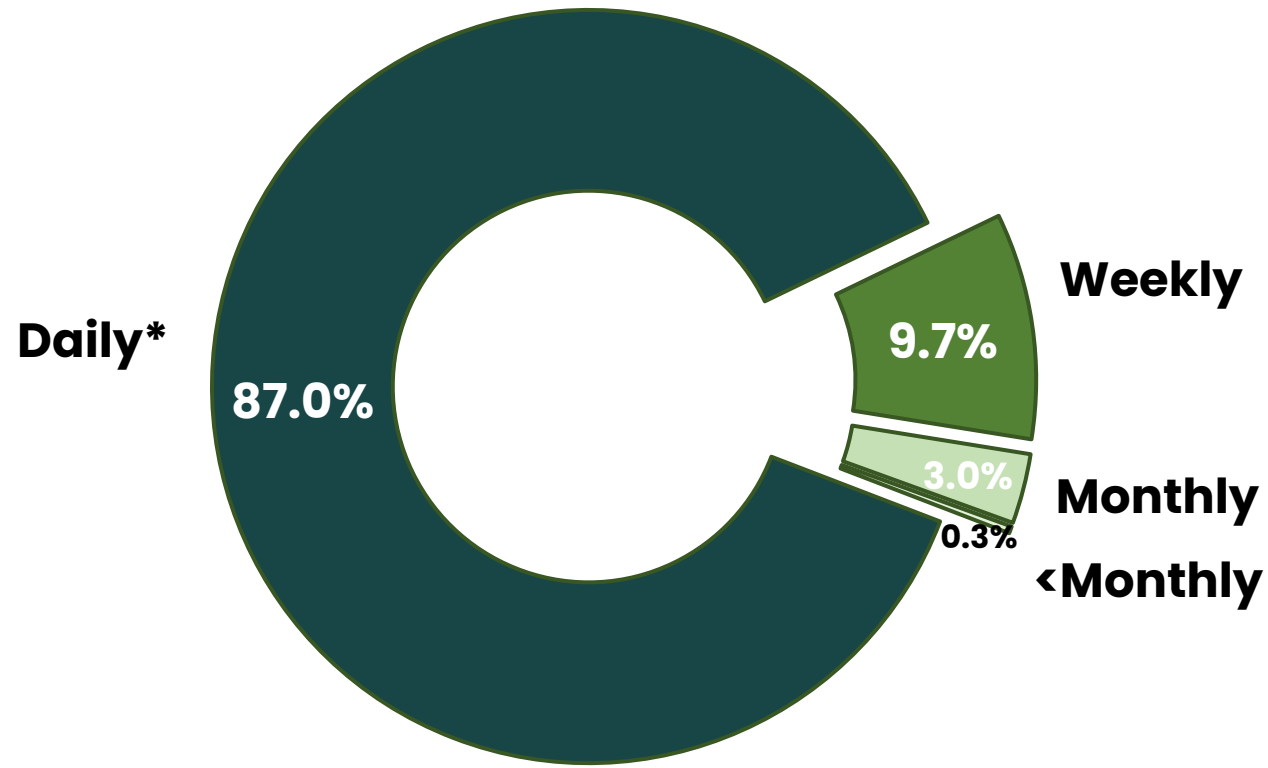
Daily* 2.0 g

* ≥5 days / week

Daily consumers account for vast majority of consumption.

Percentage of all dried flower consumption – By frequency of use

2020 AMONG CONSUMERS IN PAST 12 MONTHS, N=6,671



* ≥5 days / week

Little data on consumption amounts for products other than dried flower.

Usual daily consumption of 'solid concentrates', on days used

2020 AMONG CONSUMERS IN PAST 12 MONTHS, N=1,453



1.2 grams
ON DAYS USED

Summary 1.0

- **Wide diversity of products**
- **'Poly' product use is the norm**
- **Steady 'shift' towards extracts**
- **Consumption data lacking**





How do product trends differ by legal status?



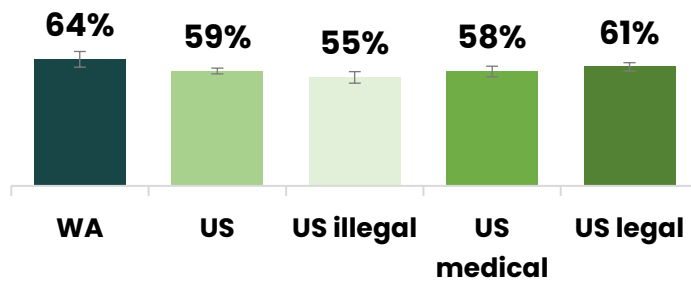
Differences between jurisdictions have narrowed over time.

Use among past 12-month consumers

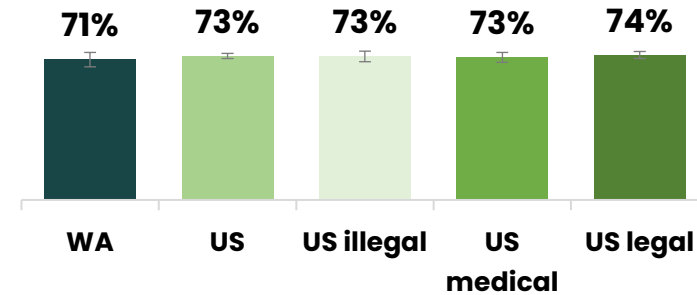
% USED IN PAST 21-MONTHS, 2021



Edibles



Dried herb



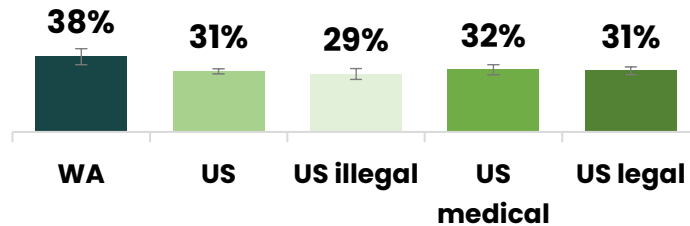
Differences between jurisdictions have narrowed over time.

Use among past 12-month consumers

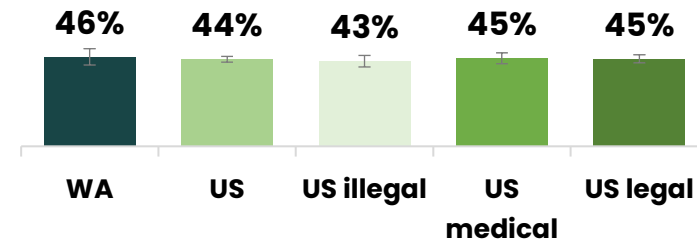
% USED IN PAST 21-MONTHS, 2021



Drops or capsules



Vape oils



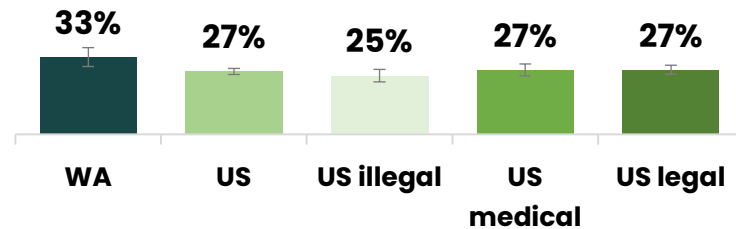
Differences between jurisdictions have narrowed over time.

Use among past 12-month consumers

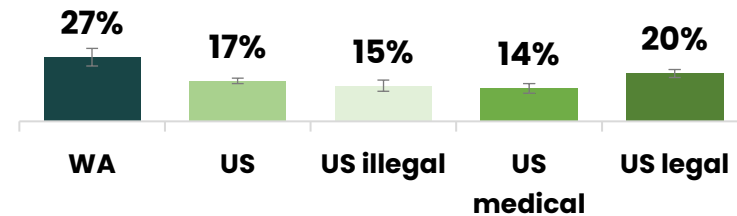
% USED IN PAST 21-MONTHS, 2021



Solid concentrates



Drinks





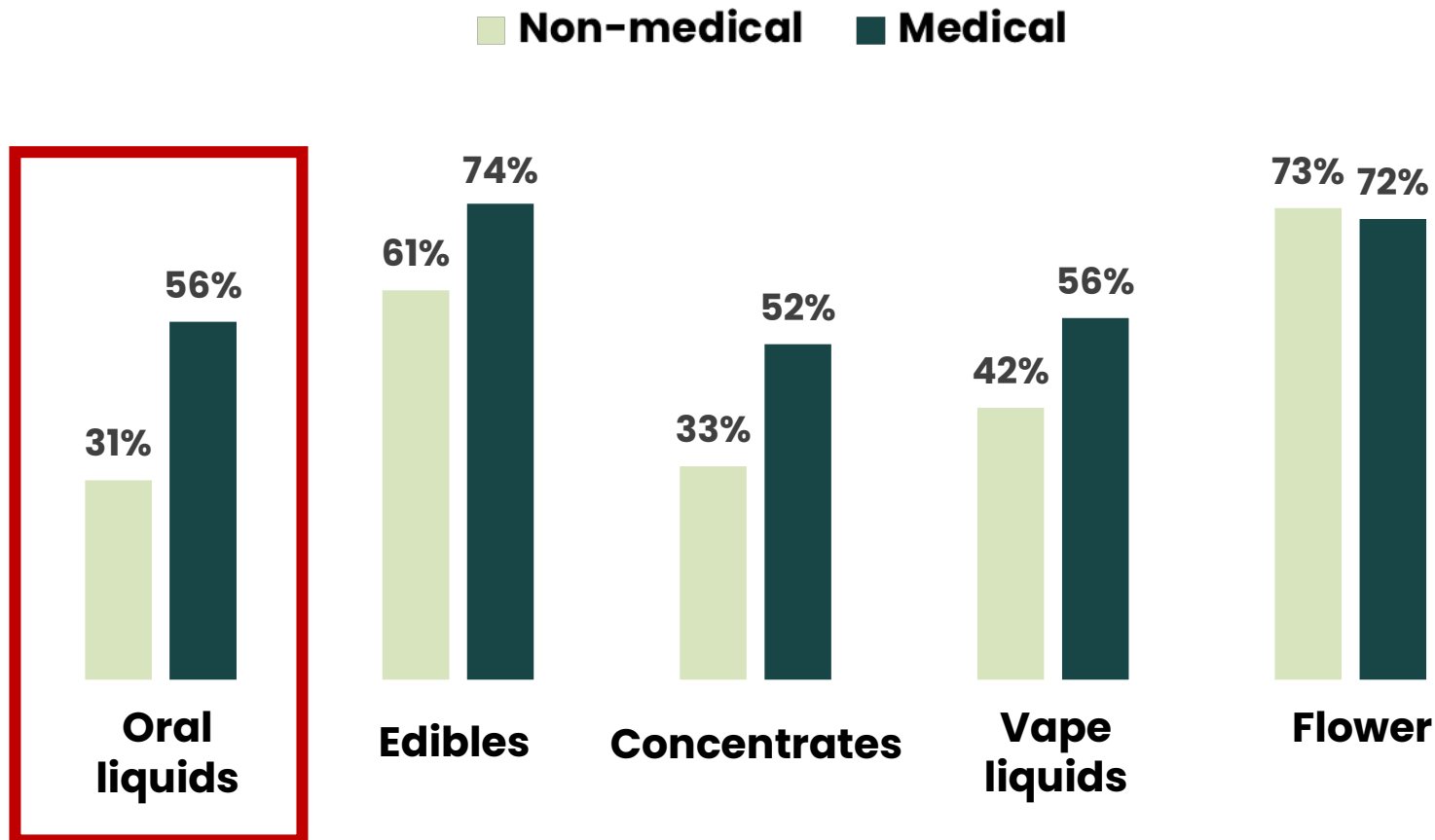
Who is using each product type?



Medical consumers more likely to use 'extracts'.

Cannabis products used in past 12 months

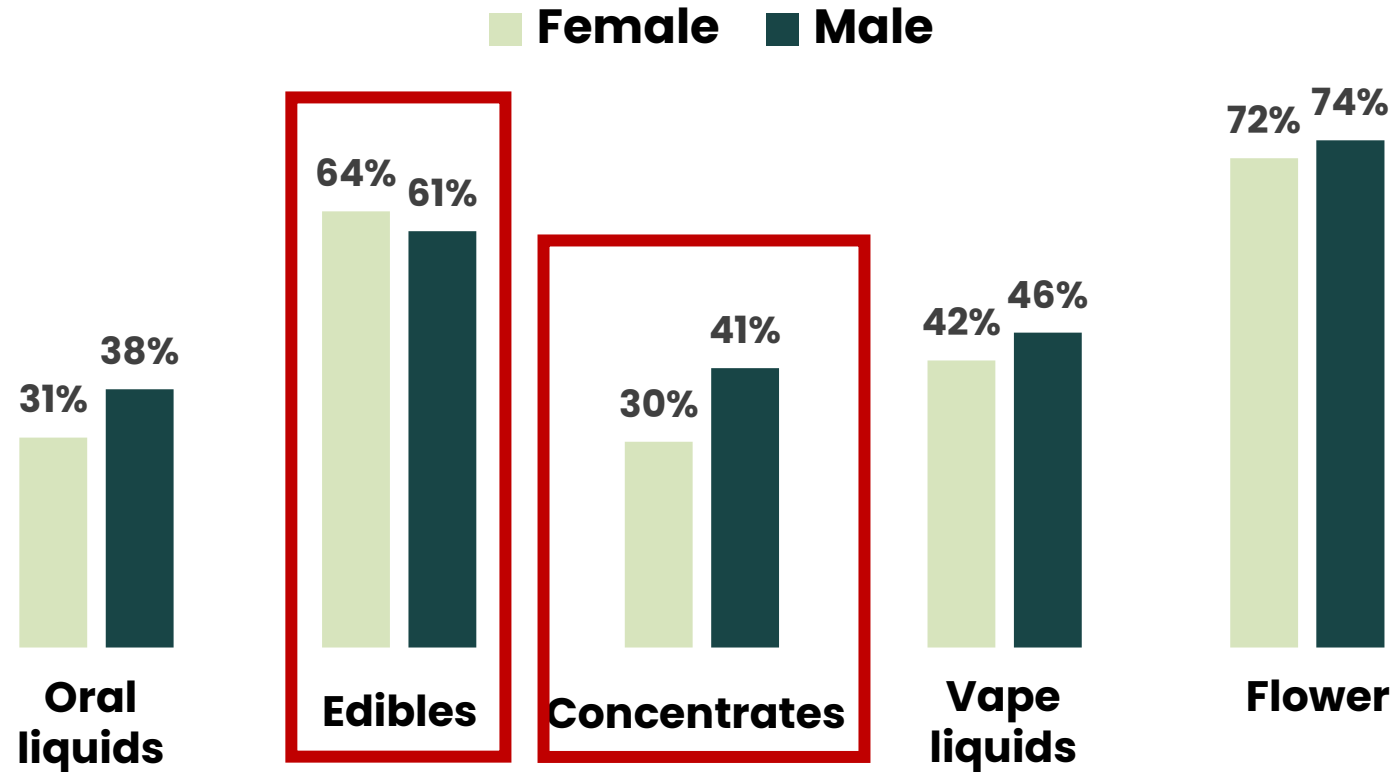
% USED IN PAST 12-MONTHS, AMONG PAST 12-MONTH CONSUMERS, 2021



Modest sex differences in product types.

Cannabis products used in past 12 months

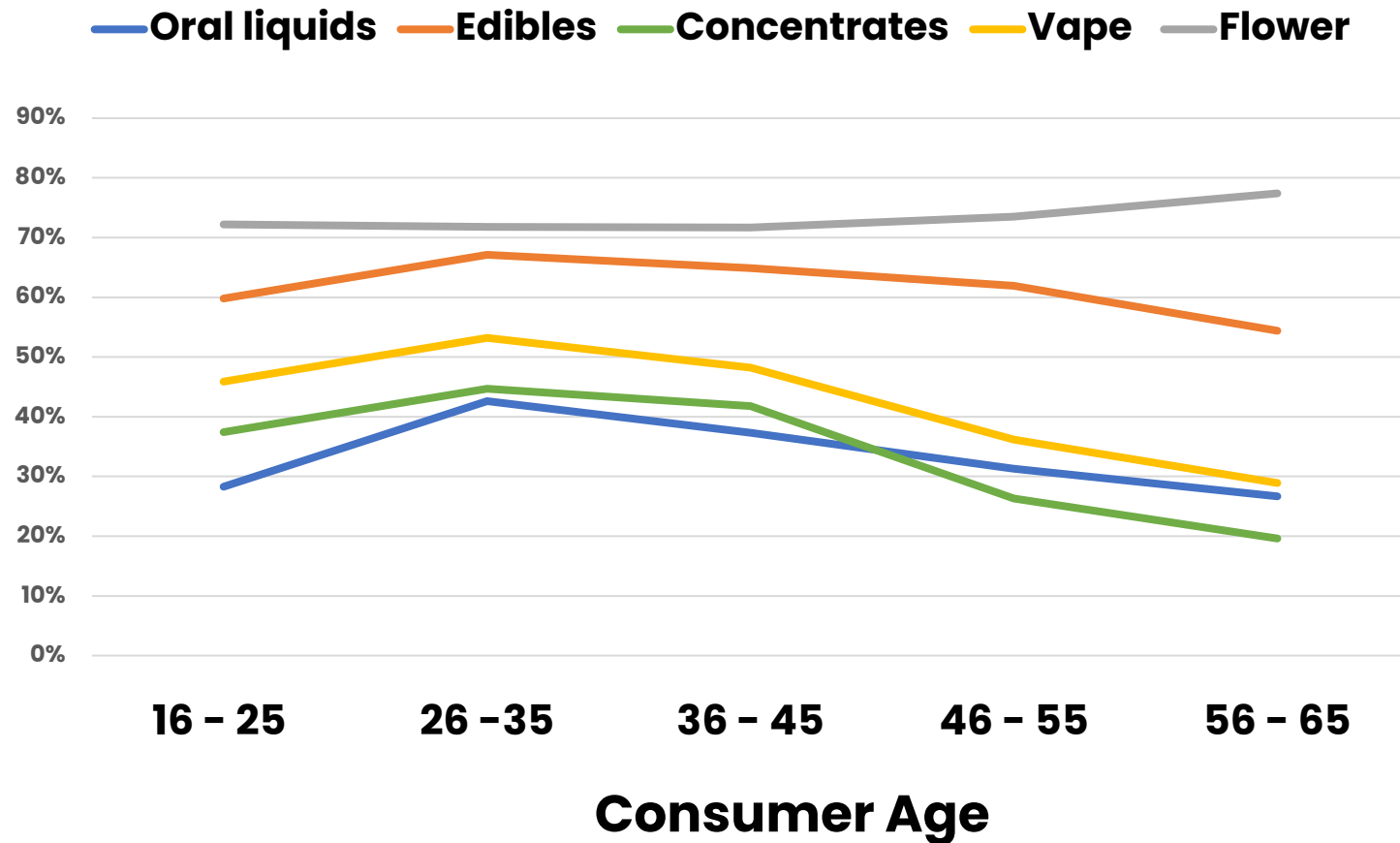
% USED IN PAST 12-MONTHS, AMONG PAST 12-MONTH CONSUMERS, 2021



'Extracts' more popular among younger consumers.

Cannabis products used in past 12 months

% USED IN PAST 12-MONTHS, AMONG PAST 12-MONTH CONSUMERS, 2021





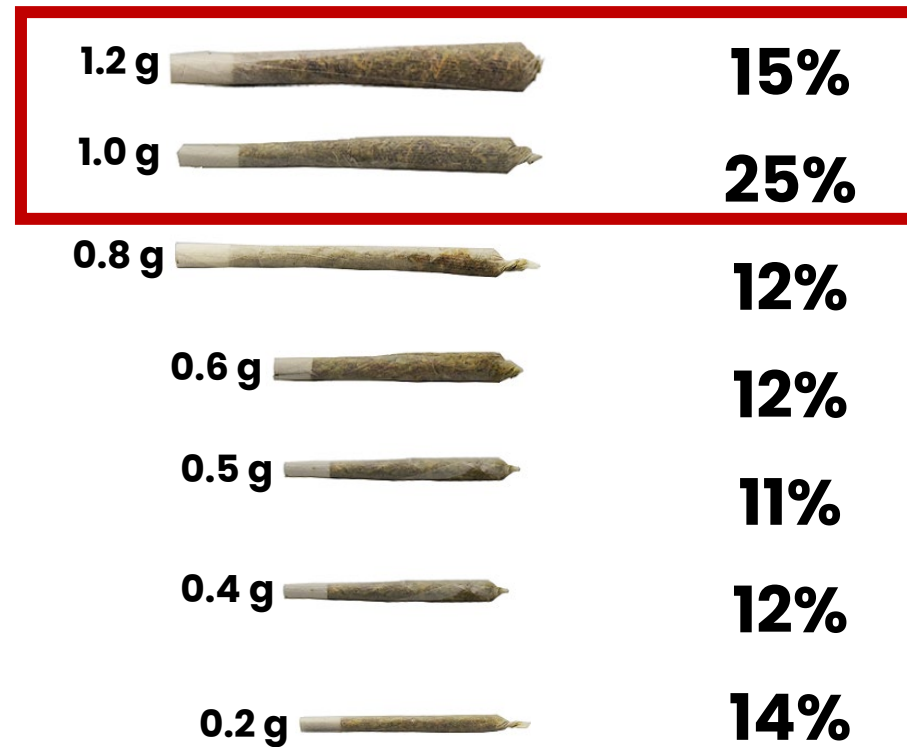
Recent trends in product use



Joints are getting bigger...

Choose the joint closest to the size you normally smoke

PAST 12-MONTH DRIED FLOWER CONSUMERS WHO REPORTED IN JOINTS 2021 (n=4,869)



Increase in 'processed' flower products.



34% flower bought as pre-
roll at 'last purchase'



Illegal: 25%

Medical: 26%

Adult legal: 38%

The last time you bought dried herb, was it a pre-rolled joint (i.e., rolled into a joint before purchase)?

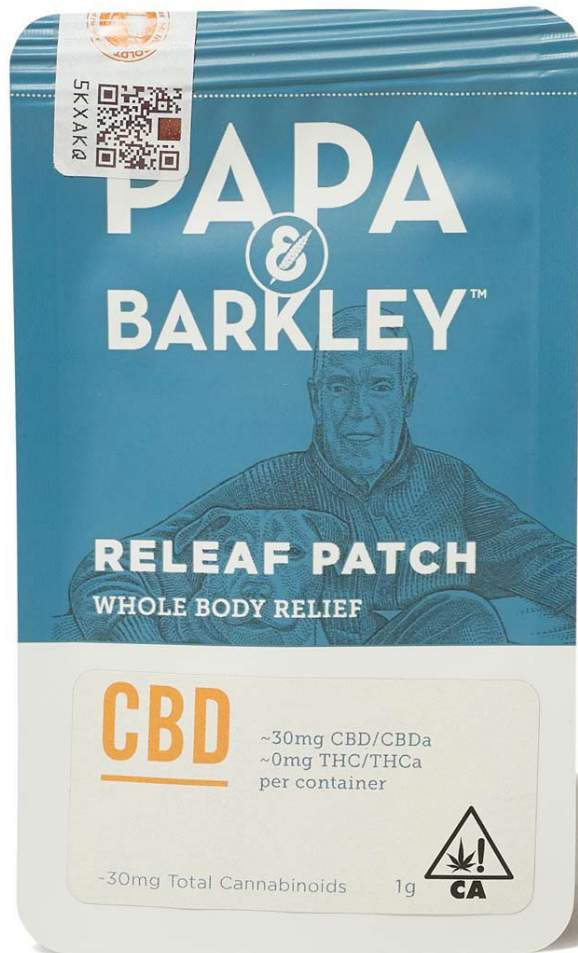
2021, CONSUMERS THAT PURCHASED FLOWER IN PAST 12-MONTHS N=5,626

25% pre-rolls at last purchase
that were 'infused' products



**Dried herb dipped in high-potency oil or
mixed with concentrate (e.g., moonrockets)**

2021, AMONG PURCHASERS OF DRIED FLOWER IN PAST 12-MONTHS N=432



**Use of 'CBD only'
products is prevalent.**

27.7%

USE IN PAST 12-MONTHS

2021, N=29,927

Delta-8 THC

TRY DELTA 8 TODAY

Best D8 & D9 in the industry

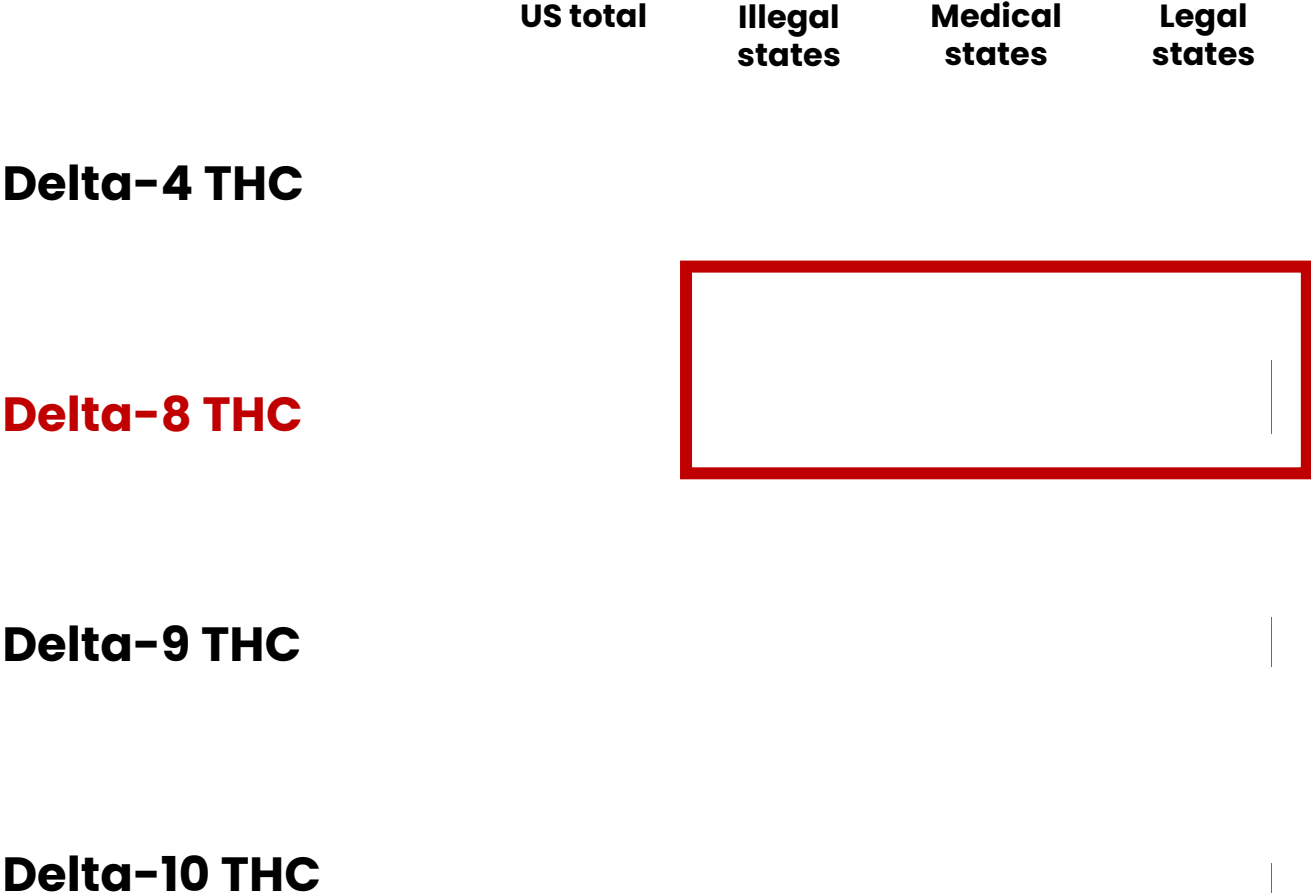


20LIFE

20% discount - Farm bill compliant

THC is responsible for the “high” in marijuana.
Have you heard of products that contain the following?

% 'YES', ALL RESPONDENTS, 2021, n=30,081





3%

**of all respondents report 'ever'
using a Delta-8 THC product**

Have you ever used a DELTA-8 THC product?

ALL RESPONDENTS, 2021, n=3,645



Adverse events from cannabis products





ADVERSE EVENTS

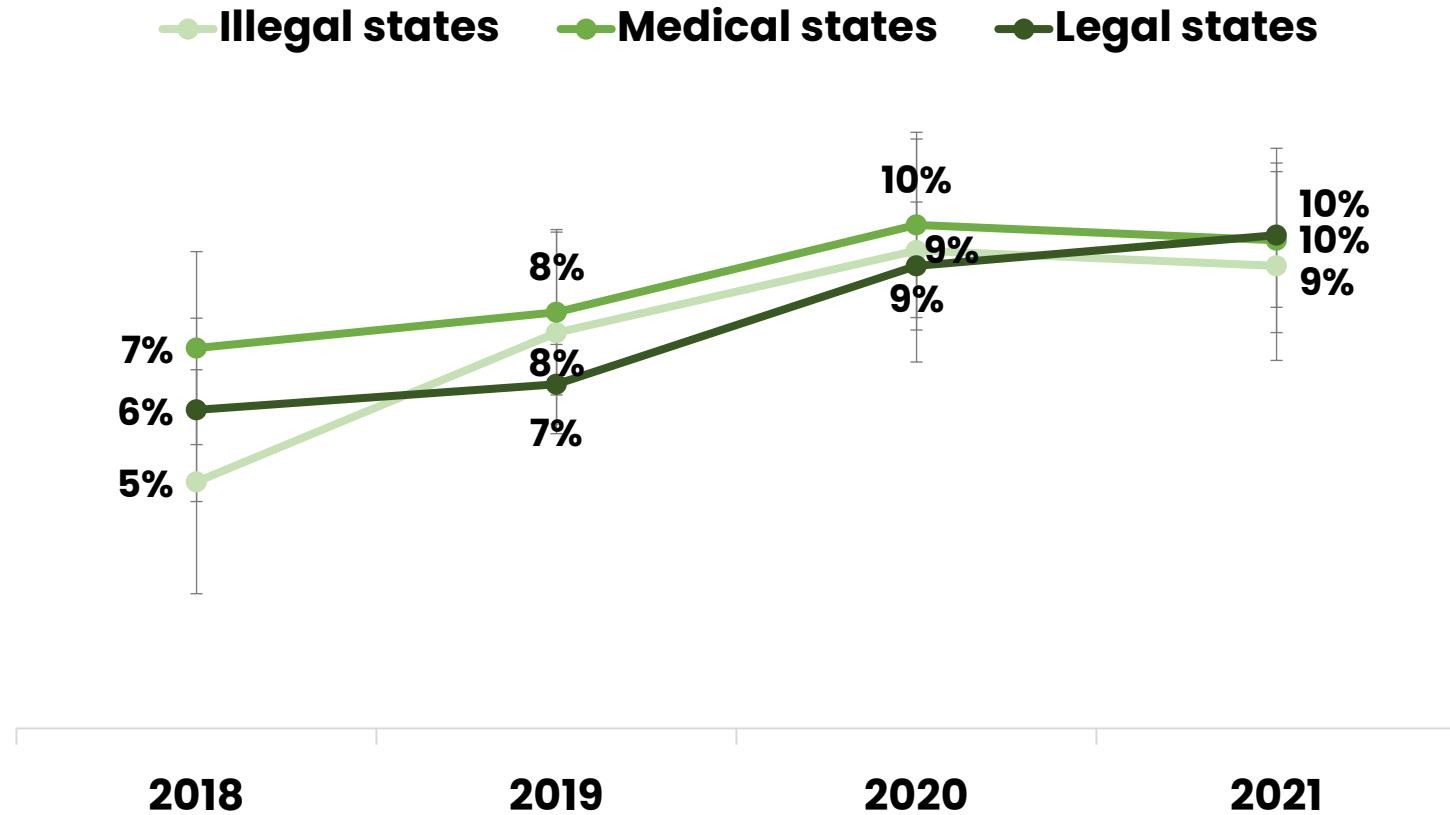
Population-based self report vs. administrative health care data

Adverse events from cannabis use are commonly reported.

30.8% reported an adverse event in past 12 months

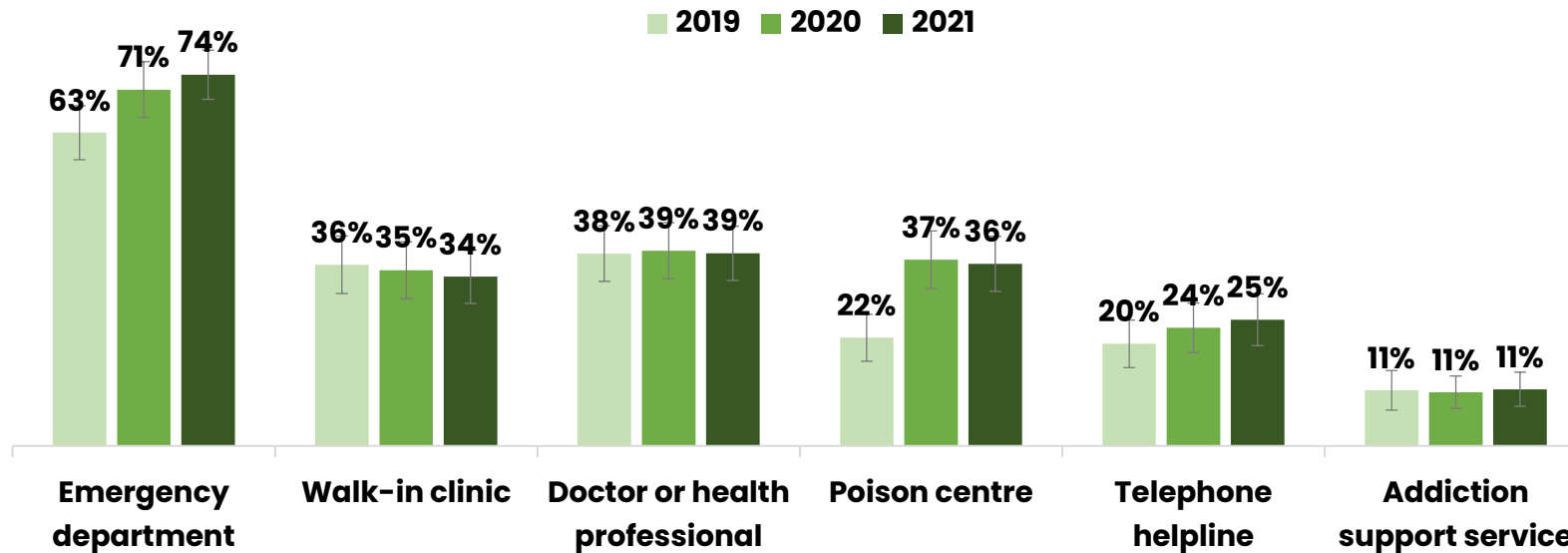
In the past 12 months, has anyone in your household **accidentally consumed** marijuana?

% 'YES' PAST 12-MONTH CONSUMERS, N=33,999



Adverse events from cannabis use are commonly reported.

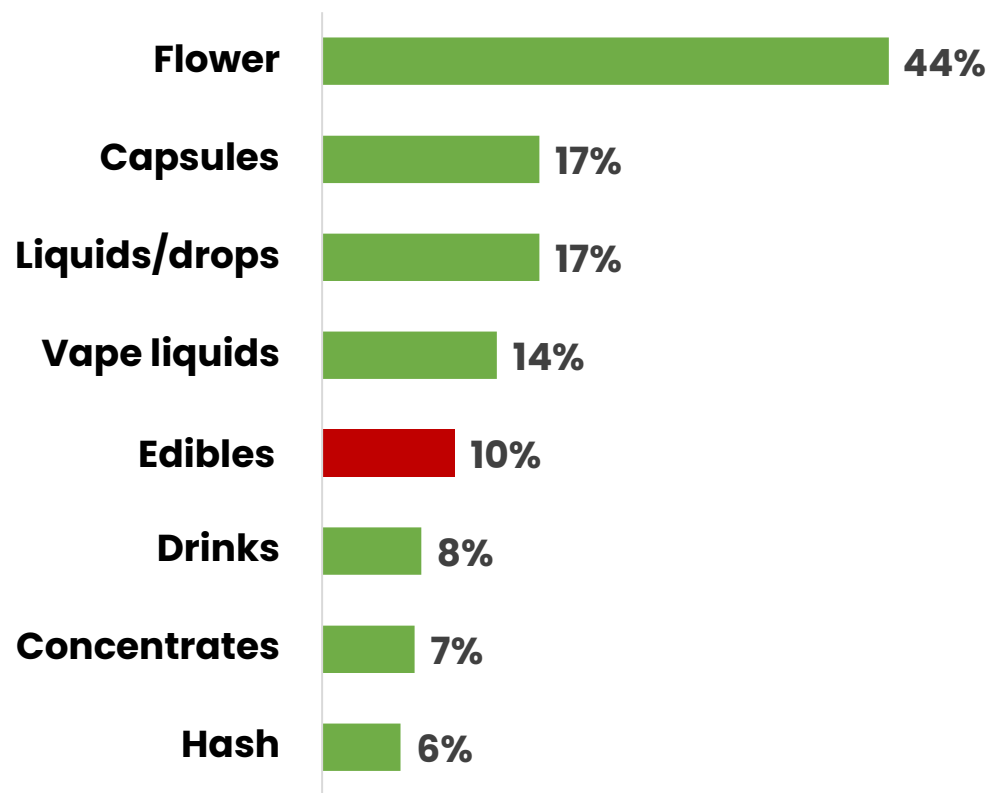
Sources of assistance among consumers who sought medical help for adverse effects
AMONG THOSE WHO SOUGHT MEDICAL HELP



Most adverse events are NOT from edibles.

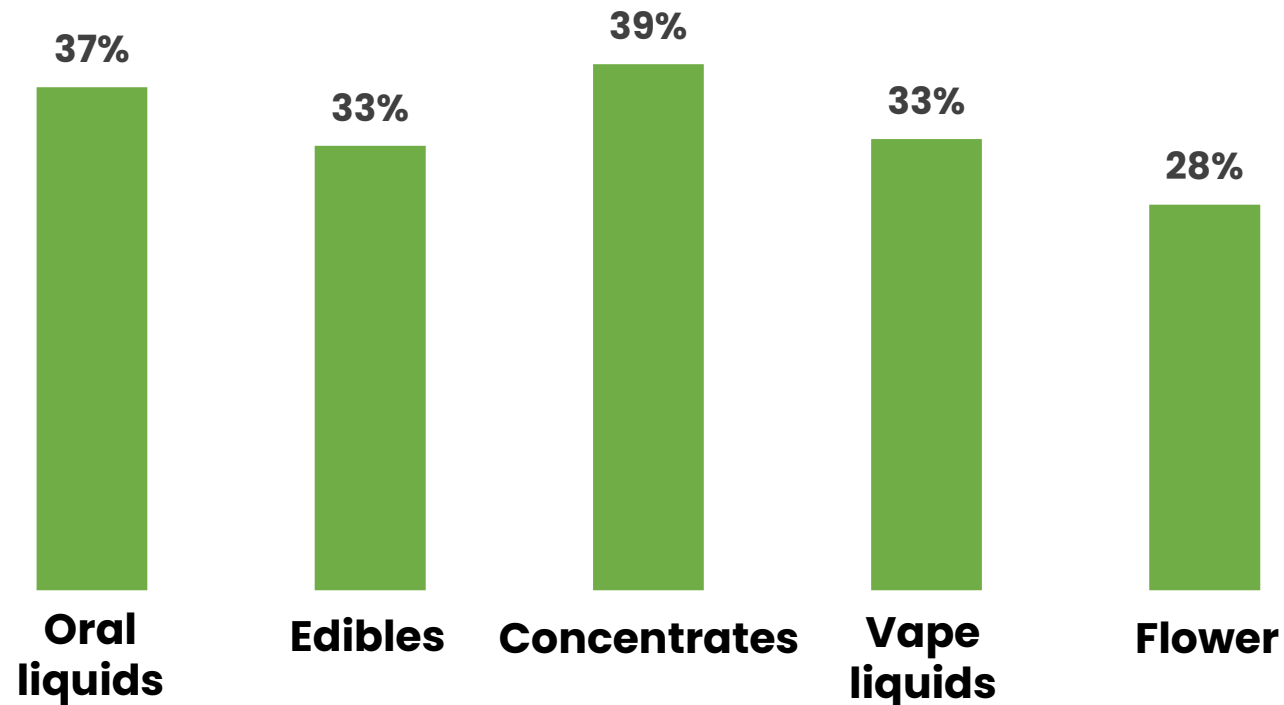
**When you experienced the negative health effects,
what type or form of marijuana were you using?**

AMONG THOSE WHO REPORTED ADVERSE EVENT IN PAST 12-MONTHS



Similar likelihood of adverse events across users of each product type.

Percentage of consumers who report experience adverse events – by product used
% REPORTING ADVERSE EVENT IN PAST 12-MONTHS





Consumer 'THC literacy' is low.



Do you consider this a **marijuana product**?

% 'YES', ALL RESPONDENTS ASSIGNED TO THIS EXPERIMENT, n=1,457



65%



46%



74%

Can this product **get someone 'high'**?

% 'YES', ALL RESPONDENTS ASSIGNED TO THIS EXPERIMENT, n=1,457



42%

12%

41%

Do you know the amount/number of THC of the dried herb you used last?

% 'YES

All consumers	25%
◀ Monthly	12%
Monthly	26%
Weekly	26%
Daily	31%



What are the THC levels in the dried herb you usually use?

UNIVERSE: DRIED HERB USERS WHO REPORTED KNOWING THC, 2020 (N=1469)

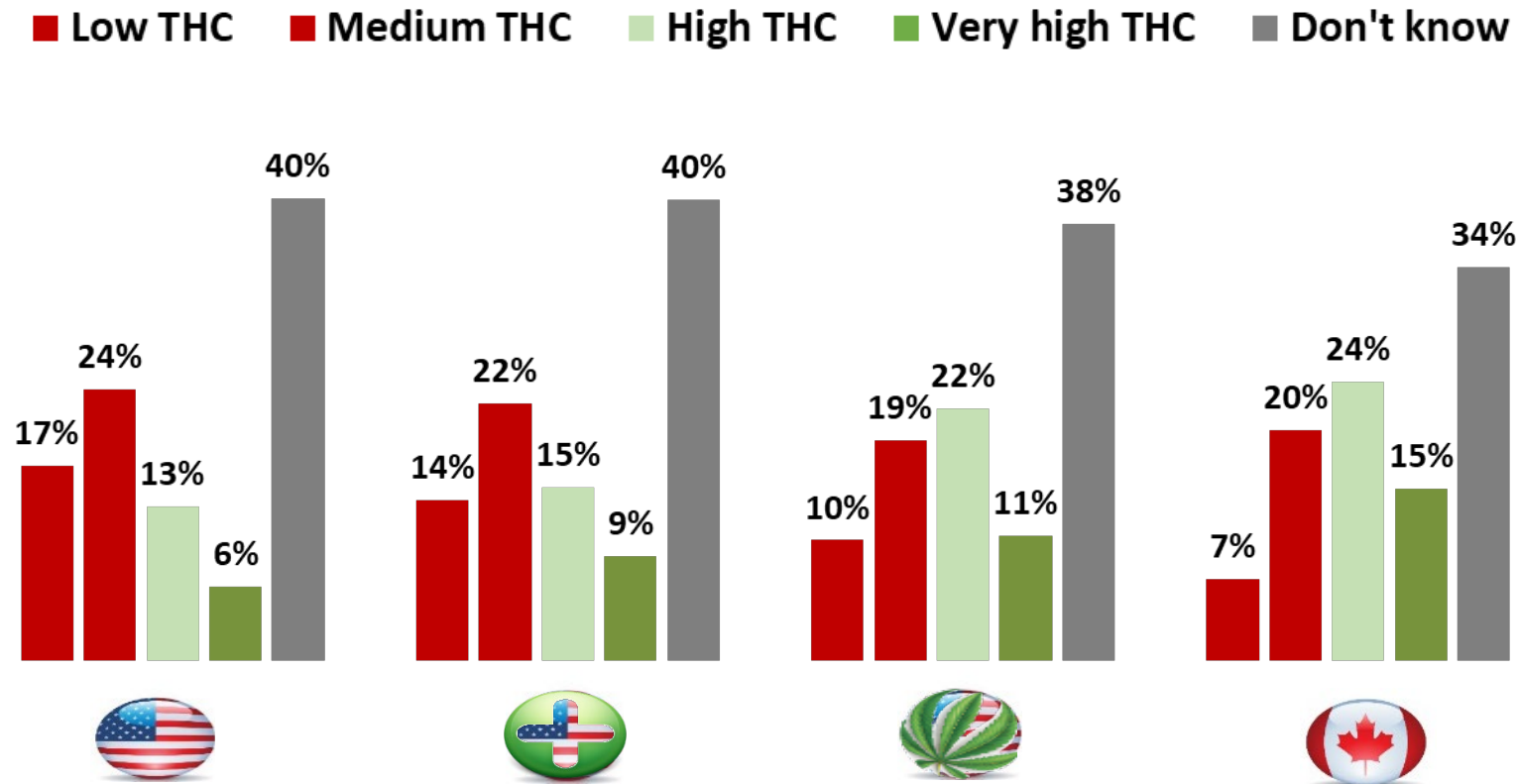
38% THC

◀Monthly	38%
Monthly	40%
Weekly	36%
Daily	37%



Is 30% THC a low, medium, high amount for dried herb?

UNIVERSE: PAST 12-MONTH CANNABIS CONSUMERS 2020, n=13,540



Standard THC units

ADDICTION OPINION AND DEBATE

doi:10.1111/add.14842

‘Standard THC units’: a proposal to standardize dose across all cannabis products and methods of administration

Tom P. Freeman^{1,2,3}  & Valentina Lorenzetti⁴ 

Addiction and Mental Health Group (AIM), Department of Psychology, University of Bath, Bath, UK,¹ National Addiction Centre, King's College London, London, UK,² Clinical Psychopharmacology Unit, University College London, London, UK³ and School of Behavioural and Health Sciences, Australian Catholic University, Fitzroy, VIC, Australia⁴

ABSTRACT

Background and Aims Cannabis products are becoming increasingly diverse, and vary considerably in concentrations of Δ^9 -tetrahydrocannabinol (THC) and cannabidiol (CBD). Higher doses of THC can increase the risk of harm from cannabis, while CBD may partially offset some of these effects. Lower Risk Cannabis Use Guidelines currently lack recommendations based on quantity of use, and could be improved by implementing standard units. However, there is currently no consensus on how units should be measured or standardized among different cannabis products or methods of administration.

Argument Existing proposals for standard cannabis units have been based on specific methods of administration (e.g. joints) and these may not capture other methods, including pipes, bong, blunts, dabbing, vaporizers, vape pens, edibles

Would standard amounts or serving sizes of THC help people decide how much of an edible to consume?

ALL US RESPONDENTS 2020, n=29,742

Should packaging for other cannabis products display standard amounts or serving sizes of THC?

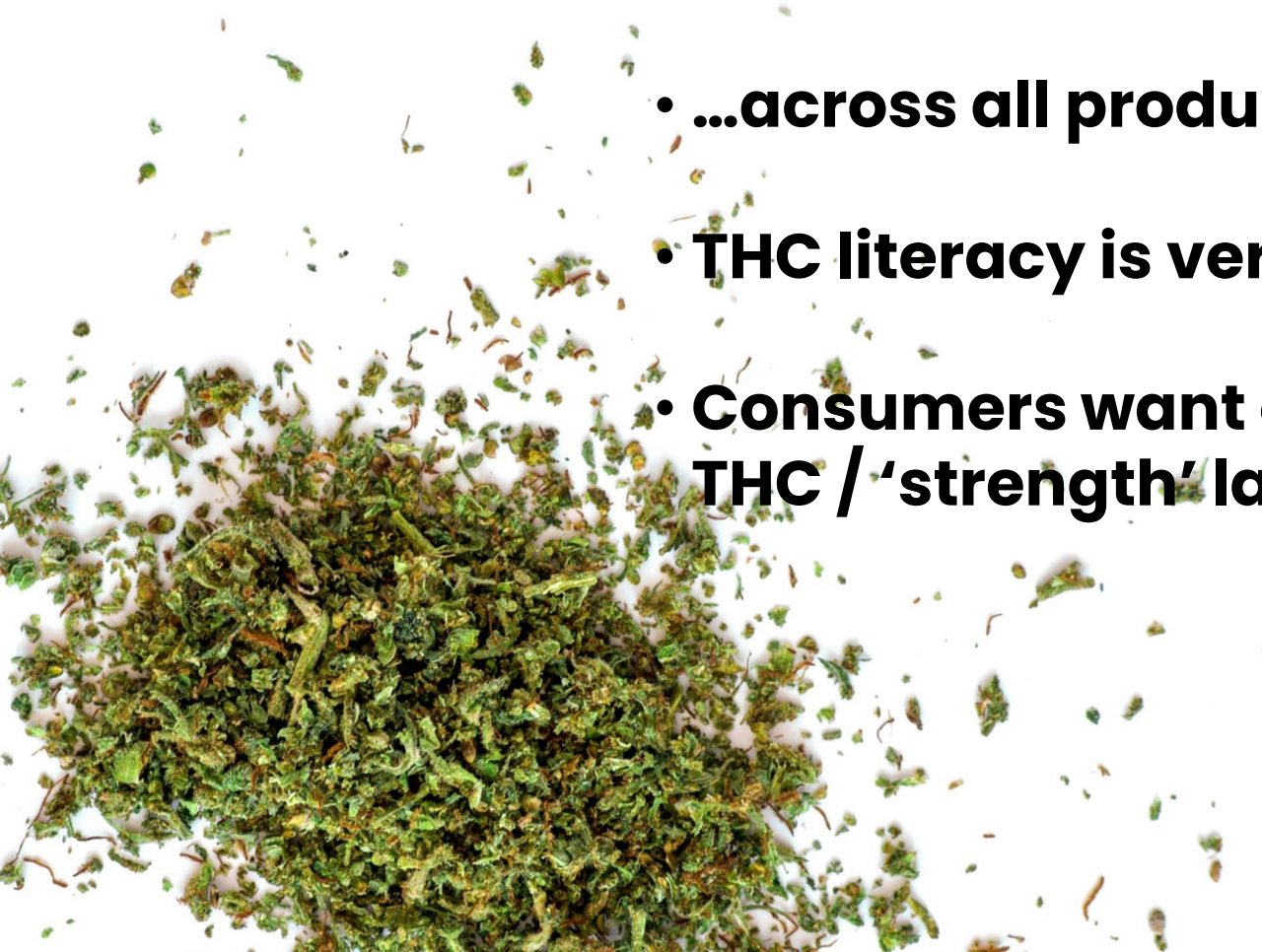
ALL US RESPONDENTS 2020, n=29,711

Yes	69%
No	11%
Don't know	20%

Consumers: 76% "Yes"

Summary 2.0

- **Adverse events are common**
- **...across all product forms**
- **THC literacy is very low**
- **Consumers want easy to understand THC / 'strength' labelling**





Product labelling & health warnings



To what extent do consumers notice & use health warnings?



IMAGE SOURCE: <https://thcaffiliates.com/b2b/cannabis-packaging/>

Exposure to health warnings

Noticing cannabis health warnings on packages

AMONG PAST 12-MONTH CONSUMERS

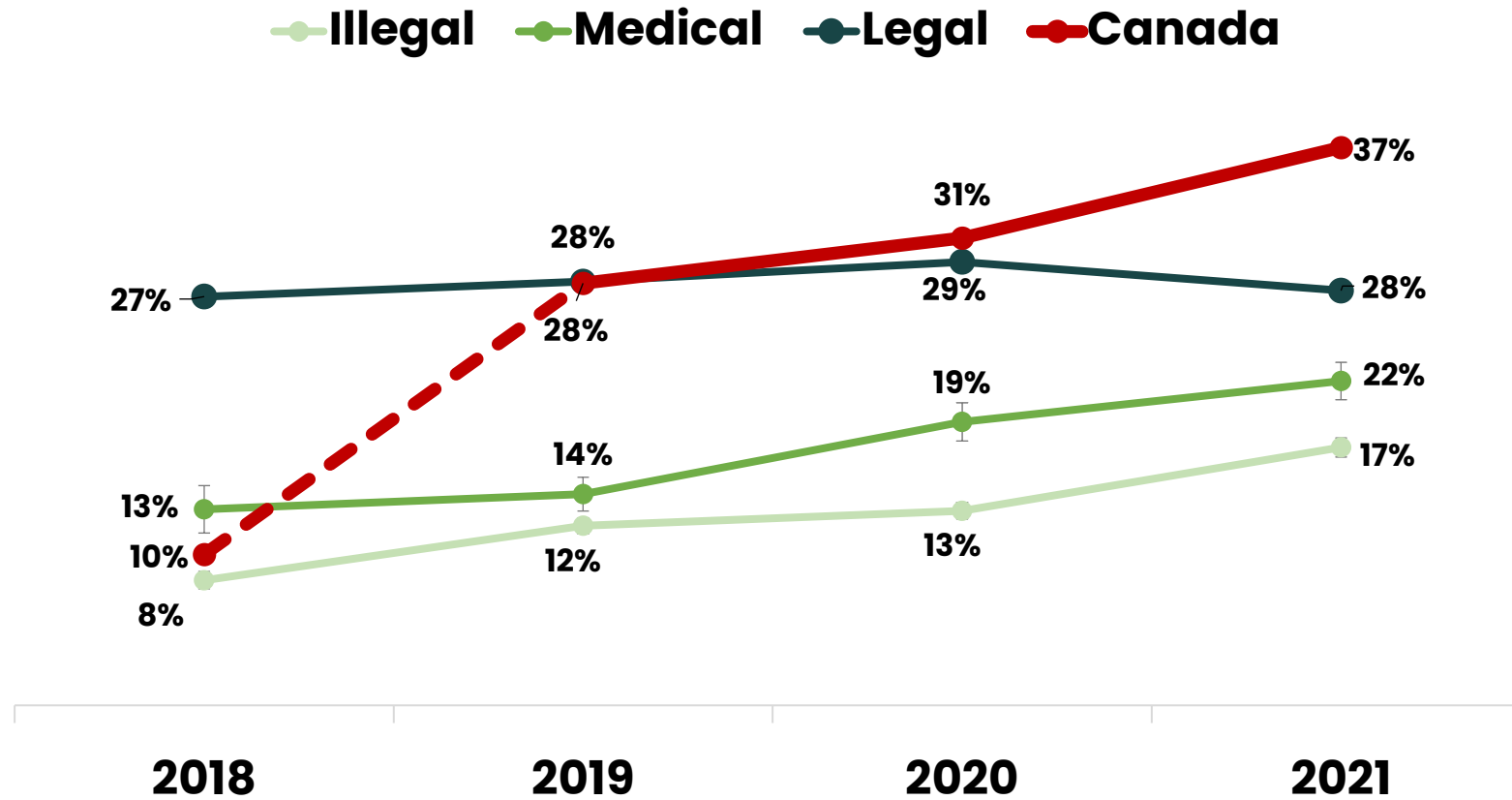


CANADA

More comprehensive health warnings and labelling regulations than any US state.

In the past 12 months, have you seen health warnings on marijuana products or packages?

AMONG PAST 12-MONTH CONSUMERS





Labelling regulations are associated with greater message recall.

Recall is highest among consumers who purchase from legal sources.

GOODMAN S, LEOS-TORO C, HAMMOND D. DO MANDATORY HEALTH WARNING LABELS ON CONSUMER PRODUCTS INCREASE RECALL OF THE HEALTH RISKS OF CANNABIS? SUBSTANCE USE & MISUSE 2022; 57(4): 569-580.

HEALTH WARNING

Experimental studies



No warning



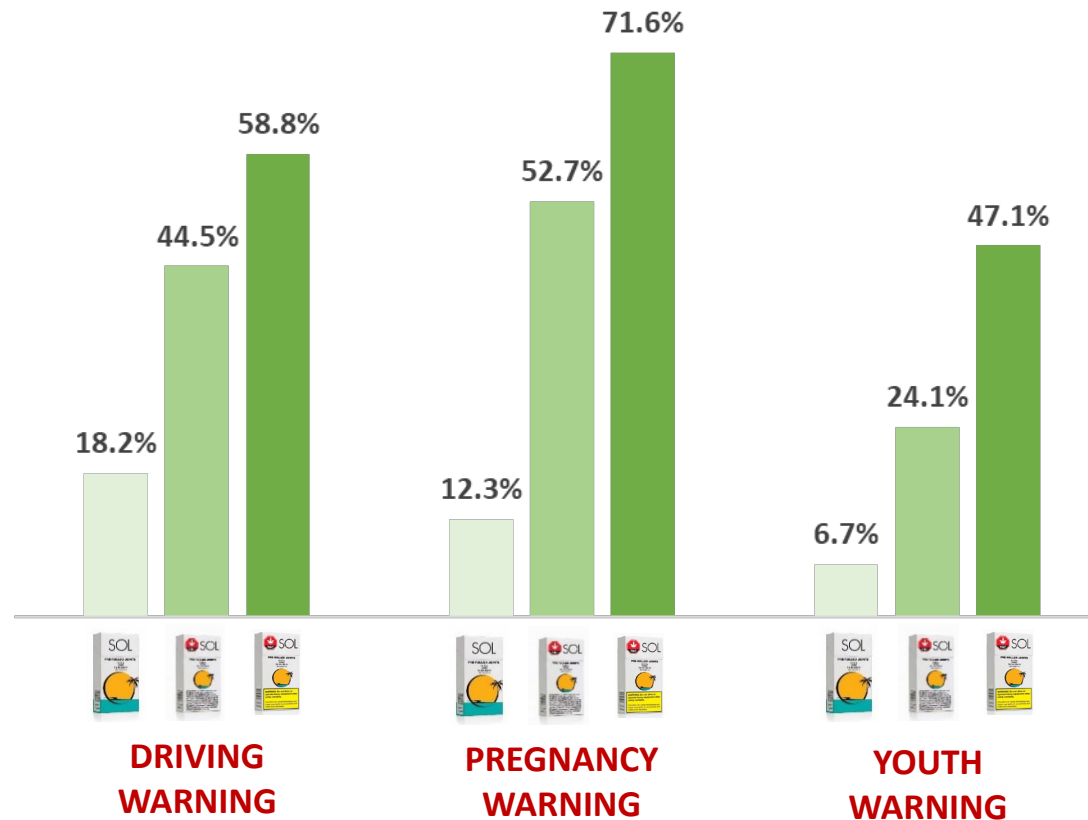
US states



Canada



EXPERIMENT

Canadian warning design increase message recall vs. US-style warnings.



Do you support or oppose government health warnings on marijuana products?

ALL RESPONDENTS 2021

		
Support	66%	59%
Neutral	28%	32%
Oppose	6%	9%

*Excluding 'Don't Know'

Limits on brand imagery reduce appeal and increase efficacy of health warnings.



COLORADO



CANADA

Summary 3.0

- **Mandated warnings are a low-cost, sustainable means of communicating with consumers.**
- **More comprehensive warnings are more effective.**
- **'Spill-over' effects into 'illegal' markets.**

REGULATIONS

Product standards



Product standards in legal market

Leafly.

World's largest THC-infused brownie weighs in at 850 pounds



20,000 mg of THC

Source: https://www.leafly.ca/news/industry/worlds-largest-thc-infused-brownie-weighs-in-at-850-pounds?utm_source=blast&utm_medium=email&utm_campaign=121121-soty-2021-can-sat

Quebec – Product standards

- No candy, dessert, chocolate or any other product attractive to persons under 21 years of age.
- THC limit of 30%, including concentrates



Restricted products



Search



products

learn about cannabis

about the sqdc

home / edibles

Edibles (1 Products)



Bouchées Cannelle et Cassis

Solei
Ready-to-eat

Cannabinoids
THC 2.5 mg/unit
CBD 5 mg/unit

Category
derived

Dominance



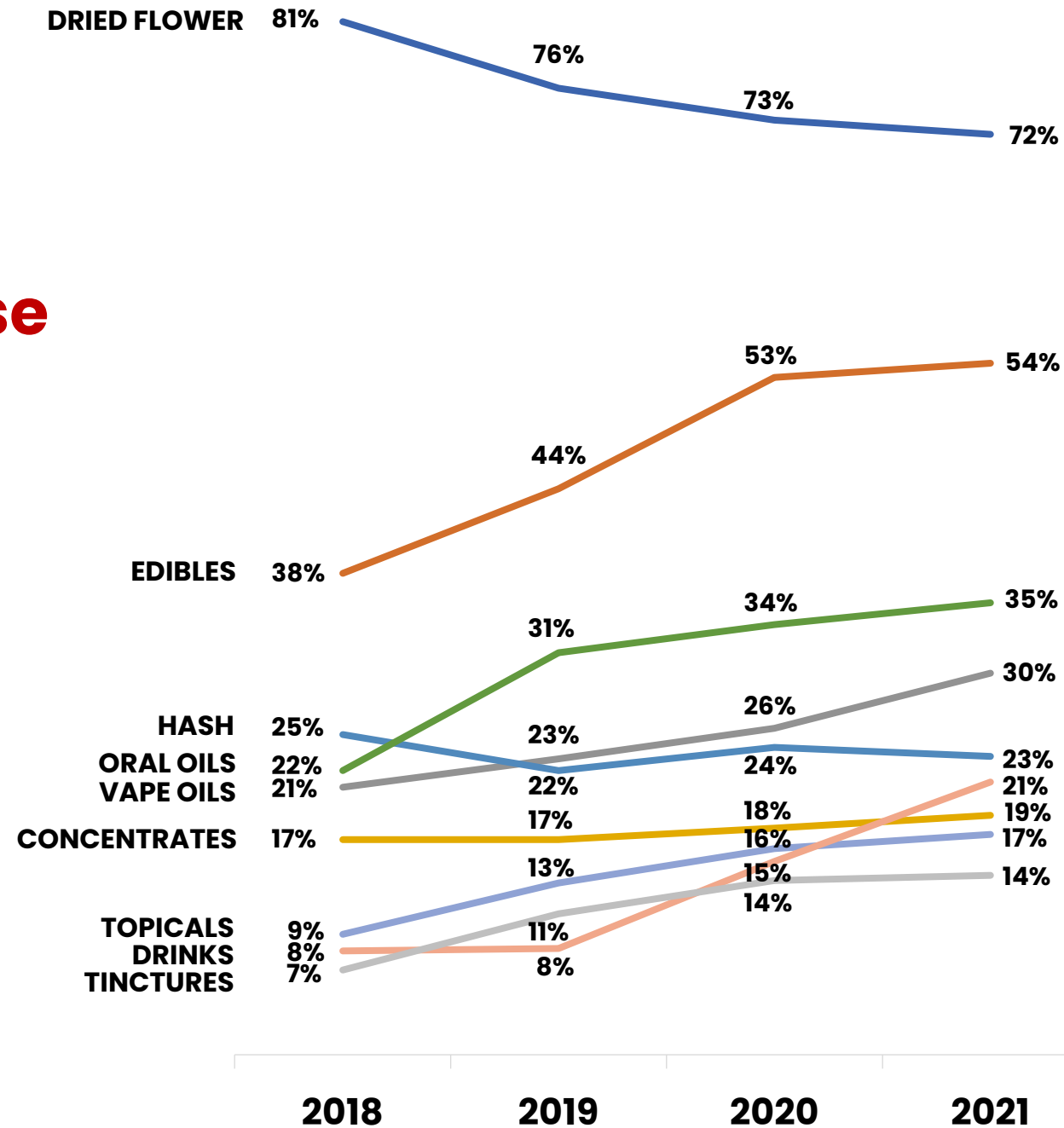
size

2 units



Product use CANADA

PAST 12-MONTH CONSUMERS



Product regulations

PRODUCT USE AMONG PAST 12-MONTH CONSUMERS 2021

QUEBEC 'LEGAL' SALES



Dried flower



Hash or kief

QUEBEC 'RESTRICTED' SALES



Edibles

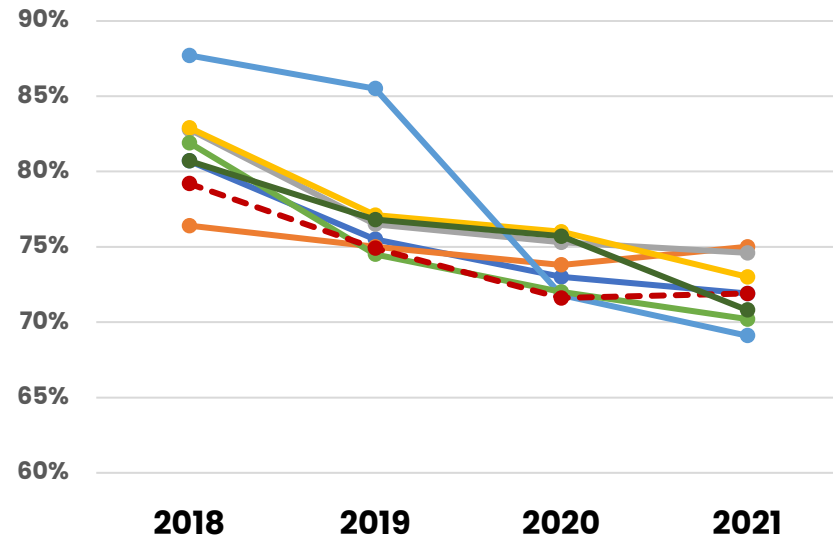


Vape oils

Similar trends for products legally available in Quebec vs. rest of Canada.

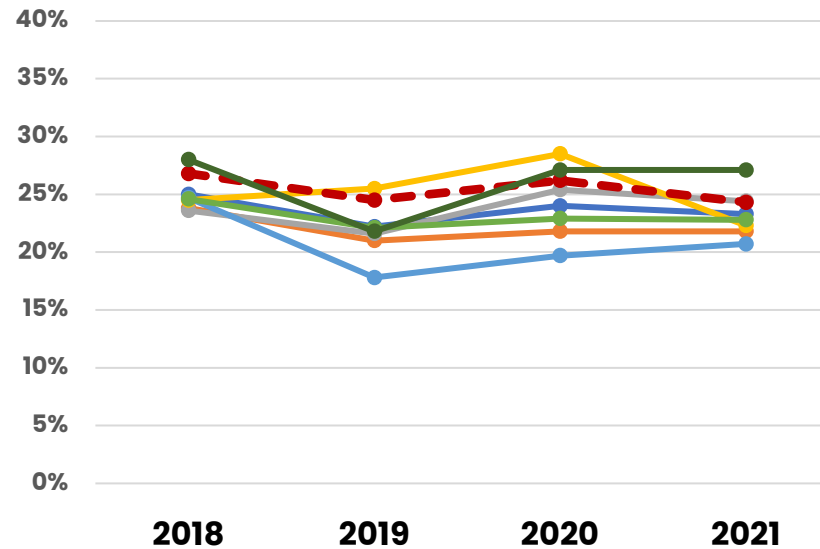
Dried flower

PAST 12-MONTH USE



Hash

PAST 12-MONTH USE



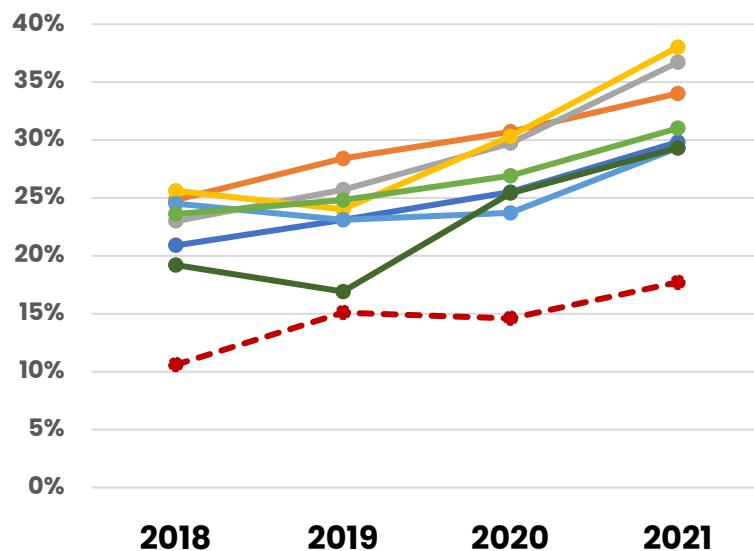
CA BC AB SK MB ON QC ATL

Lower use of prohibited products in Quebec vs. rest of Canada.

CA BC AB SK MB ON QC ATL

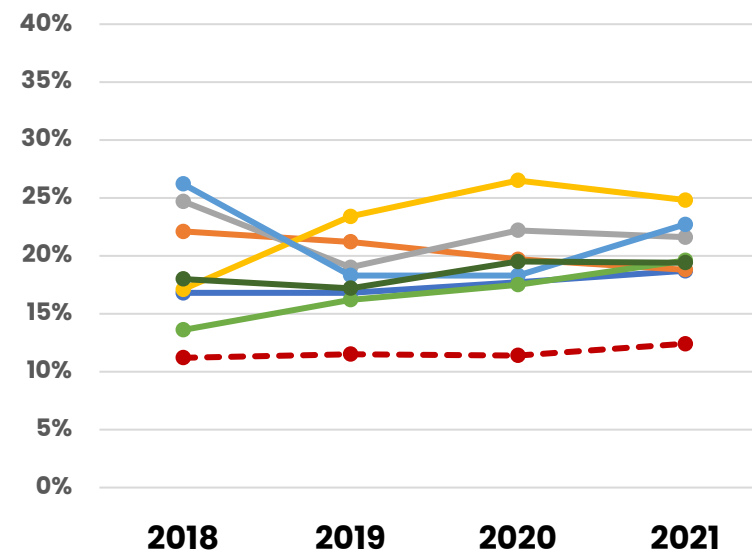
Vape liquids

PAST 12-MONTH USE

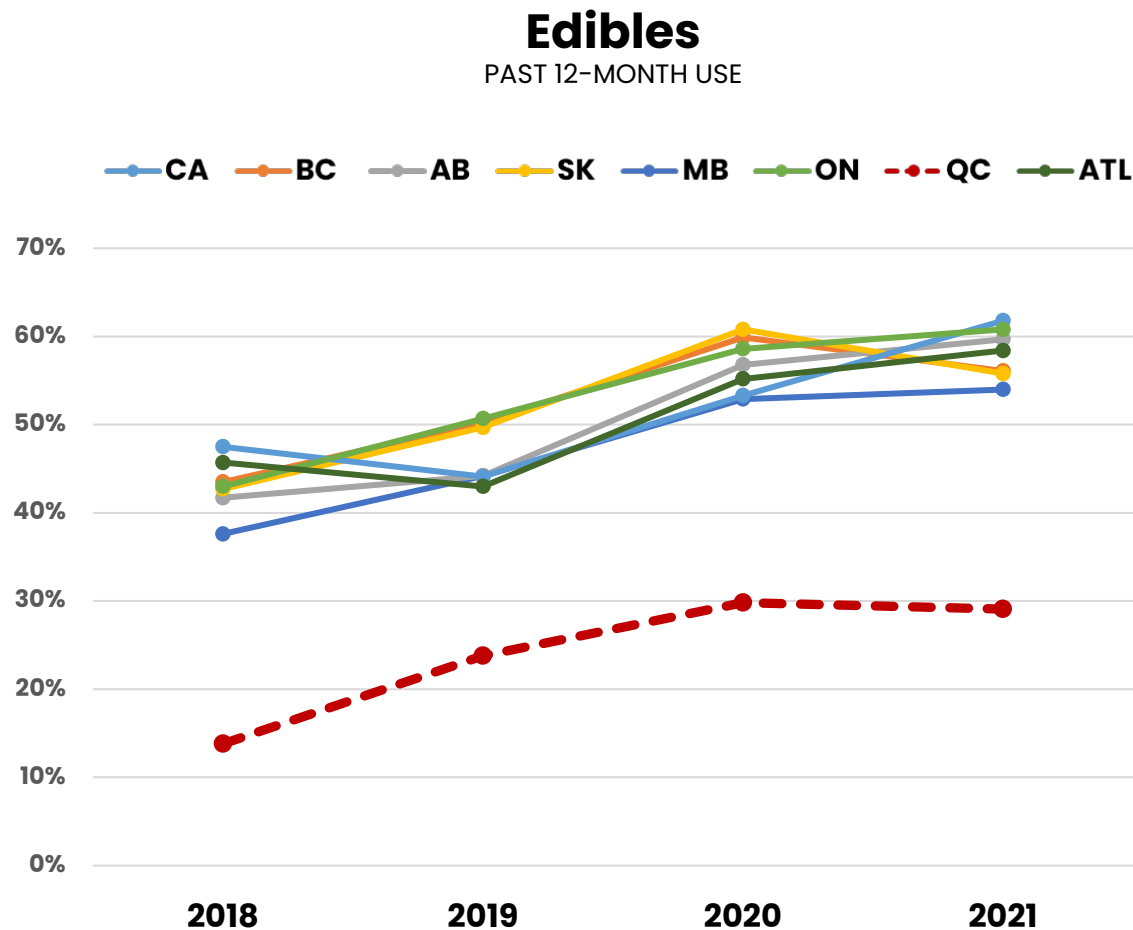


Solid concentrates

PAST 12-MONTH USE



Lower use of prohibited products in Quebec vs. rest of Canada.



Do product standards sustain illicit trade?

THC caps in Vermont could keep black market alive

By Lex Merrell, Vermont News & Media Jun 19, 2022

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MONTPELIER — The amount of THC — the cannabinoid that produces the high sensation after consumption of cannabis, commonly referred to as marijuana — in concentrates has been capped in Vermont, but some worry that cap could cause the illegal cannabis market to thrive.



[Act 158](#), signed by Gov. Phil Scott at the end of May, states that cannabis concentrates cannot surpass 60 percent THC, a cap backed by science due to concern over the negative effects of highly concentrated cannabis.

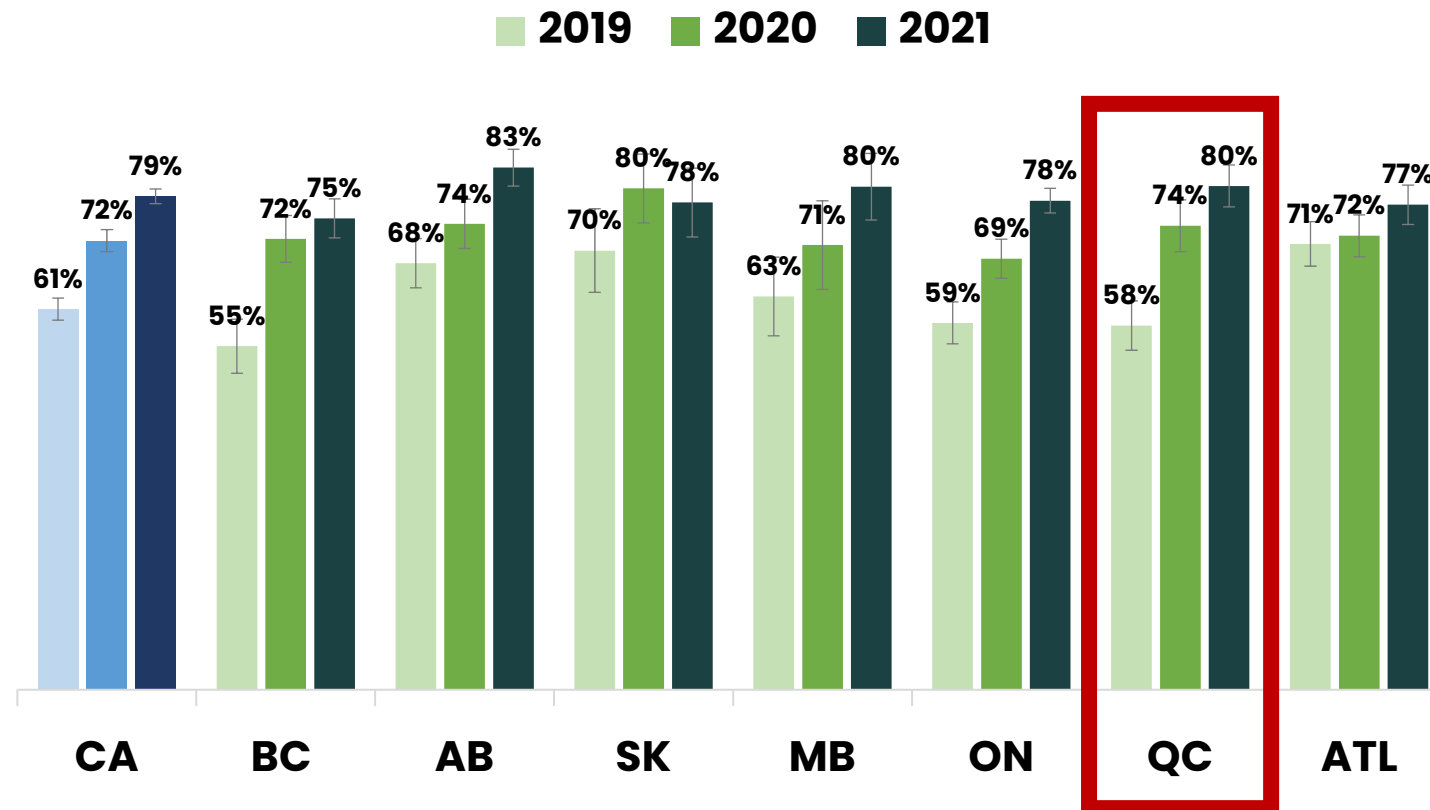
Dr. Catherine Antley, a pathologist at Copley Hospital in South Burlington, said, “These are not products used by the ‘casual’ cannabis consumer.” In the 1990s, the average THC content of cannabis in flower form was less than 4 percent. Today, she said, it’s about 15 percent.

SOURCE: [HTTPS://WWW.REFORMER.COM/LOCAL-NEWS/THC-CAPS-IN-VERMONT-COULD-KEEP-BLACK-MARKET-ALIVE/ARTICLE_90E37FE6-EDB7-11EC-ABA1-33DCABC534196.HTML](https://www.reformer.com/local-news/thc-caps-in-vermont-could-keep-black-market-alive/article_90e37fe6-edb7-11ec-aba1-33dcabc534196.html)

Illegal cannabis purchases are similar between Quebec and other provinces.

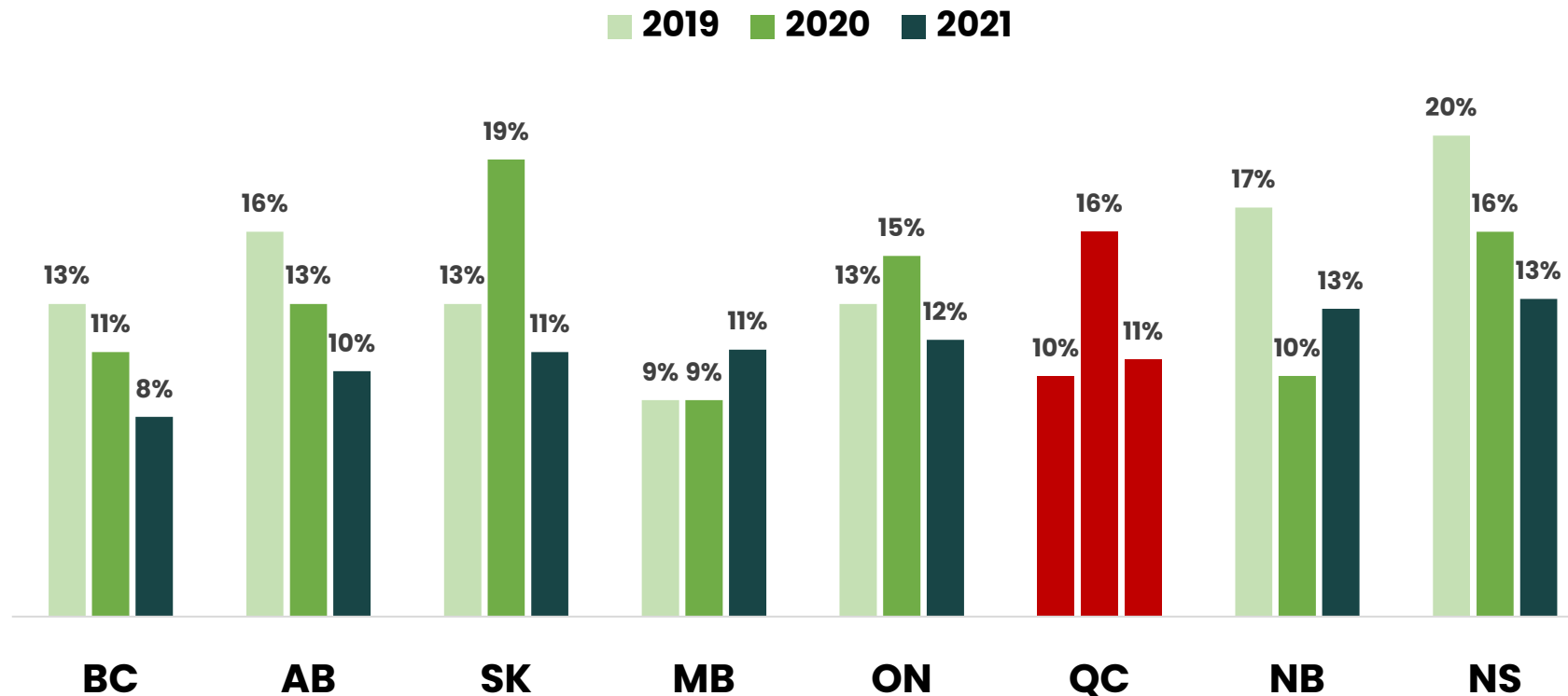
Mean percentage of all cannabis products purchased in last 12-months from a legal retail source

AMONG PAST 12-MONTHS CONSUMERS



Reasons for purchasing from 'illegal' sources

“Legal sources don't sell products I want”



AMONG CONSUMERS WHO REPORT PURCHASING FROM ILLEGAL SOURCE IN PAST 12 MONTHS

Compared to other provinces, Quebec consumers..

↑ 'illegal' purchases for vape oils and edibles

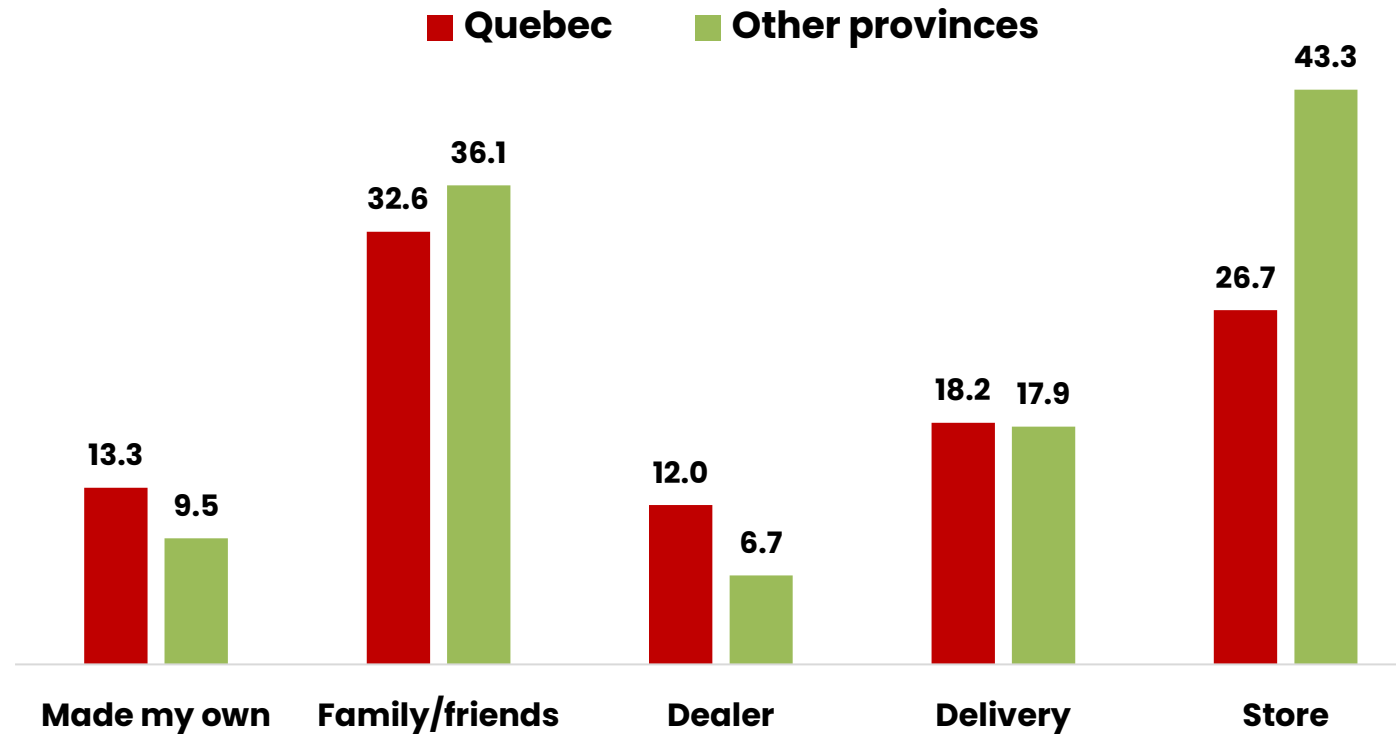
↓ 'illegal' purchases for dried flower and orals

SOURCE: WADSWORTH ET AL. LEGAL SOURCING ACROSS DRIED FLOWER AND NON-FLOWER CANNABIS PRODUCTS IN THE CANADIAN CANNABIS MARKET, 2019-2021. UNDER REVIEW.

Edible consumers in Quebec less likely to source from legal stores.

In the past 12 months, how did you get the edible(s) you ate?

2021, N=3,329



**Likelihood of 'illegal' edibles is higher
among edible consumers in Quebec**

But....

**Overall number of who source illegal
edibles is lower in Quebec.**

(BECAUSE QUEBEC HAS ~HALF THE NUMBER OF EDIBLE CONSUMERS.)



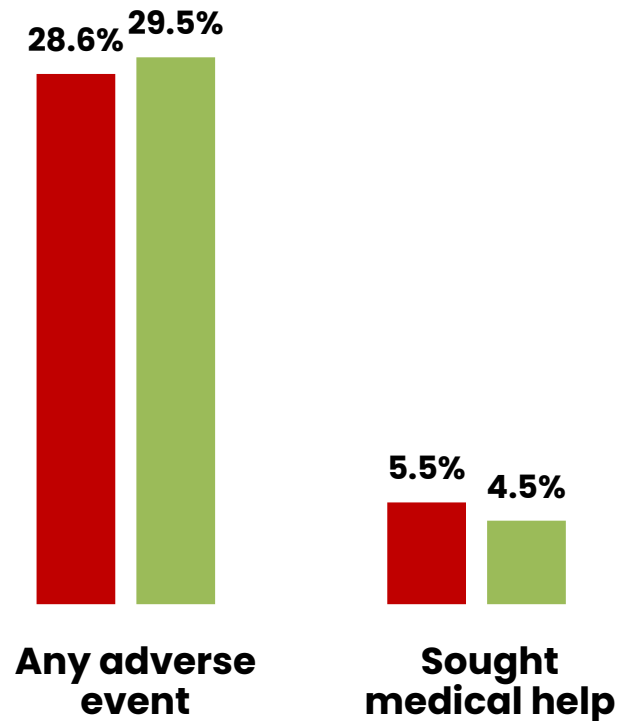


**Do adverse events differ in
Quebec vs. the rest of Canada?**

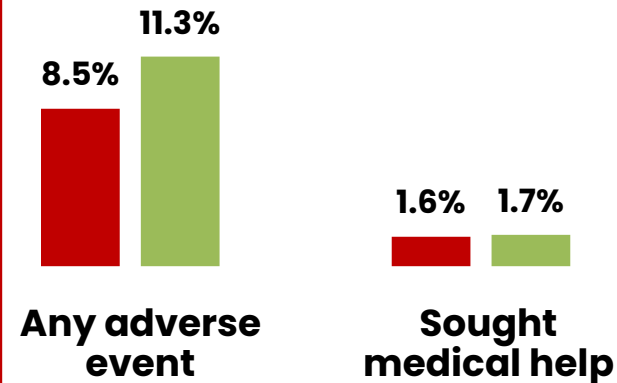
Similar profile of adverse events.

■ Quebec ■ Other provinces

AMONG CONSUMERS PAST 12-MONTH USERS



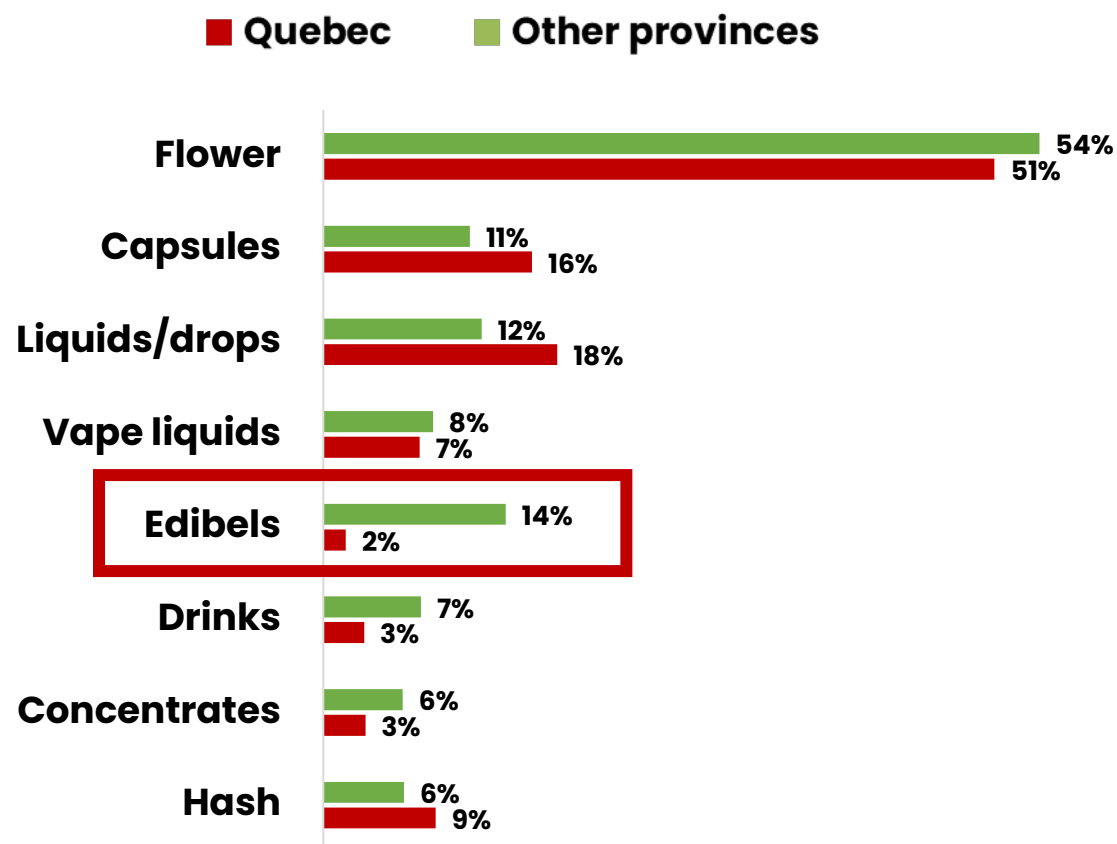
ALL RESPONDENTS



Adverse events attributed to different products.

**When you experienced the negative health effects,
what type or form of marijuana were you using?**

AMONG THOSE WHO EXPERIENCED ADVERSE EVENT IN PAST 12-MONTHS



Pediatric cannabis hospitalizations

Greater increases in other provinces vs. Quebec

The NEW ENGLAND JOURNAL of MEDICINE

CORRESPONDENCE



Edible Cannabis Legalization and Unintentional Poisonings in Children

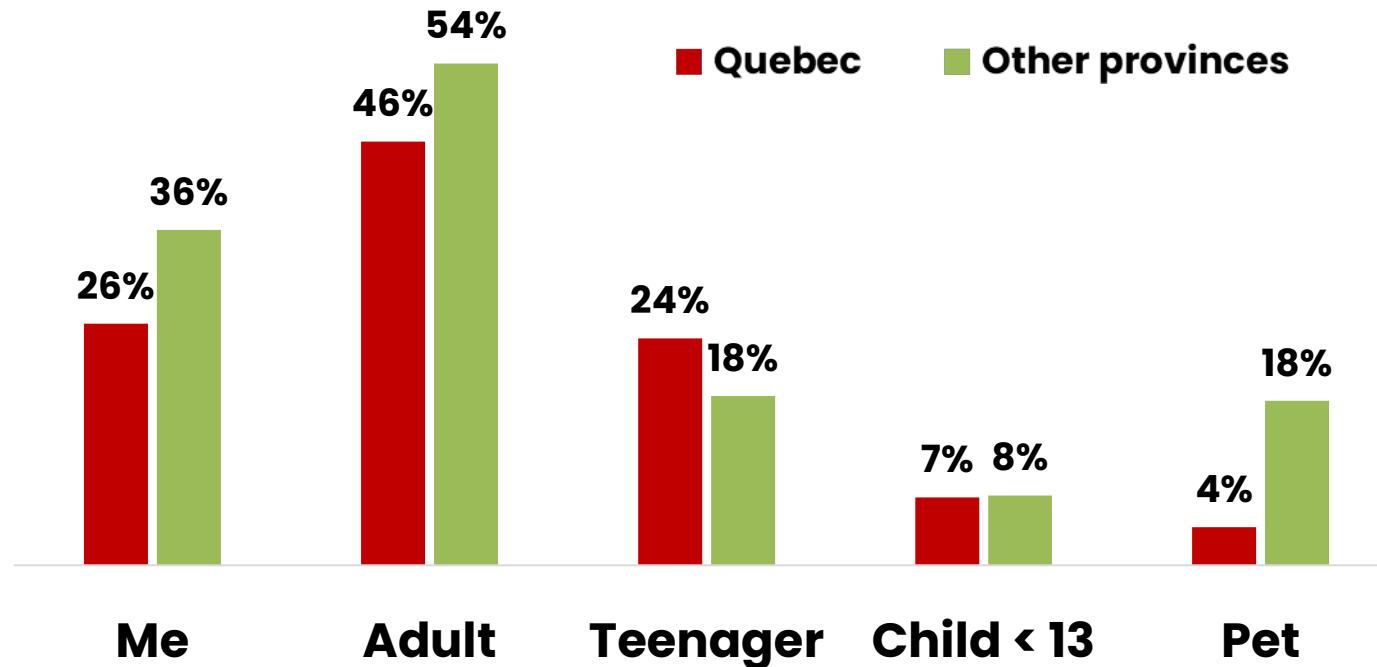
TO THE EDITOR: Unintentional cannabis poisoning in children may be a consequence of legalizing cannabis for adult use, although the effect of legalization with or without the sale of cannabis edibles on cases of ingestion in children is unclear.¹⁻³ In October 2018, Canada legalized the sale of dried cannabis flower to adults for non-medical use.⁴ Starting in January 2020, the sale of edible products (e.g., gummies, chocolates, and baked goods) with tetrahydrocannabinol (THC) was approved.⁴ Although all provinces were required to allow the sale of cannabis flower, each province could choose to restrict sales of edibles. Alberta, British Columbia, and Ontario (combined population, 24.3 million) al-

through September 2021). Details of our methods are provided in the Supplementary Appendix, available with the full text of this letter at NEJM.org.

During the 7-year study period, there were 581 hospitalizations for cannabis poisoning in children (53.9% in boys; mean age, 3.6 years). Details on the representativeness of our study population and the generalizability of our findings are provided in Table S1 in the Supplementary Appendix. Before legalization, hospitalization rates were similar across provinces (0.95 per 100,000 person-years in exposed provinces vs. 0.93 per 100,000 person-years in the control province (Fig. 1). Hospitalization rates in the

No clear difference in accidental ingestion between jurisdictions.

When you experienced the negative health effects, what type or form of marijuana were you using?
AMONG THOSE WHO EXPERIENCED ADVERSE EVENT IN PAST 12-MONTHS 2021

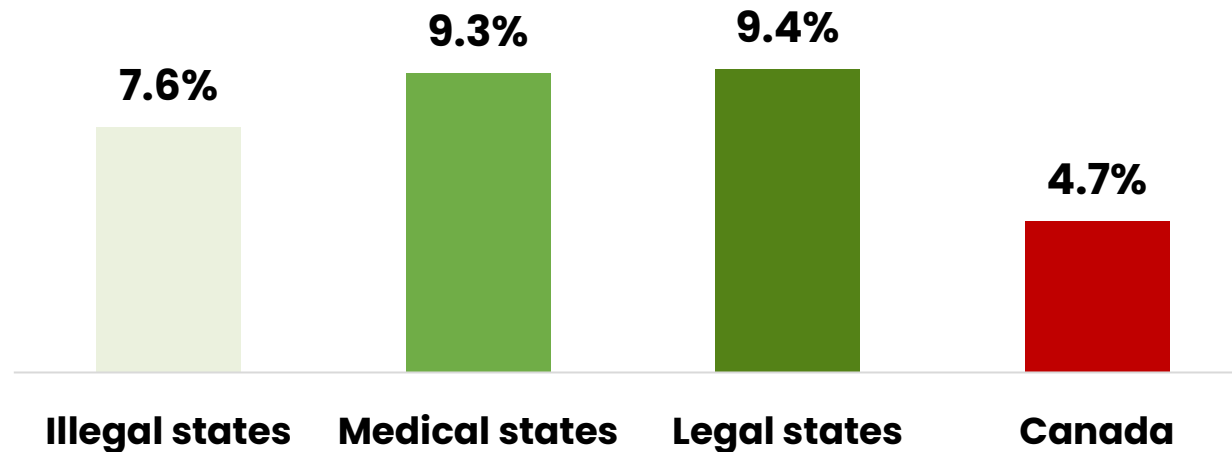




THC limits
Edibles
10mg / package

US consumers more likely to report adverse events.

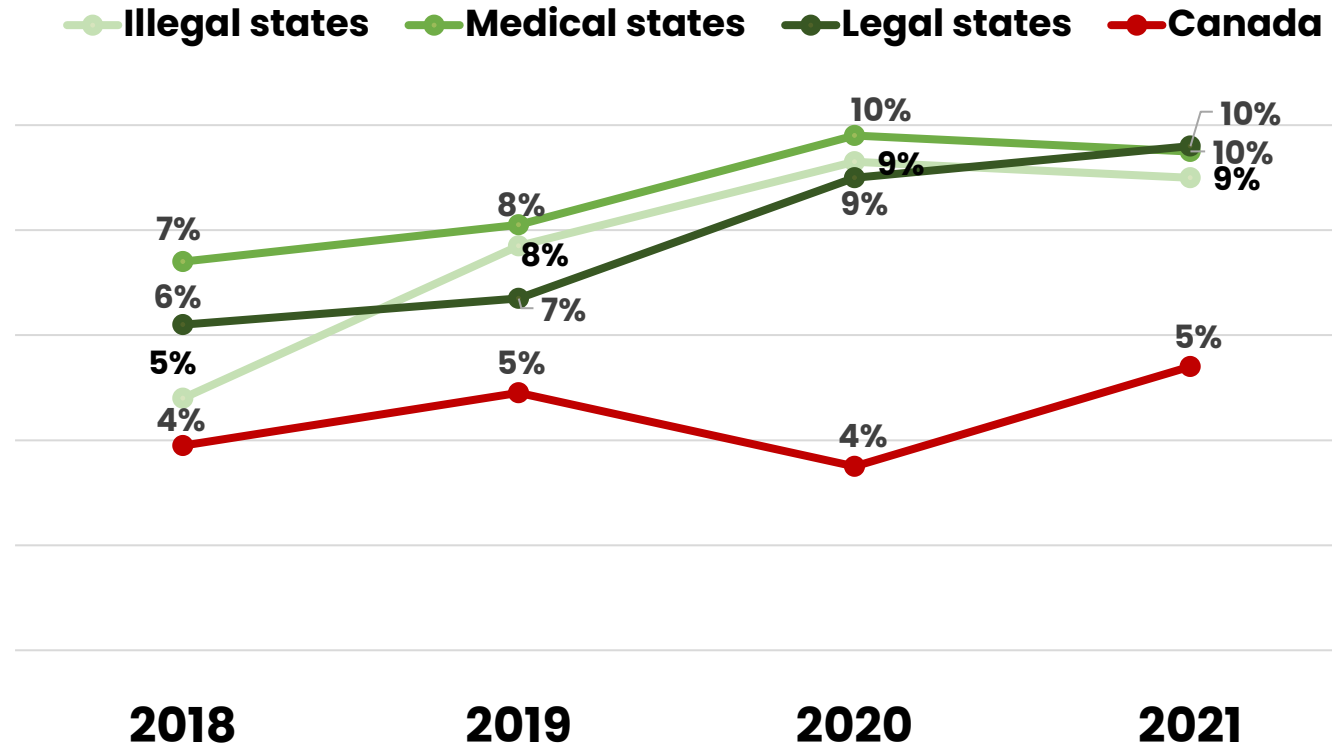
Percentage of consumers who sought medical help for adverse effects caused by cannabis use
AMONG PAST 12-MONTH CONSUMERS, 2021



US consumers more likely to report accidental consumption.

In the past 12 months, has anyone in your household accidentally consumed marijuana?

% 'YES' AMONG PAST 12-MONTH CONSUMERS, 2021, N=33,999



Summary 4.0

- **Product standards resulted in lower use for prohibited products in Quebec.**
- **Similar or lower levels of illegal purchasing at population-level.**
- **No clear impact on adverse events in either direction.**
- **Broad need for additional evidence.**



Price and purchase sources



THC-based taxes

- Weight-based for flower
- THC-based for extracts: 1 cent per mg

\$44.95 / cartridge



80.00 - 85.00%
800.00 - 850.00
mg/g



0.00 - 3.00%
0.00 - 30.00 mg/g

PLANT TYPE ?

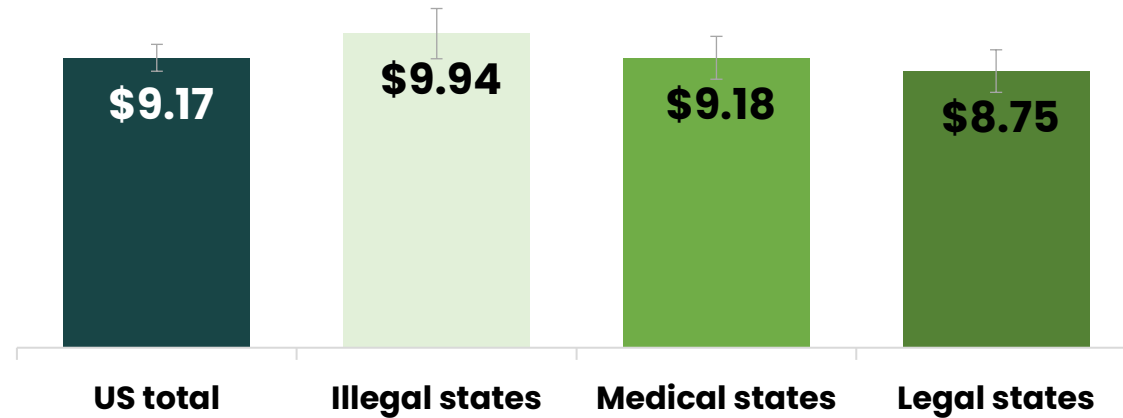
Indica Dominant

~ \$8.00 tax per vape cartridge

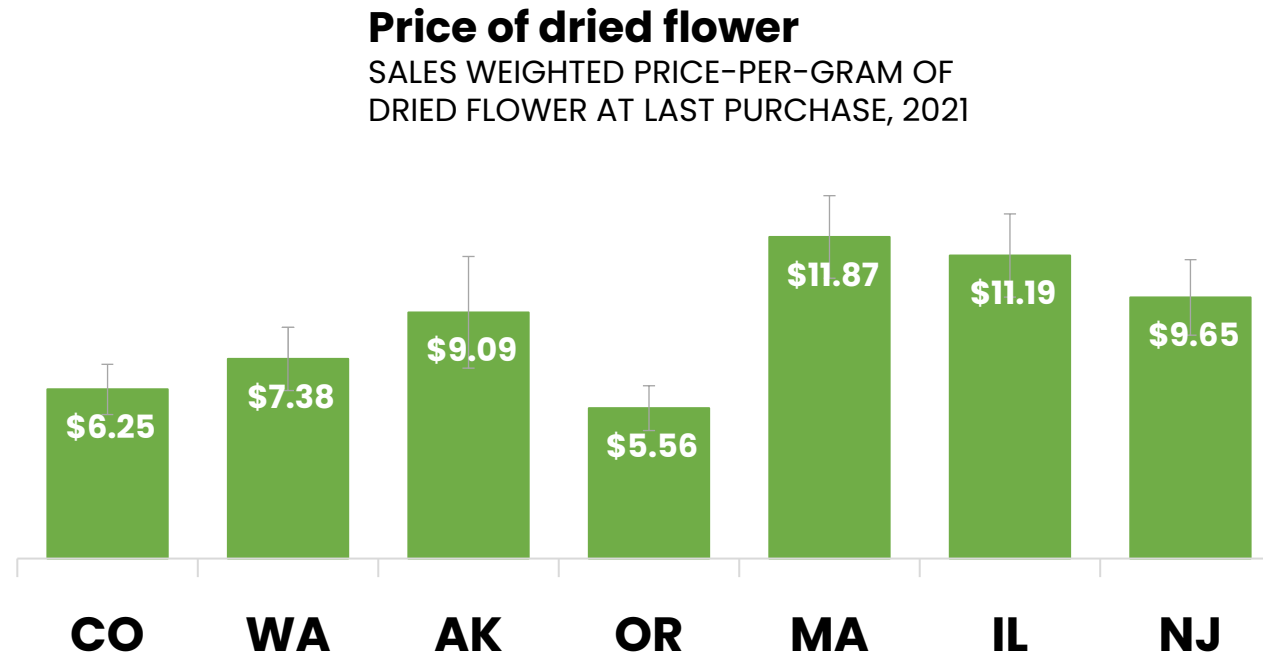
Variable prices across jurisdictions.

Price of dried flower

SALES WEIGHTED PRICE-PER-GRAM OF
DRIED FLOWER AT LAST PURCHASE, 2021



Major price differences between 'legal' markets.





Summary

- **Rapid evolution of cannabis market.**
- **Increase in more highly processed products**
- **National US market reaching a tipping point—narrowing differences across jurisdictions?**

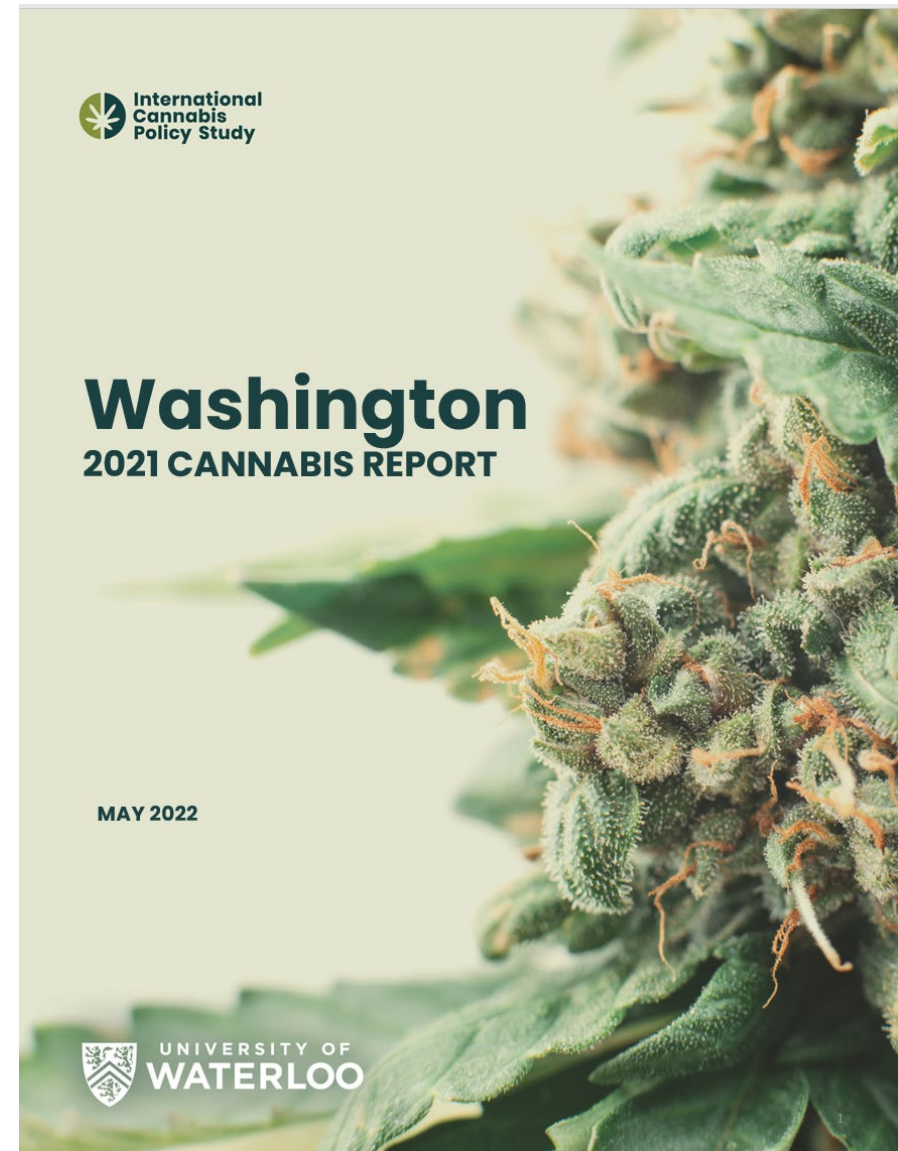


Summary

- **Product standards can shift consumer consumption, not just retail source.**
- **Behavioral compensation at the 'individual' and 'population' level?**
- **Integration of biomarker and product collection in population studies desirable.**
- **Potential of 'natural experiments' comparing jurisdictions with different regulations**



ICPS reports



www.cannabisproject.ca



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Thank you.

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