

The Impact of Legalization of Access to Recreational Cannabis on Canadian Medical Users with Cancer.

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Abstract

Background

Canada legalized cannabis use for medical purposes in 1999. Legalization of cannabis for recreational purposes in October 2018 offered the opportunity to assess the impact of recreational legalization on cancer patients' patterns of use to identify learning points that would be of use to other countries considering similar legislation.

Method

Two identical anonymous cross-sectional surveys were administered to cancer patients in British Columbia, 5 months apart (2 months before and 3 months following legalization), with the same eligibility criteria. The prevalence of medical cannabis use, the distribution of symptoms leading to use, the most common types of cannabis products and sources, reasons for stopping using cannabis, and barriers to access were assessed.

Results

The overall response rate was 27% with 821 and 852 individuals returning the first and second surveys respectively. Both cohorts were similar regarding participants' characteristics, including age (median= 66yrs), gender (53% of participants were female), and education (one-third of participants had an education level of high school or less). Comparison of the two cohorts showed that legalization increased the prevalence of current cannabis use by 21% (23.1% to 29.1%, p-value 0.01). However, after legalization, Current Users reported more issues in getting cannabis (18% compared to 8%, p-value: <0.01). The most common barrier cited was lack of available preferred products, from closure of illegal dispensaries.

Conclusions

Results showed that legalization of access to cannabis for recreational purposes will have an unintended negative impact on those who use cannabis products for medical purposes. These should be anticipated and mitigated in the design and implementation of new legislation.

Keywords

Cannabis, Cancer, Survey, Symptom Management

Background

Cannabinoids of a variety of types have been shown to alleviate several symptoms common among cancer patients, and there are currently two cannabis-based pharmaceutical products available by prescription in Canada to people living with cancer, multiple sclerosis or AIDS, for management of pain, muscle spasm, and anorexia respectively. Both have significant limitations due to cost (nabiximols/Sativex®) or lack of non-THC components (nabilone/Cesamet®)[1–4]. Canada legalized the use of plant-derived cannabis for medical purposes in 1999 but made the process of accessing it quite onerous[5]. Though there have been different iterations of the process over the years, patients have always had to obtain a “medical authorization” document from their physician and then register with an online supplier, making a mail-order purchase with a credit

card[5]. This legal access route has consistently been bypassed by widespread availability of cannabis-derived products via illegal but unprosecuted storefront dispensaries, and unlicensed growers; not only by those who lack internet access/skills or do not have a credit card or address, but also by those who do not want to be on any form of register involving cannabis, and also many who either did not want to discuss it with their doctor because of fear of stigmatization, or had tried to do so but were not able to get a medical authorization. Many patients were also simply unaware of the existence of the medical access process.

In 2000 the Supreme Court of Canada deemed access to cannabis for medical purposes a human right, which made prohibition of unregulated suppliers virtually impossible. Failure to enforce laws prohibiting sale of cannabis products by unlicensed providers led to a lucrative and unregulated cannabis supply industry, with no medical oversight, no standards, highly variable quality of product, and inconsistent or inappropriate guidance for medical users. Anecdotal reports from consumers were however frequently very positive, and many cancer patients report that they had tried it, often with significant benefit, despite substantial personal cost.

In response to this legal quagmire, the Canadian government announced in early 2018 that Canada would be the second country in the world (after Uruguay), to legalize cannabis for recreational use[6–8] (which from here on will be referred to simply as ‘legalization’), as of October 17, 2018[6]. Widespread publicity of the planned date of legalization created the unique opportunity to observe the use of cannabis in the medical setting both before and after recreational legalization.

Part I of this study was a survey which was developed and administered roughly two months prior to legalization to all British Columbia cancer centre attendees on a single day [9]. Results from this survey demonstrated a high frequency of taking cannabis in a variety of forms by cancer patients in BC. Just over half (52%) had used cannabis at some point in their lifetime, and most past users reported their prior goal of use to be recreational. Half of those who had ever taken cannabis reported currently using cannabis for medical purposes, i.e. one in four responding cancer patients reported currently using cannabis or cannabis-based products for medical purposes. The most common reasons for use were for symptoms: pain (62%), insomnia (41%), nausea (39%), and anxiety (36%); but many (52%) reported also using it for cancer treatment, despite the lack of any compelling human clinical trial evidence of benefit in survival. Current users tended to primarily use cannabis oil extracts to alleviate multiple symptoms simultaneously, suggesting potential for measurable doses of cannabinoids to substitute for other drugs such as analgesics, anti-emetics, hypnotics, and anxiolytics[5]. These results are consistent with those of other similar studies in Canada which reported on cannabis use in the medical setting prior to legalization[10, 11].

The survey was repeated in another cohort of BC Cancer patients randomly selected in exactly the same way, three months after legalization, to see if legalization had impacted the prevalence or patterns of use. This report describes the results from the second survey and compares them with the first.

Methods

The survey and its administration were exactly the same as for the first survey described in detail previously[5]. In brief, the survey was designed to capture cannabis use prevalence and patterns, and mailed to all patients who were scheduled for an appointment at any of the six British Columbia Cancer (BCC) Centres on an arbitrarily chosen study day. As noted in our first report, BCC is a provincial organization and sees 94% of the

total number of cancer patients seen for specialist oncology services each year in BC (Fiscal 2017/2018), so the surveyed cohort can be considered representative of the cancer patient population in the province, which includes urban, rural, and remote populations. The one-page survey had been reviewed previously for ease of readability by a group of patient volunteers prior to administration (see Fig. 1). The study was approved by the University of British Columbia Research Ethics Board (H18-01638). Eligibility for a cash prize was offered as an incentive for participation, and lottery entries were separated from the surveys immediately upon opening. All surveys were reviewed anonymously. Returned surveys were collected for one month following the study day and entered into the REDCap data capturing system[12, 13]. The first and second surveys were differentiated by paper colour to avoid confusion between the two cohorts.

Respondents were asked to state their age; gender; ethnicity; level of education; primary cancer diagnosis (if any); and understanding of treatment stage; current and past cannabis use; form(s) used; source of product(s); reason(s) for use; whether they had had any difficulties accessing cannabis; and if a past user their reasons for stopping. All information was provided anonymously. The only chart-derived data was the appointment booked on the arbitrarily selected index day (Wednesday January 9th).

Survey respondents were assigned into user groups (Never, Prior, and Current Users) and within groups into pre- and post-legalization cohorts. Comparisons between groups were made using the chi-square test of independence and two sample t-tests.

Results

The response rate of 27.0% (852 out of 3167 surveys mailed) was almost exactly the same as for the pre-legalization survey mail out; 27.4% (Fig. 2). Respondent demographics were very similar between the two survey cohorts. In the second (post-legalization) cohort Never, Prior, and Current Users were all very similar in regard to gender, primary cancer diagnosis, treatment stage, and education. The majority of participants were Caucasian (81%) or Asian (7%). Fifty five percent of Caucasians and 31% of Asians in this study were prior or current cannabis users. Current and Prior Users had a lower median age compared to Never Users (62, 64, and 70yrs, respectively; p-value < 0.01).

One of the most important findings of this survey was that the majority of current users did not use the legal online system set up for patients to access medical cannabis, despite using it for medical rather than recreational use, and preferring non-inhaled routes of ingestion. Only 27% of Current Users had a medical authorization.

Current Users obtained their cannabis from a friend (54%) and from dispensaries (53%) almost equally. For many patients, the prior use was many years previously. Current Users reported using multiple forms of cannabis products, but used oils the most (70%) followed by smoking (64%), eating (48%), vaporizing (33%) and topically (29%).

Current Users also used cannabis for multiple reasons. The most common target symptoms were pain (58%), insomnia (42%), anxiety (36%), and nausea (33%). Recreational use was disclosed by 40% of current users and nearly half (47%) also used it with a goal of treating their cancer. Prior Users stated their use was most often recreational (58%), with the next most frequent reason being pain (27%).

Prior Users stated that they had stopped because of ineffectiveness; losing interest; intolerable side effects; safety concerns; or not having used it since their youth (no specific reason stated).

Impact of Legalization

Comparing surveys returned before and after, legalization was associated with an increase in Current Users of cannabis from 23.1% to 29.1%, p-value 0.01. No significant differences were found among the demographics of groups when comparing pre- and post- legalization. Similarly, there were no changes in medical authorization prevalence, products used, reasons for use, and where cannabis was obtained from before to after recreational legalization of cannabis.

After legalization, Current Users reported more issues in getting cannabis (18% compared to 8%, p-value: <0.01) with the most common barriers cited as lack of available dispensaries (n = 19), lack of preferred product (n = 15), and cost (n = 4).

Discussion

After Legalization

Our results showed that the most common target symptoms were pain (58%), insomnia (42%), anxiety (36%), or nausea (33%). The results of this study are strikingly similar to two 2019 reports from the USA. One report described a retrospective review of ambulatory palliative care clinic patients from New Hampshire and Vermont, and found a 27% current cannabis use rate, primarily for medical purposes. Patients were often treating multiple symptoms: pain (59%), anorexia (19%), insomnia (17%), nausea (16%), anxiety (10%) and depression (6%)[14]. It would be expected that a palliative care population would be more likely to be symptomatic than our unselected cancer centre-attending population, and therefore be more likely to use medical cannabis, yet our study reported the same prevalence and reasons for use. Very similar results were reported in an ambulatory Seattle cancer patient study [15].

Our results showed that current users often used multiple forms of cannabis products, but used oils the most (70%) followed by smoking (64%), eating (48%), vaporizing (33%) and topically (29%). Consistent with the findings in this study, a previous study in the US showed that the prevalence of using cannabis via inhalational and oral routes were equal [15]. The slight differences could be explained by the fact that at the time of this study (the post-legalization survey), the legal sources of gel capsules filled with oil were just becoming available and could possibly have been classified by some respondents as “edibles” rather than oils, whereas most “edibles” were in the form of cookies, brownies and candies which were (and remain) illegal. Legally obtained oils could conceivably have been compounded for topical use by the consumer, but pre-prepared creams, ointments or soft sticks for topical application would all have been illegal.

The similarity in results between studies conducted in the US and Canada suggest that other countries considering legalization can expect similar patterns.

Comparison Between Before and After Legalization Surveys

Comparing our two surveys, we found that legalization was associated with a 21% increase in the prevalence of current cannabis use, from 23.1% to 29.1% ($p = 0.01$). One explanation for this increase might be that in the run-up to legalization news and media outlets were filled with articles about dispensaries opening and closing,[16–18] products available,[19, 20], and new research[21–24] which may have emboldened more patients to try cannabis. Anecdotally, health care providers involved in cancer care reported a surge of inquiries about medical cannabis use from patients and their families at this time. If the prior medical system of access had been sufficient, we would have expected that any increase in use would have been due to recreational use, which was not the case.

There are no data comparing the prevalence of cannabis use before and after legalization in other jurisdictions.

Despite the increase in current users, the choice of cannabis products used and reasons for use remained the same between both surveys. The consistency between surveys strengthens the suggestion in that cannabis has the potential to reduce polypharmacy by providing patients relief for multiple symptoms.[9] Use of cannabis as a form of cancer treatment also remained one of the most common reasons for cannabis use between surveys.

Our survey identified issues that arose immediately following legalization. We showed that the increase in Current Users was also associated with an increased reporting of difficulty accessing medical cannabis and that patients had been using the illegal system in preference to the legal system for accessing cannabis for medical needs. Dispensaries and other unlicensed sources were much more commonly used than the legal medical system.

More difficulty accessing medical cannabis after legalization was primarily due to closure of illegal dispensaries, which were abundant prior to legalization, but since legalization were forced to close while waiting for government-issued licenses[25]. Only one Health Canada-approved licensed storefront dispensary was open in BC on legalization day[17].

The second problem was that the new licenses for storefront dispensaries were also supposed to be just for recreational use, and the personnel in the dispensaries were prohibited from providing medical advice. Thirdly, patients could still purchase medical cannabis products online. Patients who had been accessing their product(s) from an unlicensed dispensary would have to negotiate the online system of access, including getting a medical authorization, which is clearly an additional barrier for many, although the process for this was also a barrier to individuals without credit cards, identification, a stable address, etc.

The complexities of two different licensing authorities, and confusion between medical and recreational use made it extremely difficult for patients and health care providers to figure out where to access reliable information and suitable cannabis products for medical purposes. It should be noted that BC was not unique in this respect in Canada[25, 26].

Similarly, respondents from the second survey identified the lack of legalization of certain products (primarily edibles), as their reason for accessibility barrier. Edibles are not the recommended route of administration of medical cannabis due to difficulty with dose labelling and slow time to effect, however this route was listed as the third most often used route of administration among Current Users in both survey cohorts. The lack of provision for this type of product to be available within the medical system caused significant distress for patients.

Implications and Suggestions

Other jurisdictions planning to legalize recreational cannabis should consider the impact it will have on medical cannabis users. Information about medical use should be provided in all vendor locations irrespective of vendor focus. This will require standardized and thorough training of vendors, clear labelling, and provision of appropriate educational materials, as well as public information directed at medical as well as recreational users. In order to ensure that medical users are fully informed about what products to take, in what doses and how often, what side-effects might occur, and counseled to avoid its use for purposes for which there is no evidence of benefit, health care providers will require extensive education. This education should be facilitated by high quality clinical research. Regulators need to be aware that if the process for medical access is made too challenging or stigmatizing, patients will instead use whatever other means to try cannabis that they have access to. Without adequate provision for expected sales after legalization, the 'black market' for cannabis products will not disappear quickly.

Strengths and Limitations

Results of this study provide new insights into cannabis use among cancer patients in British Columbia. The design of this study answered the research questions successfully. This study is the first to provide data on the impact of recreational legalization on medical users. Strengths of this study include the close comparability of characteristics among participants in both cohorts, and clear differences between cohorts for the questions exploring the impact of recreational legalization. Open-ended questions in the survey allowed participants to share their experience with regards to barriers in obtaining cannabis, which added depth to understanding of the survey results.

As with the limitations inherent in all surveys, the 27% response rate could reflect a sampling bias and causality cannot be determined. Also, the information was collected by self-report, which could have resulted in an underestimation of cannabis use among participants in the study. There also may have been a recall bias about respondents' prior cannabis use.

Conclusions

This study adds to the literature on medical cannabis use in cancer patient populations and describes the impact that the legalization of recreational cannabis in Canada had on medical users.

Results suggest a correlation between increased cannabis use in cancer patients and legalization of recreational cannabis, as many patients using cannabis-based products for medicinal purposes access them through routes outside the official medical access process. This has significant implications for future research. Other jurisdictions contemplating legalization could avoid the unintended negative consequences of legalization by being aware of Canada's experience. Separating medical and recreational access programs is not relevant for many patients, and making sure that legal access routes have clear advantages for patients over existing illegal sources will be crucial to success for any legalization initiative. Price, product range, face to face contact with vendors, and complexity of access processes all need to be considered if illegal supply systems are to be eliminated.

Tables

Table 1
Cannabis use before and after recreational legalization in Canada.

	Before		After		p
	n = 821	%	n = 852	%	
Users (%) ^a					0.01
Never	398	48.5	395	46.4	
Prior	233	28.4	209	24.5	
Current	190	23.1	248	29.1	
^a p values were calculated using the chi-square test of independence					

Table 2

Demographic comparisons of respondents who are Never, Prior, and Current Users of cannabis before and after legalization of recreational cannabis in Canada

	Never Users			Prior Users			Current Users		
	Before n = 398	After n = 395	p	Before n = 233	After n = 209	p	Before n = 190	After n = 248	p
Age ^a			0.91			0.03			0.54
Median	70	70		63	64		61	62	
IQR	61–76	62–77		54–69	56–71		52–70	55–69	
Not Reported	3	3		1	2		1	1	
Gender			0.69			0.86			0.99
Female	213	217		127	115		94	123	
Male	182	175		105	92		95	124	
Other	0	0		0	1		0	0	
Not Reported	3	3		1	1		1	1	
Race			0.25			0.22			0.90
Caucasian	284	314		187	181		155	197	
Asian	49	42		10	8		7	11	
Aboriginal	6	1		4	1		8	8	
East Indian	8	9		0	3		2	2	
African American	1	0		0	1		2	1	
Latin American	2	1		0	1		0	0	
Other	25	12		20	3		11	16	
Not Reported	23	16		12	11		5	13	
Primary Cancer			0.23			0.72			0.87
Breast	93	102		58	59		31	46	
Prostate	59	65		27	32		26	23	
Gastrointestinal	56	42		27	23		26	44	
IQR = Interquartile Range									
^a Age was calculated using a 2-sample t test									
^b p values were calculated using the chi-square test of independence and did not include 'Other' and 'Not Reported' categories									

	Never Users			Prior Users			Current Users		
	Before n = 398	After n = 395	p	Before n = 233	After n = 209	p	Before n = 190	After n = 248	p
Blood/Lymph System	52	46		25	23		23	29	
Lung	41	32		21	14		24	24	
Head/Neck	18	20		25	17		14	19	
Gynecologic	28	19		14	9		12	13	
Skin	15	11		14	7		11	14	
Brain	9	9		9	6		7	7	
Genitourinary	7	13		5	4		4	7	
Sarcoma	3	11		3	6		4	8	
Other	13	13		5	6		7	12	
Not Reported	4	2		0	3		1	2	
Treatment Stage			0.47			0.04			0.55
Newly Diagnosed	12	20		13	13		10	8	
In Treatment	254	249		137	140		130	163	
Finished Therapy	100	98		76	44		39	55	
Not Receiving Treatment	30	25		7	12		11	20	
Not Reported	2	3		0	0		0	2	
Education			0.23			0.22			0.84
Less than High School	20	17		7	5		8	9	
Some High School	41	35		17	11		13	21	
High School/GED	72	84		29	35		41	57	
Some College	51	72		59	36		47	51	
College Graduate	105	92		67	73		49	64	

IQR = Interquartile Range

^a Age was calculated using a 2-sample t test

^b p values were calculated using the chi-square test of independence and did not include 'Other' and 'Not Reported' categories

	Never Users			Prior Users			Current Users		
	Before n = 398	After n = 395	p	Before n = 233	After n = 209	p	Before n = 190	After n = 248	p
Graduate Degree	104	92		48	45		29	46	
Not Reported	5	3		6	4		3	0	
IQR = Interquartile Range									
^a Age was calculated using a 2-sample t test									
^b p values were calculated using the chi-square test of independence and did not include 'Other' and 'Not Reported' categories									

Table 3

Descriptions of cannabis use among respondents who are Prior and Current Users comparing before and after recreational legalization of cannabis in Canada

	Prior Users			Current Users		
	Before n = 233	After n = 209	p	Before n = 190	After n = 248	p
Medical Authorization			0.48			0.35
No	199	183		128	178	
Yes	32	24		58	66	
Not Reported	2	2		4	4	
Product ^a			0.81			0.92
Smoked	174	141		105	159	
Oils	75	75		139	174	
Eating	83	63		86	119	
Vaporized	14	11		61	82	
Cream	21	13		46	71	
Tablets	10	10		24	29	
Drinking	3	2		16	25	
Mouth Spray	3	1		9	12	
Suppositories	4	1		6	14	
Other	6	6		16	16	
Not Reported	0	5		0	0	
What do you use it for? ^a			0.78			0.79
Recreational Use	152	121		60	99	
Pain	51	57		118	143	
Cancer Treatment	25	30		99	116	
Insomnia	31	28		77	104	
Nausea	30	25		74	81	
Anxiety	22	20		69	89	

^a p values were calculated using the chi-square test of independence and did not include 'Other' and 'Not Reported' categories

	Prior Users			Current Users		
	Before n = 233	After n = 209	p	Before n = 190	After n = 248	p
Lack of Appetite	16	12		59	68	
Depression	11	7		32	48	
Tiredness	10	6		24	36	
Drowsiness	3	1		16	18	
Other	7	5		15	12	
Not Reported	0	4		0	0	
Where do you get it from? ^a			0.33			0.40
From a friend	171	143		85	134	
Dispensary	46	52		114	132	
Licensed Producer	13	16		28	41	
Grow it myself	4	7		17	26	
Other	15	12		11	17	
Not Reported	5	5		0	3	
Issues in getting Cannabis?			0.64			< 0.01
No	184	164		172	201	
Yes	11	12		15	44	
Not Reported	38	33		0	3	
^a p values were calculated using the chi-square test of independence and did not include 'Other' and 'Not Reported' categories						

Table 4
Reasons respondents who are Prior Users ceased cannabis use.

	Prior Users		p
	Before n = 233	After n = 209	
Why did you stop? ^a			0.69
Not effective	31	42	
Intolerable Side-Effects	26	25	
Cost	27	19	
Advice from Doctor	9	7	
Safety Concerns	33	25	
Other:	3	4	
Difficult to access	13	22	
No longer needed	4	5	
Contraindication	18	18	
Lost interest	29	35	
Not since youth (20 + years ago)	18	20	
Did not enjoy it	46	15	
Not Reported	18	9	
^a p values were calculated using the chi-square test of independence and did not include unspecified 'Other' and 'Not Reported' categories			

Table 5
Reasons Prior and Current Users had issues obtaining cannabis.

	Prior Users			Current Users		
	Before n = 11	After n = 12	p	Before n = 15	After n = 44	p
			0.33			0.30
Cost	1	1		2	4	
Closed Dispensaries/No available legal access	4	3		2	19	
Issue getting medical authorization	2	1		2	3	
Specific products (ex. edibles) or strengths unavailable	0	3		3	15	
Other	2	1		2	0	
Not reported	2	3		4	3	
^a p values were calculated using the chi-square test of independence and did not include 'Other' and 'Not Reported' categories						

Table 6
Counts

	Prior Users		p	Current Users		p
	Before n = 233	After n = 209		Before n = 190	After n = 248	
# Products			< 0.01			0.24
≥ 4	16	7		56	70	
3	26	21		38	59	
2	30	55		43	68	
1	131	121		53	51	
Not reported	0	5		0	0	
# Uses			1.0			0.1
≥ 4	15	13		81	83	
3	17	15		34	55	
2	37	34		35	64	
1	164	143		40	46	
Not reported	0	4		0	0	
# Places			0.51			0.51
≥ 4	2	0		3	3	
3	4	3		7	9	
2	18	20		48	78	
1	208	181		132	155	
Not reported	1	5		0	3	
^a p values were calculated using the chi-square test of independence and did not include 'Not Reported' categories						

Declarations

We have read and understood BMC Health Service's policy on disclosing conflicts of interest and declare that we have none.

Ethics approval and consent to participate

This study was approved by the University of British Columbia Research Ethics Board (H18-01638). All the necessary consents are obtained from the participants.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Authors of this paper, PH and MG, collected the data. MG analysed the data. MG was responsible for the data accuracy and database integration. PH and MG wrote the current manuscript with assistance from NA. MG prepared all the figures and tables. PH, MG and NA had full access to the data and contributed in writing the results, and interpretations.

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References

1. Walsh Z, Callaway R, Belle-Isle L, Capler R, Kay R, Lucas P, et al. Cannabis for therapeutic purposes: Patient characteristics, access, and reasons for use. *Int J Drug Policy*. 2013;24(6):511–6.
2. Webb CW, Webb SM. Therapeutic benefits of cannabis: a patient survey. *Hawaii J Med Public Health* [Internet]. 2014;73(4):109–11. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24765558><http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC3998228>
3. Koch M, Varela L, Kim JG, Kim JD, Hernández-Nuño F, Simonds SE, et al. Hypothalamic POMC neurons promote cannabinoid-induced feeding. *Nature*. 2015;519(7541):45–50.
4. Hill KP. Medical marijuana for treatment of chronic pain and other medical and psychiatric problems: A clinical review. Vol. 313, *JAMA - Journal of the American Medical Association*. 2015. p. 2474–83.
5. Government of Canada. Understanding the New Access to Cannabis for Medical Purposes [Internet]. Health Canada. 2016. Available from: <https://www.canada.ca/en/health-canada/services/publications/drugs-health-products/understanding-new-access-to-cannabis-for-medical-purposes-regulations.html>

6. Government of Canada. What you need to know about cannabis [Internet]. Health Canada. 2019. Available from: <https://www.canada.ca/en/services/health/campaigns/cannabis/canadians.html>
7. The Americas. Drug legalization in Uruguay: The experiment [Internet]. The Economist. 2013. Available from: <https://www.economist.com/the-americas/2013/08/03/the-experiment>
8. Castaldi M, Llambias F. Uruguay becomes first country to legalize marijuana trade [Internet]. Reuters. 2013. Available from: <https://www.reuters.com/article/us-uruguay-marijuana-vote/uruguay-becomes-first-country-to-legalize-marijuana-trade-idUSBRE9BA01520131211>
9. Hawley P, Gobbo M. Cannabis Use in Cancer: A Survey of the Current State at BC Cancer. *Curr Oncol*. 2019;26(4).
10. Government of Canada. Canadian cannabis survey 2017 – Summary [Internet]. Health Canada. 2017. Available from: <https://www.canada.ca/en/health-canada/services/publications/drugs-health-products/canadian-cannabis-survey-2017-summary.html>
11. Martell K, Fairchild A, Legerrier B, Sinha R, Baker S, Liu H, et al. Rates of cannabis use in patients with cancer. *Curr Oncol*. 2018;25(3):219–25.
12. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)- A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009 Apr;42(2):377–81.
13. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O’Neal L, et al. The REDCap consortium: Building an international community of software platform partners. Vol. 95, *Journal of Biomedical Informatics*. Academic Press Inc.; 2019.
14. Wilson M, Masterson E, Broglio K. Cannabis Use Among Patients Prescribed Opioids in a Palliative Care Clinic (S875). *J Pain Symptom Manage* [Internet]. 2019 Feb;57(2):522. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0885392418314398>
15. Pergam SA, Woodfield MC, Lee CM, Cheng G-S, Baker KK, Marquis SR, et al. Cannabis use among patients at a comprehensive cancer center in a state with legalized medicinal and recreational use. *Cancer* [Internet]. 2017 Nov 15 [cited 2019 Aug 13];123(22):4488–97. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28944449>
16. Bains C. Lawyer urges B.C. Supreme Court to toss application to close medical marijuana dispensaries [Internet]. *National Post*. 2018. Available from: <https://nationalpost.com/news/canada/b-c-lawyer-says-medical-marijuana-users-have-right-to-buy-pot-just-like-others>
17. Eegland N. B.C. to get just a single cannabis store on day one of legalization [Internet]. *Vancouver Sun*. 2018. Available from: <https://vancouver.sun.com/cannabis/cannabis-news/partaking-some-time-b-c-to-get-just-a-single-cannabis-store-on-day-one-of-legalization>
18. Courtenay P. Government of B.C. approves the first private adult-use cannabis dispensary [Internet]. *The Georgia Straight*. 2018. Available from: <https://www.straight.com/cannabis/1158891/government-bc-approves-first-private-adult-use-cannabis-dispensary>
19. Wingrove J, Quinn G, Owrap K. Canada may not be ready for edible pot sales by October deadline [Internet]. *Financial Post*. 2019. Available from: <https://business.financialpost.com/cannabis/edible-pot-sales-could-miss-canadian-governments-october-target>

20. Rodriguez J. Trying cannabis for the first time? Here's everything you can expect [Internet]. CTV News. 2018. Available from: <https://www.ctvnews.ca/canada/trying-cannabis-for-the-first-time-here-s-everything-you-can-expect-1.4136607>
21. Fayerman P. B.C. to lead first national cannabis clinical trial for symptom relief [Internet]. Vancouver Sun. 2019. Available from: <https://vancouver.sun.com/news/local-news/b-c-cancer-to-lead-first-national-cannabis-clinical-trial-for-symptom-relief>
22. Baker R. New UBC pot professor to research potential of cannabis in treating opioid addiction [Internet]. CBC News. 2018. Available from: <https://www.cbc.ca/news/canada/british-columbia/ubc-cannabis-professor-to-research-opioid-treatment-1.4919245>
23. Young L. How long does cannabis stay in your system? [Internet]. Global News. 2019. Available from: <https://globalnews.ca/news/4988296/how-long-cannabis-lasts-body/>
24. Fitch C. Cannabis still has mystery, Canada's first weed-only academic researcher says [Internet]. National Post. 2018. Available from: <https://nationalpost.com/pmnl/news-pmn/canada-news-pmn/scientist-hopes-to-revolutionize-cannabis-research-in-groundbreaking-role>
25. Doherty B. Ontario is holding lottery for cannabis stores on Friday. Here's what the rest of the country tried and how it turned out [Internet]. The Star. 2019. Available from: <https://www.thestar.com/news/cannabis/2019/01/10/ontario-is-holding-a-lottery-for-cannabis-stores-on-friday-heres-what-the-rest-of-the-country-tried-and-how-it-turned-out.html>
26. Murphy J. Why is Canada running out of marijuana? [Internet]. BBC News. 2018. Available from: <https://www.bbc.com/news/world-us-canada-46200873>

Figures

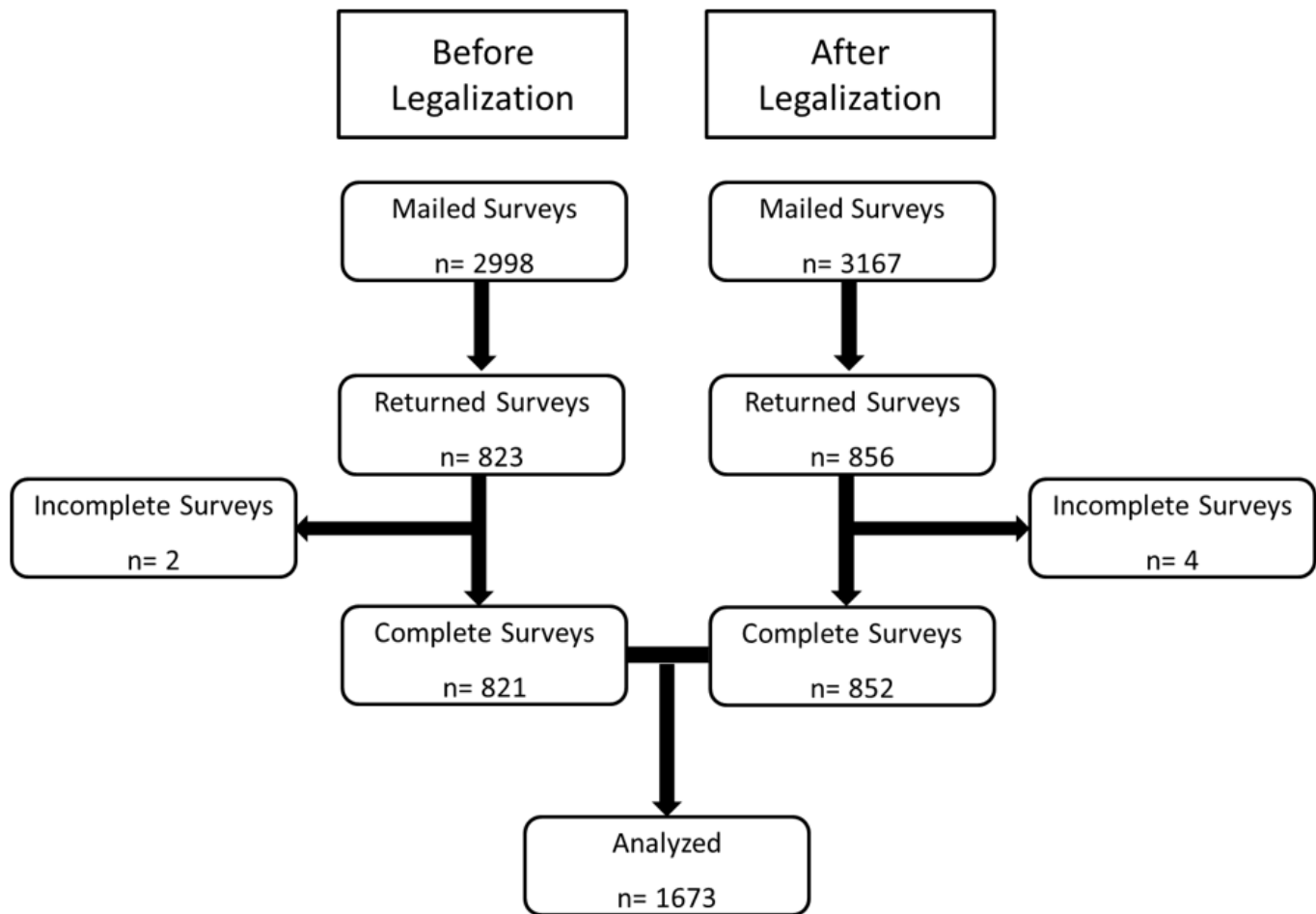


Figure 1

Consort Diagram.

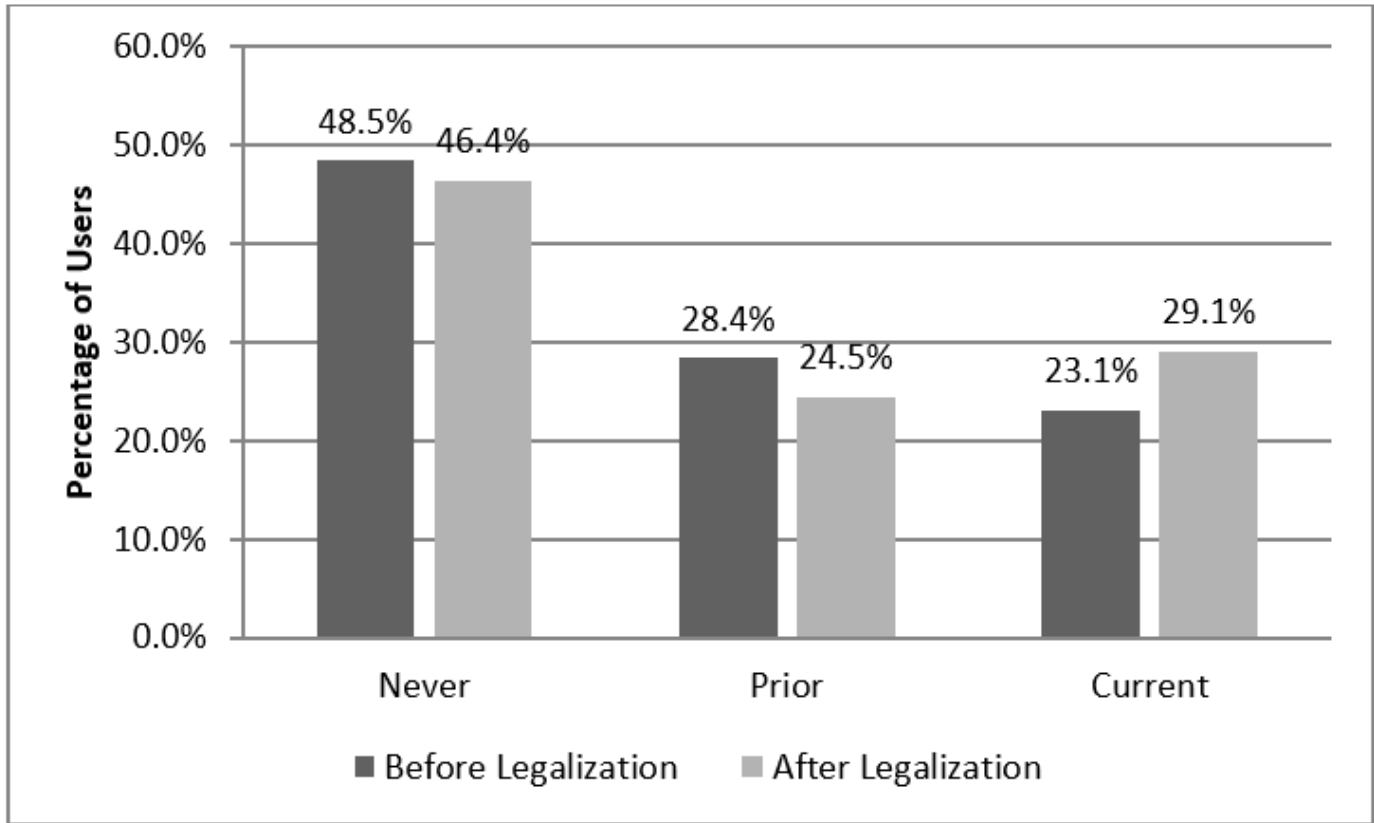


Figure 2

Total Users.

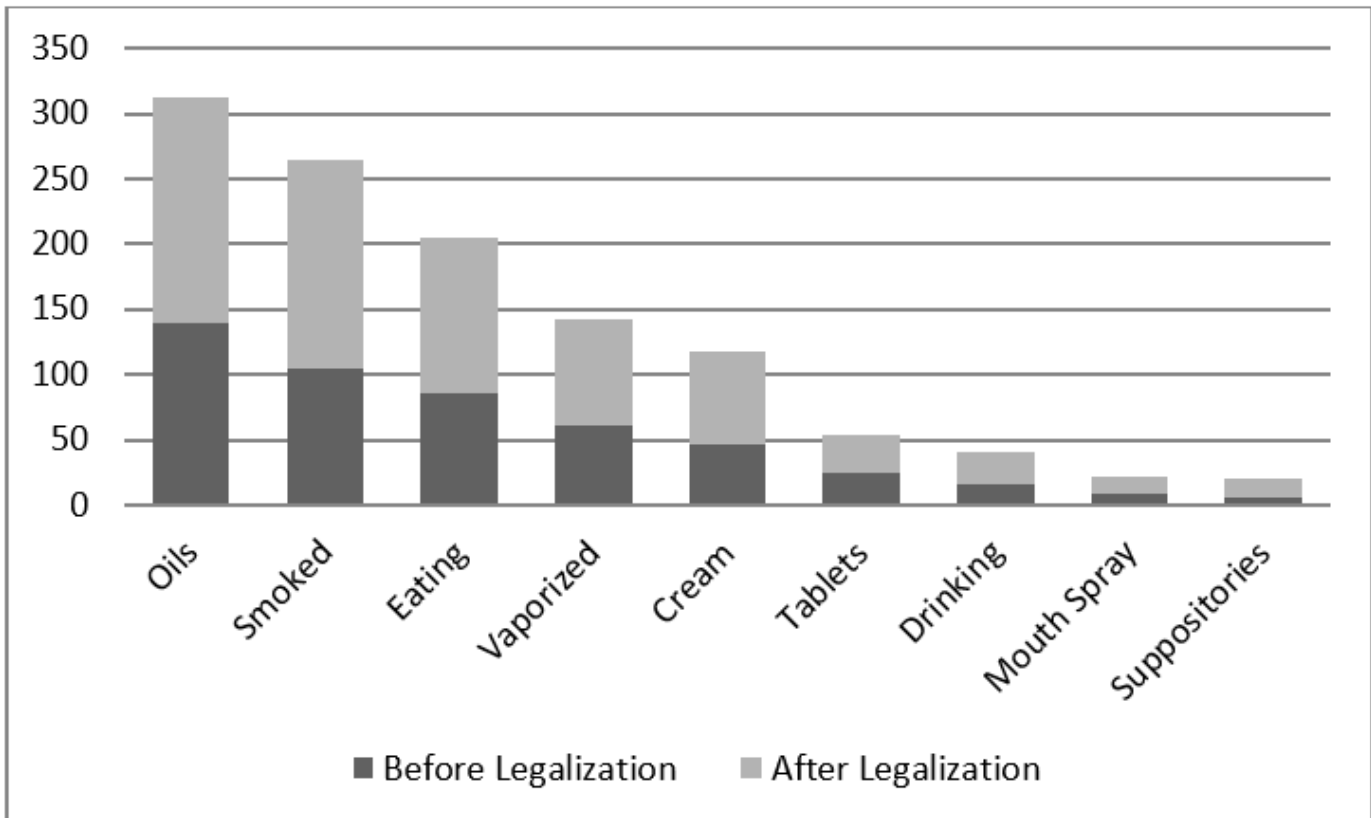


Figure 3

Modes of Administration (Products) of Cannabis.

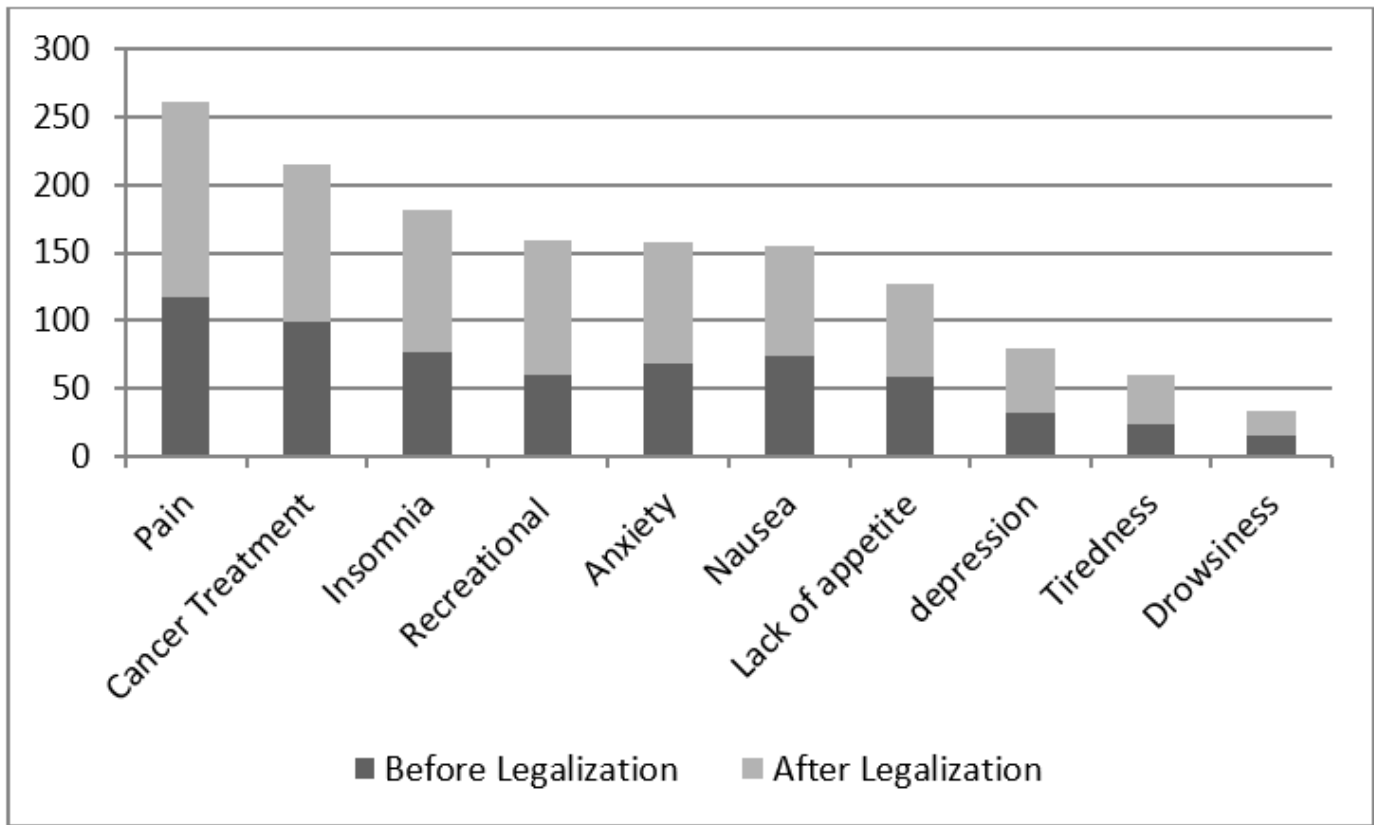


Figure 4

Reasons for Cannabis Use.

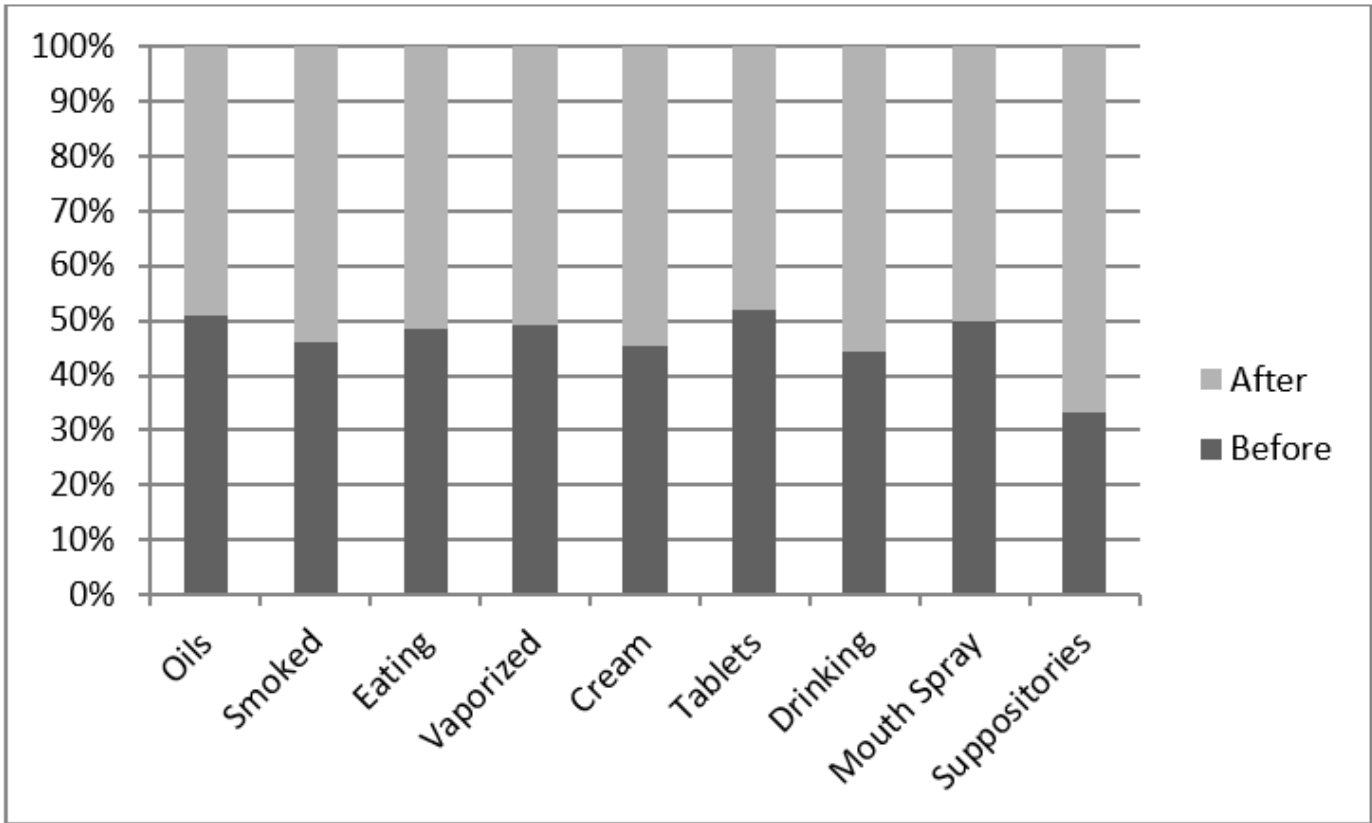


Figure 5

Modes of Administration (Products) of Cannabis (%).

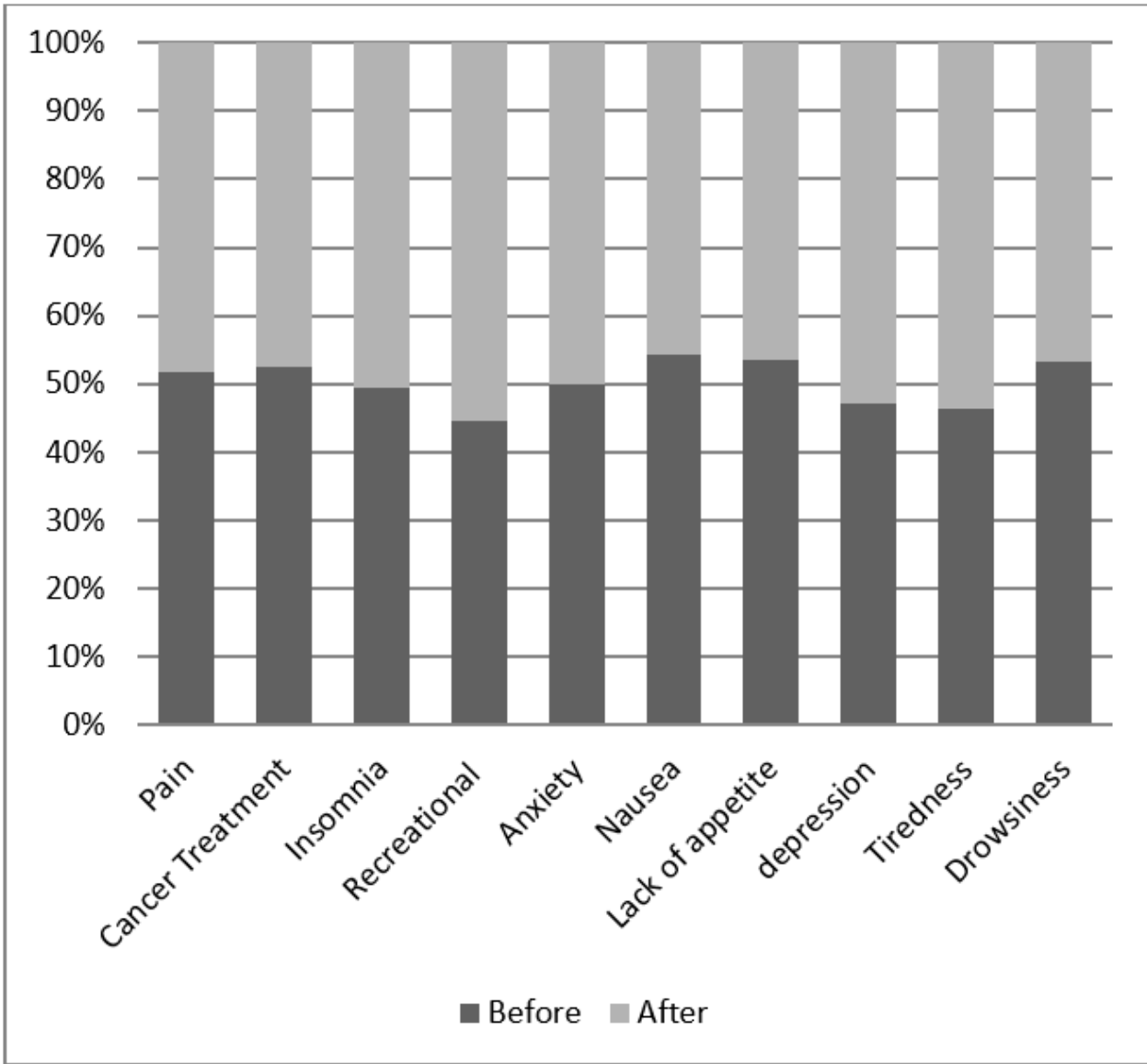


Figure 6

Reasons for Cannabis Use (%).