RESEARCH ARTICLE

The health, economic, and social effects of cannabis use in Thailand [version 1; peer review: 1 approved with reservations, 1 not approved]

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V1 First published: 03 May 2019, 8:614
<https://doi.org/10.12688/f1000research.17391.1>

Latest published: 03 May 2019, 8:614
<https://doi.org/10.12688/f1000research.17391.1>

Abstract

Background: Controversy surrounds the harm and benefit of cannabis use. Further research on the impact of cannabis might guide the government in developing appropriate policies. This research aims to examine the health, economic, and social effects of cannabis use in Thailand.

Methods: From a prospective cohort of 261 cannabis users in Kalasin province, Thailand, we followed 45 cannabis users over 1 year as part of an in-depth study. Quantitative and qualitative data on the health, social, and economic consequences of use were gathered. In-depth interviews, participant observation by researchers during home visits, and self-report instruments were utilized. To supplement the cannabis users' data, we also collected data from 10 health personnel, 16 community leaders, and 480 laypeople.

Results: Our results indicate that cannabis use causes health problems. We determined the disability-adjusted life years of cannabis users and found a total loss of 120.09 years and a mean loss of 0.78 years. The possible economic impacts of cannabis treatment include medical expenses, loss of revenue for both cannabis users and their caregivers, and costs due to law enforcement and possible lawsuits. The economic costs measured during the study period totaled 1,561,460 baht, of which 1,347,950 was attributed to the costs of law enforcement and legal prosecution. However, we found no costs due to accidental losses. Cannabis does appear to not cause community conflict or crime. Despite this, cannabis use remains a social problem, and has been associated with outbreaks of illegal drug use.

Conclusions: This study showed that using cannabis can harm users, their family, and society as a whole. This should be essential for policy advocacy.

Keywords

cannabis, law enforcement, Thailand, disability-adjusted life years, medical expenses, crime, illegal drug use

Open Peer Review

Approval Status ? X

	1	2
version 1		
03 May 2019	view	view
1. Jürgen Rehm , Centre for Addiction and Mental Health (CAMH), Toronto, Canada		
2. Jakob Manthey , Technische Universität Dresden, Dresden, Germany		

Any reports and responses or comments on the article can be found at the end of the article.

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Author roles: **Ritmontree S:** Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Kanato M:** Supervision, Validation, Visualization; **Leyatikul P:** Conceptualization, Investigation, Methodology, Resources, Supervision, Validation

Competing interests: No competing interests were disclosed.

Grant information: The authors would like to thank the Office of the Narcotics Control Board (ONCB75/2558) for funding support of this research project.

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How to cite this article: Ritmontree S, Kanato M and Leyatikul P. **The health, economic, and social effects of cannabis use in Thailand [version 1; peer review: 1 approved with reservations, 1 not approved]** F1000Research 2019, 8:614 <https://doi.org/10.12688/f1000research.17391.1>

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Introduction

Cannabis is the most commonly used illegal drug worldwide, with the fastest growing rate of use¹. This may be due to growing research on the medical uses of cannabidiol (CBD) and delta-9-tetrahydrocannabinol (THC), both of which are found in cannabis plants and can be used to treat various medical diseases, including glaucoma^{2,3} and epilepsy⁴. In addition, cannabis can be used to treat pain and reduce nausea in patients with cancer receiving chemotherapy or to increase the appetite of HIV patients^{5,6}.

However, THC also binds to the brain's cannabinoid receptors, interfering with the body's natural cannabinoid system, resulting in possible euphoria, anxiety, hallucinations, or delusions⁷. For example, cannabis users are at least four times as likely to get in an accident while driving^{8,9}. In addition, among employed workers, those using illicit drugs (including cannabis) are more likely to be fired¹⁰.

Cannabis has been recognized as a food ingredient and traditional herb throughout the history of Thailand, although it has been outlawed since 1934¹¹. Although cannabis is illegal, the number of cannabis users is increasing throughout the country¹². Increasingly, they are calling for the legalization of cannabis. Revision of such national policies, however, requires a considerable evidence base that should be taken into account. Thus, the health, economic, and social impacts of using cannabis should be explored. Such data could be of considerable benefit to policymakers as well as academics.

Methods

Study design

This was a prospective cohort study design. Kalasin province in the northeast of Thailand was selected as the study site because it is a major area of cannabis production.

Population and samples

A total of 261 cannabis users registered as patients in hospitals. Registered cannabis users in 2014 who settled in Kalasin province, a province chosen randomly from those with the greatest cannabis production in Thailand, were identified as the target population for this study, and were approached to participate in person at an appointment. All 261 agreed and gave their written consent to participate in a study on the burden of disease in April 2015. Of these, 58 cannabis users agreed and gave their written consent to participate in an in-depth study. These individuals gave their private telephone number to the research team and allowed the research team to visit them at home in April 2015. After 1 year, 13 cannabis users moved to other provinces or had lost contact with the research team. Thus, 45 cannabis users remained in April 2016. These 45 individuals lived in 16 communities in 10 districts in Kalasin province.

Besides cannabis users, 16 community leaders were recruited to provide information about community demographics and drug use. In addition, 480 laypeople from 16 communities (30 each

of both sexes in various age groups) agreed to answer the Thai Addiction Stigma Scale¹³ (for comparison with the cannabis users). All participants were recruited in April to May 2016.

Tools

In this study, investigators and research assistants were essential. One investigator had a PhD and over 20 years of experience in drug research, one had a PhD and 10 years of experience in drug research, and one had a master's degree with 5 years of experience in qualitative research. Assistance was provided by health officers who have worked with target communities for over 10 years.

A psychiatric nurse with a master's degree and over 20 years of experience working with drug addicts, developed three in-depth interview guidelines (for healthcare personnel, community leaders, and cannabis users). Diaries were created for cannabis users to self-report signs/symptoms, healthcare activities, healthcare and related expenditures, and cannabis-related expenditures. The Thai Addiction Stigma Scale (content validity index = 0.97, Cronbach's alpha = 0.77)¹³ was used to gather data from the laypeople. This scale had a total score ranging from 16 to 120 and comprised 5 subscales: familiarity, risk perception, fear, social distance, and community response. Furthermore, data on burden of disease among cannabis users were gathered using the interview guidelines developed by Loeiyood¹⁴.

Data collection

In April 2015, data on medical history, cannabis use patterns, and personal characteristics were collected from cannabis users through in-depth interviews. A total of 261 cannabis users who gave their consent were interviewed at their home, without anyone else present, after their regular appointment at a hospital. At each appointment, cannabis users provided 30–60 minutes for the research team to interview them. When we did not reach data saturation for a particular participant, we asked participants to take part in another interview at their next appointment and repeated this until the data were saturated (ranging from 1 to 3 times). We did not use voice or video recording or take photographs of the interviews or users. However, notes were taken during the interview. For the 58 cannabis users who consented to the in-depth study, the research team visited them at home for another private interview and participant observation during daily activities on a monthly basis, half a day each. Again, recording devices were not used. Diaries were given to each cannabis user to enable them to record data on the symptoms and expenditures of cannabis use. This diary was exchanged with a researcher once per month based on appointments until April 2016. During the monthly appointments, cannabis users were asked to clarify what they had recorded in the diary and were interviewed in more detail. During the fieldwork period, we interviewed 10 healthcare personnel and 16 community leaders. The Thai Addiction Stigma Scale was administered to the laypeople in early 2016. On cannabis users' last appointment, around April 2016, they were interviewed about the burden of disease and their medical history in the past year.

Analysis

Data from cannabis users' diaries and interviews were triangulated with data from the health personnel and community leaders. Content analysis was employed for the interview data, while the health events in the diaries were tallied. To evaluate the burden of disease, we calculated users' disability-adjusted life years (DALYs) from their 1-year medical history. The direct economic costs, both public (e.g., hospital expenses for – medication, supplies, admission) and private (e.g., food, transportation, and others), of cannabis use were tallied. Furthermore, we calculated the economic losses based on individual non-working hours/days. The costs incurred from other cannabis-related events were also tallied.

Data analysis

Once data were collected from the participants, the researchers used data coding to categorized information. Data analysis was conducted by considering the essence of the content of the health, economic, and social effects of cannabis use in Thailand.

Ethics statement

During the data collection stage, participants provided their written informed consent. Personal identifiers (names, full addresses) were stripped from the dataset. This research project was approved by the Human Research Ethical Committee of Khon Kaen University (HE 571473) based on the principles of the Declaration of Helsinki and the Good Clinical Practice standards of the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH).

Results

Study background and demographic information

The 261 cannabis users we initially selected made 2,698 visits to healthcare facilities in the past 12 months due to illness. Furthermore, 150 out of these 261 users visited the hospital due to cannabis-related illness. Approximately 150 users reported psychiatric problems and 3 experienced multi-drug use. A total of 14 users had road accidents, 6 users were injured by others, and 1 user made a suicide attempt.

Of the 45 participants who completed the in-depth study, all were male and had an average age of 43.51 years. The majority were married (55.53%) and had primary degrees (53.33%), and 37.77% worked as farmers. For most respondents, alcohol was their first drug (53.33%), and they later moved to cannabis. The average age at which participants first used cannabis was 19.02 years. The primary method of cannabis use was bamboo pipes. Participants had used cannabis for an average of 26.86 years. All of them perceived that they were addicted to cannabis. The most common frequency of use was three times per day (42.22%), and the average amount was about 1 g per use.

When researchers followed up with 45 participants after one year, they examined the health, economic, and social effects of cannabis. While none of the users died over the study period, there was a considerable loss of DALYs, at 120.09, with a mean loss of 0.78. Interestingly, among the three users of multiple drugs, cannabis was not the gateway—they had used other drugs before cannabis.

Health impacts

Although a number of cannabis users had received treatment for illness over the study year, they generally perceived themselves to be of good health. Of the 45 respondents, 3 reported that they had a preexisting medical condition (one had diabetes and two had epilepsy). One participant told researchers:

“My mother and brother are diabetic. 15 years ago, I went to the hospital and the doctors told me that I was diabetic. An elderly man told me that cannabis can be used to treat diabetes. I tried cannabis and have used it since then. When I went to the hospital last month, the doctors said that I had normal blood sugar.”

Overall, 89.77% of participants viewed themselves as in good health. For example, one respondent said:

“I never get sick. I check on my health every year. I do not have diabetes or blood pressure issues.”

In addition, 87.33% users reported that they did not believe they were abusing drugs, despite their continuous cannabis use. For example, respondents said:

“I can repay everyone. People who use cannabis alone will be healthier. However, if cannabis is used in combination with other drugs like alcohol, then people might be exposed to certain health risks.”

“Most old people in the past, they smoked cannabis, and did not see anyone as crazy or schizophrenic. In contrast, it's good for smokers...good health and longevity.”

Economic impacts

Of the 45 cannabis users, 17 reported contact with law enforcement since using cannabis is illegal in Thailand. Using data from the self-report diary, we analyzed the private costs of cannabis use, and found that economic losses tended to result from law enforcement—both direct costs (e.g., fines, lawyer fees, transportation) and indirect costs (for both the self and relatives, e.g., production losses, litigation, and accidental losses such as compensation for accident and injury and related costs).

The total medical costs for the cannabis users, including the treatment of addiction, amounted to 142,560 baht (4,537 USD), with an average of 3,168 baht (101 USD) per case. Meanwhile, the total of loss of income, other than prosecution amounted to 32,500 baht (1035 USD), with average of 723 baht (23 USD) per case.

The total costs related to law enforcement and prosecution litigation amounted to 1,445,330 baht (44,267 USD), with an average of 85,019 baht (2,604 USD) per case (range: 12.3–5997.1 USD). Of these total costs, direct costs for litigation (e.g., fines, lawyer fees, bailout) accounted for 1,230,000 baht (39,145 USD), or about 85.1% of all private costs, with an average of 72,353 baht (2,303 USD) per case (range: 0–5,360 USD). The indirect cost accounted for 14.9% of the total costs, and included loss of income during prosecution (82,266 baht or 2,519.6

USD) and caregiver expenses (133,064 baht or 4,075.5 USD), which included transportation/food/accommodation costs during prosecution (102,900 baht or 3,151.6 USD) and loss of caregiver income during prosecution (30,614 baht or 923.9 USD). In addition, the loss of income due to prosecution process was 38,450 baht (1212 USD), an average of 854 baht (27 USD) per case.

Interestingly, we found no costs associated with accidents or property destruction due to drug-related accidents. This may be because when individuals use cannabis, they are careful to keep to themselves or in small groups. Cannabis users do not drive and are often not social while under the influence, as demonstrated by the following responses:

“Since using cannabis, I have never had an accident. I have never heard of anyone using cannabis having an accident. When you smoke cannabis, it puts you in a relaxing, calm mood and you are careful to smoke it by yourself...”

“Do not connect accidents with cannabis use. Cannabis does not cause impulsive moods and thoughts like amphetamines or alcohol.”

Social impact

Social impact in this study was defined as stigma related to cannabis. The 45 cannabis users lived in 16 communities. Within these 16 communities, the addiction stigma score of the 480 laypeople was analyzed. We found a mean stigma score of 84.23 with an SD of 13.44 (95% CI [83.15, 85.31]) and a range of 50 to 111 score. This indicates a moderate level of addiction.

Addiction stigma reflects the negative perception of drug use among community members, and scale scores reflect the degree to which community members attribute various problems in their communities to drug users, including cannabis users. Cannabis users, on the other hand, perceived that cannabis use itself did not cause these social problems, nor did it have an impact on their work or the likelihood of crime, as shown by the following responses:

“I am a hairdresser. Every day, when I smoke cannabis in the morning, I want to do good work and I do it. After work, I smoke in the evening, then go to bed, never disturbing anyone.”

“I have heard rumors that cannabis users are aggressive and assault other people. But no, cannabis puts you in a good mood. I do not want to argue with anyone. It is difficult to find the time to smoke, and it is rare to have a chance to smell the smoke. If you know which family members use cannabis, you will see that these family members do not quarrel. Unless maybe the quarrel was about the use of illegal cannabis, the fear of being arrested, or the fear that others knew they were using drugs.”

“The villagers know who uses cannabis, and they are not offended by it. Cannabis users do not fight and annoy people.

But we think that people in the community hate us because it's illegal. The community thinks that people who use drugs are bad people. The cannabis community has been branded as a drug community . . . if cannabis were legal like cigarettes, the community would not mind. I would not have come to such a dark place.”

Discussion

The study analyzed the effects of cannabis use and found that cannabis is not a gateway to the use of other addictive drugs. These results are in contrast to those of previous studies¹⁵.

Participants that reported using cannabis medically might not use it over the long-term, but still reported a change in their perceived health status. Although this shift may be gradual, it reflects the findings of Lev-Ran *et al.*, who conducted a literature review of 14 studies and found that cannabis users have a 17% lower risk of developing depression than do non-users; in people who use large amounts of cannabis this number increases to a 62% lower risk of depression¹⁶.

Our study showed that cannabis use has a notable economic impact in terms of the government's incurred costs regarding medical treatment, loss of income (for the user and caregiver), and law enforcement and prosecution costs for cannabis-related offenses. Our findings of unemployment of cannabis use are similar to those from a previous study. Past-year job loss preceded past-moth cannabis use, among those who were not using cannabis previously. Moreover, the prior cannabis use presented as a risk factor for unemployment¹⁰. In contrast, our findings differ from those of previous studies in that we did not find any costs associated with accidents. In the United States, for example, in 2006, more than one third of motorists who suffer a fatal road accident used cannabis either before or during their drive⁹. However, our results indicate that cannabis users are self-conscious of their impairment and do not use the drug before or during a drive.

Conclusions

Cannabis use led to a pronounced disease burden and considerable economic losses. However, it does not appear to lead to violence or crime within either the family or community. Despite this, the associated stigma of cannabis use might harm the community. Once the community has labelled drugs as an epidemic, the community begin surveilling the drugs much more intensively, thereby disrupting the normal lives of villagers.

This research admittedly has limitations. This study only included males, and the study period only covered 1 year. In addition, the findings might not be applicable to studies of cannabis use in other locations.

Data availability

Raw datasets have not been made available at the request of the ethics committee in order to maintain participant

confidentiality. Access to the complete raw data can be obtained upon request and with the permission of Ethics Committee of Khon Kaen University (www.ekku.ac.th); since all data were collected in Thai, all data including quotes are only available in Thai. Anyone wishing to access the data should first contact the corresponding author who will facilitate contact with the ethical review board (Contact email: manopkanato@gmail.com). Access will be granted to researchers that wish to use the data for grant applications or similar.

Grant information

The authors would like to thank the Office of the Narcotics Control Board (ONCB75/2558) for funding support of this research project.

Acknowledgements

Grateful acknowledgement is made to the ISAN Academic Network, Khon Kaen University, for generous support for facilities.

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Open Peer Review

Current Peer Review Status: ? ✖

Version 1

Reviewer Report 10 March 2020

<https://doi.org/10.5256/f1000research.19017.r60540>

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Jakob Manthey

Technische Universität Dresden, Dresden, Germany

Overall:

This is an important contribution for the discussion around the regulation of cannabis in Thailand. However, the paper has several major problems and should be thoroughly revised.

Point-by-point:

- ○ The abstract uses causal language ("Cannabis does appear to not cause community conflict or crime"), which is inappropriate given the study design and sample.
- "cannabis use [...] has been associated with outbreaks of illegal drug use" is absolutely not a finding of this study and should be removed altogether.
- ○ I am not sure if cannabis use still has the steepest increases globally or if cocaine is leading. In any way, the most recent UNODC World Drug Report should be cited.
- The second sentence is not logically connected to the first, as medical use is legal in many countries and thus not driving illegal use rates. I would recommend to distinguish between recreational and medical use instead.
- "In addition, among employed workers, those using illicit drugs (including cannabis) are more likely to be fired". I imagine this is more due to the legal status rather than attributable to cannabis use.
- ○ It should be stated whether Kalasin is renowned for illegal or legal, i.e. medicinal, cannabis cultivation.
- It is unclear what kind of patients were included in the study. Were they admitted to hospital because of cannabis use problems? What kind of diagnoses did they meet?
- The term "cannabis users" seems inappropriate, at least for the smaller sample of 45 persons, as they all perceive to be addicted to cannabis.
- It is unclear how many of the original sample have been asked to participate in the in-depth study. Refusal rates should be reported.
- "Laypeople" should be defined. I suppose this means a general population sample of non-users?

- It is not specified how healthcare personnel was recruited.
 - "symptoms [...] of cannabis use" is incorrect and leads to a medicalization and stigmatization of use per se. See also comment above if the study refers to users or persons with CUD.
 - The content of the diary should be specified in more detail and the length of assessment is currently missing.
 - It is not clear to me how exactly the burden of disease, i.e. DALYs, were calculated. An example and reference for calculation should be given.
 - It is not clear to me how exactly economic losses were calculated. What was the reference for calculating losses (e.g. no illness/always working)? I suggest to align terminology with the health economics literature, referring to direct (e.g. medical) and indirect (e.g. productivity losses) costs. Also, state that intangible costs were not assessed.
 - I understand that a wealth of information was collected in the study and it is hard to summarize all data analyses but this section is really slim and insufficient, making it impossible to reproduce this study.
 - I don't understand what data were collected from community leaders and healthcare professionals. How were they analysed?
-
- ○ Generally, I am missing estimates of uncertainty for all results. Further, I would recommend to add descriptive tables for each section (demographics, health, economics, social).
 - An average of 1g per use occasion is quite unusual for Western countries. If available, please state the average THC content in available cannabis products in Thailand.
 - A "mean loss of 0.78" is not clear and should be specified.
 - Interestingly, ..." This should be removed as it is judgemental and actually, before the background of evidence regarding gateway drugs, not surprising.
 - As extensive data on medical records were collected, I would expect more data presented in the paper, at least in a form of a descriptive table.
 - For the economic impact section, the corresponding time frame and the specific sample (all 261 or 45 participants) should be explicitly mentioned.
 - It should be reported how many of the persons had how many legal problems/encounters in which time frame. This would help to contextualize the "economic losses".
 - If baht are converted to USD, the year of date of conversion should be mentioned.
 - The stigma results cannot be interpreted if no reference was given (e.g., mean point, range, results for other conditions/risk factors). Also, how can a stigma scale be an indicator for addiction? This should be removed altogether: "This indicates a moderate level of addiction."
-
- ○ "The study analyzed the effects of cannabis use and found that cannabis is not a gateway to the use of other additive drugs". No, this was not the aim of the study, nor was it really investigated. This sentence is misleading and should be removed. Also, this finding (if it was a real finding) is not in contrast to a large body of research on this topic.
 - Citing the findings from Lev-Ran regarding risk of depression among cannabis users seems out of context. It is not clear why this study was cited here. Instead, results of

the study should be discussed in context of the literature.

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

No

Are all the source data underlying the results available to ensure full reproducibility?

Partly

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Epidemiology, public health, cannabis and alcohol use and disorders.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 14 October 2019

<https://doi.org/10.5256/f1000research.19017.r53644>

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Jürgen Rehm

Institute for Mental Health Policy Research, Centre for Addiction and Mental Health (CAMH),
Toronto, ON, Canada

The following points should be clarified before I would consider this article to be “scientifically sound”.

1. Can we please give details for the following statement: *Although cannabis is illegal, the number of cannabis users is increasing throughout the country*¹². Please indicate also how solid the underlying data are. To my knowledge, 0.2% of the Thai general population used cannabis in the last year (Angkurawaranon *et al.*, 2018¹), and it would be very hard to be

sure about increases in use.

2. The original sampling is not at all clear. What is a “registered user” in Thailand? Registered where? Please indicate exactly this process and what potential biases it may introduce. It is also not clear if these people were medical cannabis users or not.
3. The biggest problem seems to me that it is not at all clear for which group the results are representative or typical? Less than 20% of the original sample was re-interviewed, and it is not even clear what the original sample stood for. So the discussion needs to focus on this question way better. Who were the people who consented to follow-up and why?
4. Then, the role of stigma, which may be the most important part of the study, should be clarified. The used scale needs to be described in greater detail, and the results need to be better contextualized.
5. No causal language should be used. The authors report some perceived associations, and this should be described as such.
6. With respect to the gateway drug, if I am not mistaken, the conclusions are based on N=3 cases. Much more caution in the interpretation is necessary.
7. The authors speak about cannabis-related disease. Please define, what disease groups were considered as cannabis related.
8. Given all of the above, the authors should make a detailed limitations section in the discussion and based on this state, what conclusions can be drawn from the study with what uncertainty.

References

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Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Partly

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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