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Legalization of Non-medical Cannabis: A Public Health Approach to Regulation

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Foreword

The *Institut national de santé publique du Québec* (INSPQ) is a public health expertise and reference centre in Québec. Its mission is to support Québec's Minister of Health and Social Services and regional public health authorities and institutions in the exercise of their responsibilities, by making available its expertise and its specialized laboratory and testing services. One of the INSPQ's missions is to inform the Minister of Health of the impact of public policies on the health status of the population of Québec based on the best available evidence.

The present analysis is pursuant to this objective. In preparation for the legalization of non-medical cannabis announced by the federal government, the Government of Québec has formed an interdepartmental committee with participation from the departments of health, justice and public safety. This committee is tasked with developing a potential framework for the management of legalized cannabis. To inform the thinking of public health authorities, the INSPQ has produced, at the request of the *Ministère de la Santé et des Services sociaux* (MSSS) [Québec's ministry of health and social services], a preliminary analysis of the challenges posed by the legalization of cannabis from a public health perspective. This analysis was carried out between August 25 and October 28, 2016.

The INSPQ's expertise in this area derives from its surveillance, toxicology and health prevention and promotion activities. In 2011, the INSPQ hosted a symposium on public policy related to psychoactive substances (*Symposium sur les politiques publiques en matière de substances psychoactives*), during which the issue of cannabis, and in particular the possibility of legalizing it, was widely discussed. More recently, the INSPQ's research has focused directly on the use of cannabis by Québec youth, as well as on the effects of cannabis on driving. The reflections set out in this document were also informed by solid expertise developed in the areas of alcohol and tobacco regulation, reducing harms associated with illicit psychoactive substances, and healthy public policy development.

This analysis also includes some excerpts from documents the INSPQ has already published or will be releasing.

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Highlights

- Cannabis is the most commonly consumed illegal substance. The current system of prohibition and its sanctions do not prevent the use of this substance. The most recent data indicate that about 15% of the Québec population report having used cannabis in the past 12 months. More than half of those who have used cannabis report having used it less than once a month. Those who use it weekly or daily represent about a quarter of cannabis users.

- Cannabis is not an ordinary product. It carries risks for public health and safety. Its psychoactive effects affect the ability to drive motor vehicles, can lead to dependence, can impair brain development in youth, and can potentially give rise to mental disorders. Smoking cannabis can also cause respiratory diseases. The legalization of non-medical cannabis provides an opportunity to create a regulatory system aimed at reducing the social and health problems associated with the use of this substance.

- There are several possible regulatory scenarios or options. The choices made concerning the production, distribution and consumption of cannabis are necessarily interrelated and should be the subject of integrated reflection. These choices will be key to the success of the legalization process, the flattening of the illicit market and the achievement of public health goals.

- The choices made for regulating the distribution and consumption of cannabis should avoid tending toward a trivialization of the substance. In addition, they should not produce setbacks in other areas of public health, for example, by leading to the social renormalization of smoking.

- The commercialization of cannabis products, even within the context of a strict regulatory framework, sets up an opposition between the profit motive of businesses and the public health goal of reducing cannabis use within the population as a whole. In contrast, a not-for-profit approach makes it possible to focus squarely on prevention, health and safety.

- The legalization of non-medical cannabis carries its share of uncertainties and requires innovation on the part of Canada and Québec. Moreover, flexibility must be built into the system so that it can be adapted to the evolving portrait of cannabis use prevalence and practices within the Québec population. Caution should also guide the choices made concerning the regulation of this substance.

Summary

Projected legalization

In April 2016, the federal government announced that in the spring of 2017 it would table a bill to legalize and regulate non-medical cannabis. This legalization process has different objectives all of which are, a priori, compatible with a public health perspective: to put an end to the illicit cannabis market, to generate public revenues, and to reduce the harmful effects associated with the use of this substance (e.g., prosecution of users, health effects).

Cannabis: the most commonly used illicit substance

A little over one third of Canadians aged 15 years and over report having used cannabis in the course of their lives. In 2012, 10.6% of the general population in Canada reported having made use of this substance during the past 12 months, a percentage that represents 3.1 million consumers. In Québec the proportion of persons aged 15 and over who, in 2014-2015, reported having used cannabis in the past 12 months is 15.2%. Of this number, 52% used it less than once a month and 11% used it daily.

With respect to high school youth more specifically, 15.6% of Québec students reported having used cannabis in 2014, which confirms a downward trend that has been observed in this group over the past 15 years.

An atypical consumer product that can have harmful health effects

Although scientific research on cannabis is limited by the illicit status of the substance and although the statistical associations that have been observed do not constitute proof that cannabis use is necessarily the cause of certain health effects, some links have been documented in the literature.

Associations have been observed between early and regular consumption of cannabis and neurological and cognitive effects, effects on mental health, and the risk of dependence. It has also been demonstrated that regular cannabis smokers are more likely to display symptoms of chronic bronchitis. Associations have also been observed between cannabis use during pregnancy and negative effects on childhood growth, the development of cognitive functions, IQ and attention disorders. In addition, studies and tests have established that cannabis has a significant negative influence on the cognitive and motor functions required for safe driving. Evidence suggests that cannabis use is associated with an increase in road accidents and that this risk increases significantly when cannabis is consumed in high doses or simultaneously with alcohol. Finally, contamination with pesticides and other potential effects have been reported and these merit more thorough investigation.

A regulatory system based on a public health framework

The legalization of non-medical cannabis provides an opportunity to establish a regulatory system capable of reducing the harmful effects and health risks associated with the use of this substance. This can be achieved by creating a framework for regulating production, distribution and consumption that reduces the risks associated with the conditions and practices surrounding use.

To succeed in this, the regulatory model or framework implemented should pursue the following public health objectives:

- Reduce cannabis use within the population as a whole;
- Reduce use involving the combustion of cannabis;

- Reduce exposure to second-hand smoke;
- Control the potency, safety and quality of cannabis products offered through the licit market;
- Reduce and prevent higher-risk forms of use;
- Promote consideration of the vulnerability of specific groups.

The commercialization of legalized cannabis: incompatible with a public health framework

Commercialization is, by its nature, difficult to detach from a market logic based on growth and profitability. The actors involved in the cannabis industry are incentivized, by their financial interests, to promote levels of use and practices which have harmful effects on public health. Analyses indicate, moreover, that increased cannabis use is associated with its commercialization and not with a change in its legal status.

Two broad approaches may be adopted in response to the logic of commercialization: 1) regulate the market to limit risk and harm, including through the establishment or designation of a government agency with the power to control and regulate the industry, and through the adoption of other measures such as constraints on the range of products that can be offered, strictly regulated access to the product, or the control, or even prohibition, of advertising and marketing; and (2) lean as far as possible toward a not-for-profit approach, for example, by creating user cooperatives.

The regulatory issues and options related to the production of legalized cannabis

The issues surrounding the production of cannabis are tied to product forms (dried buds, vaping products, product diversification, THC concentration), their safety and toxicity (mould, pesticides and other contaminants), the labelling and packaging of the products distributed, and the choice and level of supervision of persons/businesses that will be authorized to produce (home production for personal use, user cooperatives, large scale commercial production). The choices made regarding the regulation of production are just as important as those made regarding the distribution of products. For example, it is reasonable to suppose that if legally supplied products do not meet users' needs (for example, THC levels are too low), this could lead either to the perpetuation of the black market, or to consumption practices that are harmful to health (for example, increased frequency of use involving combustion).

The regulatory issues and options related to the distribution of legalized cannabis

The issues surrounding the distribution of cannabis are contingent upon the choices made regarding its production. They concern the choice and degree of oversight of persons or businesses that will be authorized to distribute directly to consumers (user cooperatives, licensed for-profit distributors, public distributors), accessibility of the product (legal, physical and economic), decisions related to the advertising and marketing of the product, the training and the prevention mandate of personnel tasked with distribution, and the limiting of supply quantities. These choices raise issues, among others, tied to the planning of use, the trivialization of the substance and its use, measures that could minimize the impulsive purchase of cannabis, and its distribution concomitantly with other psychoactive substances (alcohol, tobacco, drugs).

The regulatory issues and options related to the consumption of legalized cannabis

The issues surrounding the use of cannabis bear some similarity to those tied to alcohol and tobacco use and therefore pose a challenge related to the consistency of action with current measures directed at controlling the use of these psychoactive substances. Many of these issues derive from regulatory choices made upstream concerning the production and distribution of the substance. They

relate, in particular, to the designation of areas where consumption is authorized (allowing use in public or only in the home) and the modes and contexts of higher-risk forms of use (combustion of cannabis, driving with impaired faculties and intoxication in the workplace). These issues tied to consumption indicate the need to monitor the evolution of portraits and contexts of use.

Conditions for the success of public health-oriented regulation

There are numerous public health issues and possible regulatory scenarios. The choices made regarding the cannabis production-distribution-consumption chain will be key to the success of the legalization process, the flattening of the illicit market and the achievement of public health goals

To optimally foster the achievement of these objectives, the following set of conditions should be met regardless of the model or system that is ultimately preferred:

- To the extent possible, avoid a commercial logic;
- Establish one or more government agencies for controlling cannabis;
- Develop quality assurance mechanisms and procedures;
- Manage uncertainty through monitoring and the establishment of a flexible system;
- Implement public information activities prior to legalization;
- Detail the mechanisms for regulating medical and non-medical cannabis while ensuring respect for their distinct functions.

The regulatory scenarios most aligned with public health

Based on a prospective analysis of the potential impacts and the contextualization of the various components of the regulatory options, the INSPQ presents here the scenarios that merit further consideration. These scenarios, presented in schematic form on page 43 of this document, may be submitted for deliberation to the actors concerned:

- **A not-for-profit system under which** the production of cannabis in the home for personal use could be allowed and where production and distribution could also be undertaken by *user cooperatives or not-for-profit organizations (NPOs*). *A government agency* would oversee all activities, in particular by granting licenses to cooperatives and NPOs and by establishing and enforcing the rules governing production and distribution. According to this scenario, the products of licensed NPOs would be destined for a government purchasing monopoly that would redistribute the cannabis to licensed NPOs with a harm reduction mission.
- A system that opens the door to private for-profit producers. According to this scenario, cannabis could in fact be produced by private licensed producers, overseen by a government agency. Their products would also be destined for a government purchasing monopoly tasked with supplying distributors. Distribution would be handled either by *a government corporation with a distribution monopoly and with* publicly-owned retail outlets, or by licensed NPOs. These two types of distributors should have a harm reduction mission that offers, for example, a voluntary self-limitation program. Retailers should not be subject to any sales quota or be given financial performance targets. The government corporation should, ideally, be under the authority of the *Ministère de la Santé et de Services sociaux* (MSSS), in collaboration with partner departments.

Introduction

In April 2016, the federal government announced that in the spring of 2017 it would table a bill to legalize and regulate non-medical cannabis. Since then, it has set up the Task Force on Cannabis Legalization and Regulation which conducted public consultations during the summer of 2016 in order to seek the input of various government actors, experts and citizens regarding the type of regulatory model to implement.

Because cannabis is not an ordinary consumer product and its use can have harmful effects on the health of the population, public health actors must be prepared to offer their response to the framework structuring the legalization process and the various regulatory measures that will derive from it. It is the INSPQ's view that the success of the federal initiative depends on the ability of all levels of government to adopt a system for regulating legalized cannabis that will reduce the risks associated with the conditions and practices surrounding its use.

So far, neither the federal nor the provincial government have made public a bill or a formal position regarding the regulatory model to be preferred. If the alcohol and tobacco regulation systems are any indication, provincial and territorial governments will probably be responsible for cannabis distribution, as well as for the measures adopted to protect and promote public health and safety. Nevertheless, certain decisions concerning the regulation of production will have repercussions for the health of the population and the distribution system. Therefore, these must also be the subject of reflection and discussion among provincial health authorities.

This analysis aims to further knowledge about the public health issues associated with the legalization of non-medical cannabis and to open avenues for reflection about regulatory modes. The information set forth extends beyond the usual framework for reflection on public health issues, and offers a prospective analysis of the potential impacts of regulatory models. Concerns specific to criminology, sociology or policy analysis, for example, are also raised in order to broaden understanding of the impacts – real and potential – of the legalization project within the Québec context.

A review of the literature and of the best available data was carried out within the short timeframe allotted for producing this analysis. However, scientific research on the subject is limited due to the illicit nature of the substance, which constitutes an intrinsic limit to any analytical study of the effects of cannabis and its contexts of use. It is true that, recently, some jurisdictions have legalized non-medical cannabis, but they are few in number. Examples like Uruguay or the states of Colorado and Washington illustrate different approaches, from which it is possible to draw useful lessons, but few analyses and evaluations of these experiences have been conducted so far. It is, however, possible to take advantage of the lessons learned through efforts to control other psychoactive substances such as tobacco and alcohol, which are, in contrast, well documented.

The aim of this analysis is to broaden the understanding of Québec policy makers and to support the public health network in arriving at an informed position regarding this issue. Work in this area is ongoing and a more in-depth analysis may be conducted, in particular, once the federal government's intentions have been more clearly defined.

This document is divided into six sections. The first discusses the current context of prohibition. The second section draws a portrait of cannabis use in Canada and in Québec, while the subsequent section describes its effects on health. The core of the document lies in the fourth section, which presents the public health framework that should be the basis for the future regulatory model. Then, section five presents the analysis of the public health issues associated with the production-distribution-consumption chain of legalized cannabis. In advance of the conclusion, section six details a few conditions for success and some regulatory scenarios for the legalization of non-medical cannabis.

1 Current context of prohibition

The current system of prohibition is framed primarily by the Canadian *Controlled Drugs and Substances Act* (CDSA), which restricts drug uses to those carried out in medical settings (as with medical cannabis) and scientific settings and outlines the conditions for such uses. This system entails the criminalization of drug producers, distributors and users acting outside these two frameworks.

Persons convicted of violating the CDSA are subject to fines, probationary periods or imprisonment for varying lengths of time. Even offences considered minor, such as the possession of a small amount of cannabis, can result in a criminal record, with negative repercussions for offenders, in particular, on their employment opportunities and, consequently, their income.

In Québec,[1] in 2007, the police reported 20,357 violations of the CDSA related to the possession, trafficking, importing and exporting, and production of substances covered by this law. A majority of offences, totalling 14,194, related to cannabis. For all substances combined, the most reported offence was possession, with 12,958 cases. As regards court action, the Québec justice department does not systematically compile statistics on its activities related to the CDSA. According to data submitted by the *Bureau du Directeur des poursuites criminelles et pénales* (Québec's office of the director of public prosecutions), 7,726 charges of simple possession were laid in 2007 by prosecutors concerning 7,127 cases (Gagnon, 2016).

It should be noted, moreover, that Québec has adopted a Program to deal non-judicially with certain criminal offences committed by adults.[2] For certain minor criminal offences, such as the possession of a small amount of cannabis,[3] prosecutors may choose not to lay charges under certain conditions, as for example when there are no prior related offences. According to data submitted by the *Bureau du Directeur des poursuites criminelles et pénales*, 1,374 cases of cannabis possession were processed under this program in 2007. Since then, an increase in cases processed under the program has been observed. In 2011 and 2012, 2,522 and 2,311 cases respectively were processed under this program (Gagnon, 2016).

As demonstrated in the following section, which profiles the use of cannabis in Canada and Québec, the current system of prohibition and its associated sanctions do not prevent use of this substance. It has also been strongly criticized for failing to curb the illicit market, and for not enabling control of product quality or control of accessibility to youth (LeDain, 1972; Nolin, 2002).

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1 For specific information on drug-related law enforcement activities carried out by the police, judicial and correctional systems in Québec, refer to the report published in 2016 by the INSPQ entitled Synthèse des connaissances : actions novatrices en matière de substances psychoactives « illicites » (p. 19 and on).

2 In other provinces, such as Ontario and British Columbia, there exist guidelines that allow prosecutors in some jurisdictions to refrain from laying charges for minor offences. It is understood that cannabis possession offences can be included in this category, but no other provincial program specifies the offences concerned.

3 The offences of possession (Sec. 4 [1]) and possession for the purpose of trafficking (Sec. 5), when these involve less than 1 gram of cannabis resin or 30 grams of marijuana, are covered by this program (Directeur des poursuites criminelles et pénales, 2012).

2 Portrait of cannabis use[4]

2.1 In Canada

Cannabis is the most frequently consumed illicit psychoactive substance in Canada. According to the most recent Canadian Tobacco, Alcohol and Drugs Survey (CATDS), carried out in 2013, slightly more than one third of Canadians aged 15 years and over reported having already used it during their lifetime (33.7%). A total of 10.6% reported having used it during the twelve months preceding the survey. This figure corresponds to 3.1 million "current users" (Statistics Canada, 2015). This represents a decline of 3.5% as compared to 2004 (Government of Canada, 2014; Statistics Canada, 2015).

New data indicate that young adults aged 20 to 24 years form the largest proportion of users, accounting for 26.2%. This proportion falls to 22.4% for youth aged 15 to 19 years (Statistics Canada, 2015). According to a report by the UNICEF Office of Research, Canada has the highest percentage of adolescents aged 11, 13 and 15 who have used cannabis in the past year, as compared with adolescents of the same age from other developed countries (UNICEF, 2013).

2.2 In Québec: evolution of the proportion of users

According to the most recent *Enquête québécoise sur la santé de la population* (EQSP) [Québec's population health survey] conducted in 2014-2015, the proportion of persons aged 15 years and over that reported having used cannabis during the past 12 months is 15.2% (Institut de la statistique du Québec [ISQ], 2016a). Compared to 2008, this represents an increase of 3% over the entire population (15 years and over).

However, stratification by age group shows that this increase in the number of persons who report having used cannabis in the year prior to the survey is observed mainly among adults. In fact, the largest increases are observed among 18-24 year olds and 25-44 year olds. Among 15 to 17 year olds, the increase, compared to 2008, is very modest and not actually statistically significant.

Table 1 **Proportion of the Québec population aged 15 and over having used cannabis during the previous 12 months, by age group, in 2008 and 2014**

Age group	2008	2014
15-17 years old	30.2	31.0
18-24 years old	35.3	41.7
25-44 years old	15.2	21.0
45-64 years old	5.0	8.0
65 years old and over	0.5	1.1
Total	12.2	15.2

Sources: ISQ, 2008; ISQ, 2016a.

[4] Some data have been drawn from a soon-to-be-published report by the INSPQ entitled "La consommation de cannabis au Québec et au Canada" (Tessier, in press).

Certain factors, however, call for care in interpreting the evolution of the proportion of declared users reported by the EQSP data. On the one hand, it is possible that the Liberal Party of Canada announcement concerning the substance's upcoming legalization makes adults less reluctant to declare their use.5 In addition, the surveys do not provide information about the quantities consumed by those who reported use. Therefore, the overall increase in reported use cannot automatically be associated with an increase in the amount consumed. It is possible that a greater number of people reported using cannabis in the past year, but that the volume consumed increased little, or even decreased.

The relative stability of reported use among 15-17 year olds, as compared to the increase observed among adults, is less surprising if we take into account the overall downward trend in cannabis use observed among Québec high school students over the past several years. Indeed, the proportion of Québec high school students who reported having used cannabis in the past 12 months went from 21.7% in 2012-2013 to 15.6% in 2014-2015 (Health Canada, 2014; Health Canada, 2016a). This confirms the results of the Québec Survey on Smoking, Alcohol, Drugs, and Gambling in High School Students (referred to by its French acronym, ETADJES), which also indicated a significant decrease in the number of youth who reported having used cannabis in the past year. This survey, which was conducted among all high school students in Québec, revealed a decline from 41% in 2000 to 23% in 2013. Among youth in their last year of high school (those aged about 17), this proportion decreased from 60.6% to 42.8% (ISQ, 2014).

2.3 In Québec: evolution of the frequency of use

Still according to data from the EQSP, examination of the data on frequency of use reveals a decline, since 2008, in frequent consumption by users aged 15 and over. Indeed, among the Québec population aged 15 years and over who had used cannabis during the previous 12 months, a significant majority (52%) had used it less than once a month in 2014. Between 2008 and 2014, a decline in the prevalence of daily users can also be observed among 18-24 year olds (from 15% to 10%) and among 25-44 year olds (from 17% to 12%) (ISQ, 2008; ISQ, 2016a). Here again, the surveys do not indicate the quantities consumed by those who reported use.

Table 2 **Frequency of use among the Québec population aged 15 and over having used cannabis during the previous 12 months**

Frequency of use	2008	2014
Less than once a month	38.4%	52%
1 to 3 times per month	24.3%	15.2%
Once a week	10.6%	8.5%
More than once per week	12.4%	13.5%
Every day	14.4%	10.8%

Sources: ISQ, 2008; ISQ, 2016a.

[5] The multimethod collection method used is also likely to have acted on the social desirability bias. The 2014-2015 EQSP used web forms in addition to the usual telephone questionnaires to collect data. The added anonymity that respondents may associate with this web collection method can also help reduce the underreporting bias, and thus contribute to the observed increase in reported use. This is another factor that calls for caution in the interpretation of the results (ISQ, 2016b).

Also apparent is a decline, although smaller, in the frequency of use among high school students. The 2013 ETADJES reports that more than one third (34%) of 12 to 17 year olds who reported having used cannabis during the preceding year used it on a regular or even daily basis. The proportion of daily users decreased from 2.6% in 2008 to 1.4% in 2013. Although there was a decrease in those termed regular or occasional users for the same period, these differences are not statistically significant and conclusions cannot be drawn regarding these groups of users (ISQ, 2014).

3 Health effects[6]

Scientific research on cannabis is limited by the illicit nature of the substance. There are often methodological problems with studies, making their interpretation difficult. Moreover, the statistical associations observed do not necessarily prove that cannabis use is the cause of the health effects concerned. For example, studies may be biased if the populations studied are not representative of the general population (selection bias). Cannabis use may be underdeclared or be subject to memory bias. It is also possible that other factors (for example, socioeconomic level, living environment, tobacco use and consumption of alcohol or other drugs) are associated both with cannabis use and the effects studied and that they are the cause of the latter (confounding factors). Finally, studies do not always establish the direction of causality; for example, does cannabis use increase the likelihood of a mental disorder occurring or is it the presence of a mental disorder that increases the likelihood of cannabis use?

3.1 Neurological, cognitive and mental health effects

According to the studies included in the World Health Organization (WHO) report, early initiation and intensity of use can adversely affect the brain development of adolescents (WHO, 2016) up until the age of 21 (Volkow et al., 2014). The Colorado Department of Public Health and Environment (CDPHE) journal (2016b) reports that adolescents who regularly use cannabis are more likely to have problems at school (learning, memory, math and reading) which can persist for up to 28 days following use. They are also less likely to graduate from high school. Heavy cannabis use is strongly associated with memory impairment (CDPHE, 2016d; Volkow et al., 2016).

Several studies have established a relationship between regular cannabis use and psychotic disorders or symptoms (CDPHE, 2016d; Giordano, Ohlsson, Sundquist, Sundquist, & Kendler, 2015; Volkow et al., 2016). These risks increase, in particular, among persons who began using cannabis in adolescence as well as among those with a personal or family history of psychiatric disorders (Hall & Degenhardt, 2009, 2014; Volkow et al., 2016). Daily or almost daily use is associated with the presence of mental illnesses such as schizophrenia in adulthood (CDPHE, 2016b).

In addition, associations have been observed between cannabis use and bipolar, anxiety and depressive disorders, although scientific evidence remains insufficient or contradictory (CDPHE, 2016d; WHO, 2016). Also, a recent systematic review with meta-analysis demonstrated a tendency toward an increase in the risk of suicidal ideation or suicide attempts among heavy users of cannabis (Borges, Bagge, & Orozco, 2016). Here again, it should be stated that the CPDHE (2016b) considers the results of studies to be contradictory.

[6] For our discussion of the health effects of cannabis use, we relied mainly for documentary evidence on the systematic reviews carried out by the Colorado Department of Public Health & Environments (CDPHE) (CDPHE, 2015a, 2015b, 2016a, 2016d) and on a WHO report (WHO, 2016). These reviews take into account the methodological limitations of studies and were chosen for the rigour with which they were produced.

3.2 Cannabis dependence

The 2012 Canadian Community Health Survey (CCHS) indicates that an estimated 6.4% of the Québec population have reported a cannabis abuse or dependence problem during their lifetime, and that 1.4% had reported this type of problem during the twelve months preceding the survey (ISQ, 2015). The prevalence of cannabis abuse or dependence has been shown to be highest among persons aged 15 to 24, with 12.2% having experienced it during their lifetime and 6.8% having experienced it during the twelve months preceding the survey (ISQ, 2015). Still within Québec, the prevalence of abuse or dependence linked to alcohol is higher than that linked to cannabis, with the rates for alcohol being 13.3% for lifetime prevalence and 2.7% for the twelve months preceding the survey.

The risk for cannabis users of developing a dependence on cannabis is estimated at 9% (Hall & Degenhardt, 2014, Volkow et al., 2014). However, this risk rises to 16% among those who began using cannabis as adolescents (Hall & Degenhardt, 2014; WHO, 2016). Adolescents and young adults who use cannabis, even occasionally, are more likely to develop a dependence on cannabis and other drugs, as well as on alcohol and tobacco, as adults (CDPHE, 2016b).

3.3 Effects of prenatal exposure to cannabis

The active ingredient in cannabis, tetrahydrocannabinol (THC), crosses the placenta and some studies indicate that it could affect brain development (Huizink, 2014; WHO, 2016). Epidemiological studies on cannabis use during pregnancy are characterized by many of the methodological limits mentioned previously (Huizink, 2009). However, according to the CDPHE (2015b), prenatal exposure to cannabis could adversely affect childhood growth, the development of cognitive functions and IQ, and it could lead to attention disorders (CDPHE, 2015b). These effects may only become apparent during adolescence (CDPHE, 2015b). Indeed, according to Huizink (2014), it would only be during the development of certain areas of the brain that the long-term effects of cannabis would become evident. As regards prematurity, intrauterine growth delays, low birth weight and neonatal problems during early childhood, studies report contradictory results (CDPHE, 2015b).

3.4 Injuries

Studies on cannabis-related injuries are focused on road injuries. In a recent review of the literature carried out by the INSPQ, the authors describe how cognitive tests carried out on individuals having consumed cannabis reveal that perceptual and psychomotor functions are greatly affected: attention is lowered, reaction times increase, trajectory tracking and motor control diminish (Douville & Dubé, 2015). According to the WHO, the recent use of cannabis is associated with significant impairment of driving ability especially among occasional users (WHO, 2016).

Evidence suggests that cannabis use is associated with an increase in road accidents (CDPHE, 2015a; WHO, 2016). The risk appears to increase significantly with the blood concentration of tetrahydrocannabinol or in the case of concomitant alcohol use (CDPHE, 2015a; WHO, 2016).

Thus, the data points to the likelihood of a causal relationship between cannabis use and road accidents. New epidemiological studies would be needed to document the association between cannabis use and the risk of accidents in the workplace (CDPHE, 2015a).

3.5 Respiratory effects

Regular cannabis smokers are more likely to have symptoms of chronic bronchitis including a chronic cough, wheezing and sputum (Abramovici, 2013; Hall & Degenhardt, 2009). As for the association between smoking cannabis and the occurrence of chronic obstructive pulmonary disease, the results of available studies are contradictory (CDPHE, 2016a).

According to a review of the literature published by Health Canada, cannabis smoke produces more carcinogens than tobacco, and those it contains are often present in larger quantities than those found in tobacco smoke (Abramovici, 2013). Although scientific studies on the association between cannabis smoke and lung cancer are contradictory (CDPHE, 2016a; WHO, 2016), there appears to be sufficient evidence of an association with precancerous lesions in airways (CDPHE, 2016a). However, there is insufficient data available to suggest a significant association between smoking cannabis and the occurrence of emphysema or respiratory infections (CDPHE, 2016a; WHO, 2016).

Because of concomitant exposure to tobacco, new epidemiological studies would be required to improve understanding of the relationship between cannabis smoke and other effects on the respiratory system.

3.6 Risks related to exposure to pesticides

The risks associated with exposure to the pesticides contained in cannabis are poorly documented, but appear to be real. In the United States, cases of pesticide contamination of cannabis have been reported in California (Sullivan, Elzinga, & Raber, 2013). For example, when samples of medical cannabis obtained from a dispensary were assessed, the concentrations of bifenthrin, an insecticide of moderate to high toxicity, were sometimes 85 to 1600 times higher than the ingestible amount permitted in foods (Sullivan et al., 2013). Moreover, during combustion, the compounds produced by heating can form a complex mixture of products, some of which can react with pesticides to produce a higher level of toxicity than that produced by the pesticides themselves (Lorenz, Bahadir, & Korte, 1987). Unlike cigarettes, which are generally fitted with a filter that can absorb a large amount of the volatile residues and contaminants associated with tobacco smoke (Cai, Liu, Zhu, & Su, 2002), cannabis is generally smoked without a filter. A significantly greater amount of pesticides was found in cannabis smoke from filterless smoking devices than in smoke from devices with filters (Sullivan et al., 2013).

3.7 Other potential effects

According to the WHO, cannabis intoxication can increase heart rate (WHO, 2016). Some studies have reported associations between the use of cannabis and an increase in the risk of developing a heart attack among young adults (WHO, 2016). However, the evidence supporting such a relationship seems limited (CDPHE, 2016c). The same can be said of the association between cannabis use and the risk of ischemic stroke (CDPHE, 2016c). However, some authors suggest the possibility of a cerebral vasoconstriction secondary to the use of this substance (WHO, 2016). In addition, there is limited evidence to support an association between cannabis use and the risk of developing prostate cancer or testicular cancer (seminoma) (CDPHE, 2016c). Still according to the CDPHE, there is currently insufficient or contradictory scientific evidence concerning the risk of developing bladder cancer or male infertility (CDPHE, 2016c). Finally, other potential health effects that depend on the product's biological quality of the substance have been identified in the literature. For example, the use of cannabis containing mould has been associated with outbreaks of salmonellosis (Taylor, 1982). To take another example, tuberculosis outbreaks related to group use in confined spaces or materials sharing have also been documented (Oeltmann et al., 2006).

4 Public health framework

The legalization of non-medical cannabis is usually justified by the pursuit of various objectives all of which are, a priori, compatible with a public health perspective: putting an end to the illicit cannabis market, generating public revenues (that can be reinvested in prevention programs), and reducing the harmful effects associated with cannabis use (prosecution of users, health effects). However, no model for regulating the production, distribution and consumption of legalized cannabis simultaneously promotes the full and complete attainment of these three objectives. The order of priority given to these aims will influence the regulatory choices made and the structure of the system established.

From a public health perspective, it appears clear that priority should be given to the prevention and reduction of the harms associated with cannabis use. The INSPQ views the legalization of non-medical cannabis as an opportunity to create a regulatory system aimed at reducing the harmful effects and health risks associated with the use of this substance. Such harm reduction requires the creation of a system for regulating production, distribution and consumption that reduces the risks associated with the conditions and practices surrounding use.

To succeed in this, the regulatory model or framework implemented should pursue the following public health objectives:

- Reduce cannabis use within the population as a whole;
- Reduce use involving the combustion of cannabis;
- Reduce exposure to second-hand smoke;
- Control the potency (THC content), safety (packaging) and quality (mould, pesticides and other contaminants harmful to human health) of cannabis products offered through the licit market;
- Reduce and prevent higher-risk forms of use (intense and frequent use, binge-type use, combination with other psychoactive substances, use when driving motorized vehicles, use in the workplace, etc.);
- Promote consideration of the vulnerability of specific groups (youth, pregnant women, persons with psychotic symptoms or those with low socio-economic status).

In addition, the regulatory model should ensure that action is consistent with measures for controlling tobacco and alcohol so as not to reverse progress that has been made in other areas of public health, for example, by leading to the social renormalization of smoking.

5 Issues related to legalized cannabis

This chapter first raises the issue of the commercialization of cannabis. It then discusses the public health issues associated with the production-distribution-consumption chain for legalized cannabis and the different regulatory options for each of these stages.

5.1 The commercialization of legalized cannabis: a central issue

The commercialization of cannabis, due to its effect on the prevalence of use, generates significant risks and harms for health. Long experience with the tobacco, alcohol and medical drug industries, as well as the latest developments related to medical and non-medical cannabis in the United States, clearly demonstrate this. Indeed, the (WHO) has identified the commercialization of psychoactive substances as a major public health issue (Chan, 2013).

Commercialization is, by its nature, difficult to detach from a market logic based on growth and profitability. The actors involved in the cannabis industry are incentivized, by their financial interests, to promote levels of use and practices which have harmful effects on public health (Beauchesne, 1989; Subritzky et al. 2016; Kleiman & Ziskind, 2014).

In fact, analyses indicate that increased cannabis use is associated with its commercialization and not with a change in its legal status. According to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), no simple correlation can be established between regulatory changes and the prevalence of cannabis use in Europe (EMCDDA, 2011). Analyses of Dutch decriminalization policies have already shown that commercialization is what correlates with the increase in cannabis use there, and not the decriminalization of possession in "coffee shops" (MacCoun, 2011). In the United States, the most recent experience in Colorado indicates that the observed increase in cannabis use followed the rapid proliferation of dispensaries and not the legalization of the substance for non-medical use.

IMPACTS OF THE COMMERCIALIZATION OF CANNABIS IN COLORADO

A report produced by a regional law enforcement organization states that the first law legalizing the use of medical cannabis was enacted in 2000. Prior to 2009, there were between 1,000 and 4,800 valid possession permits and no dispensary had been opened. The first dispensaries opened their doors in 2009. Three years later, Colorado had 500 and the number of possession permits for "medical use" had risen to more than 100,000. Therefore, although the legalization of non-medical cannabis came into effect in 2014, the authors of the report consider that the commercialization of cannabis began in 2009 (Rocky Mountain High Intensity Drug Trafficking Area (RMHIDTA), 2015).

If commercialization is considered to have begun in 2009, the first report published by the state of Colorado concerning the legalization of non-medical cannabis points to a strong probability that the commercialization of cannabis (for medical and other uses) is linked to increased use. In fact, according to this state report:

- In 2006, 21% of 18-25 year olds reported having used cannabis in the past 30 days; whereas this proportion had risen to 31% in 2014, an increase of 10%. In comparison, during the same period, the average within the United States went from 16 to 19%.

In addition, the document highlights the following observations:

- Persons with lower levels of income and education report having used cannabis in the past 30 days more frequently than those with higher levels of income and education.
- An increase was observed in the average annual rate of hospitalizations with possible cannabis exposure, diagnosis or billing codes. Between 2000 and 2014, the rate increased from 575 to 2,413 per 100,000 inhabitants.

An increase in the number of calls to the state's poison control center during which there was mention of cannabis. Between 2006 and 2015, the number of calls went from 44 to 227, with particularly marked increases in 2010 and 2014 (Reed, 2016).

As indicated previously, in Canada, even within a context of prohibition, cannabis is a commonly used substance (the third most used psychoactive substance, after tobacco and alcohol). Its legal sale, if promoted using various business strategies, could logically lead to an increase in its consumption. Thus, a commercial logic is directly at odds with the public health goals of limiting cannabis use within the general population and reducing the associated harms. Two broad approaches may be adopted in response to this commercial logic: regulate the market to limit risk and harm or lean as far as possible toward a not-for-profit approach.

5.1.1 REGULATE THE MARKET TO LIMIT RISK AND HARM

Controlling the commercial market through strict regulation is one option. Regulation of the tobacco, alcohol and medical drug industries are examples. The commercial models for the sale of medical and non-medical cannabis in the states of Washington and, especially, of Colorado also fall into this category.

The creation or designation of a government agency with the power to control and regulate the industry has been identified as a way to counteract:

- the vertical integration of the market, that is, direct sales from producers to distributors and users, and the commercial pressures associated with this;

- the horizontal integration of the market, that is, its control by a small number of commercial companies.

The impact of such an agency would be all the greater were it to have a clear mandate to pursue a public health mission, rather than objectives aimed at generating government revenues (Caulkins et al., 2015; Haden & Emerson, 2014; Kleiman & Ziskind, 2014).

Other measures can help restrain a commercial logic, such as limits on the range of products that can be offered, strict supervision of economic, geographical and legal access to the product, as well as control, or even prohibition of advertising and marketing (CCSA, 2015; Haden & Emerson, 2014).

5.1.2 LEAN AS FAR AS POSSIBLE TOWARD A NOT-FOR-PROFIT APPROACH

The regulation of a commercial, for-profit market should not be seen as the only option for regulating the legalization of cannabis. According to some authors, an alternative approach, such as a not-for-profit one, could be an option. Various initiatives of this type have been developed, in particular, in Uruguay, Spain and Belgium and will be discussed further on in this document. Governed by clear regulatory standards determining their mode of operation and their mission, user cooperatives could potentially ensure safe production of cannabis while offering prevention services to users (Transform, 2015; Caulkins et al., 2015; Decorte, 2015). As an alternative to commercialization, the cooperative model is considered by many to be of interest (Decorte, 2015; Bewley-Taylor et al., 2014; Transform, 2015).

5.2 Discussion of the public health issues related to regulation of the production, distribution and consumption of legalized cannabis

The legalization of non-medical cannabis raises several public health issues. It places policy makers before a range of options which shape regulation of the production, distribution and consumption of this substance. Regulatory choices, thus, involve the weighing of advantages and disadvantages, whose relative weight will likely evolve as the legalization process moves forward and its effects on the health of the population are observed.

5.2.1 ISSUES RELATED TO PRODUCTION AND TO REGULATORY OPTIONS

The issues surrounding the production of cannabis are of different orders. They relate not only to the form of products, their harmlessness and their toxicity, but also to the choice and the degree of regulation of persons or companies that will be authorized to produce them. The regulations chosen to govern production are as crucial as those governing distribution to avoid the adoption of a system too driven by a commercial logic, which would encourage increased consumption. The choices made are key to the success of the legalization process, the flattening of the illicit market and the achievement of public health goals. Indeed, it is reasonable to suppose that if legally supplied products do not meet users' needs (for example, THC levels are too low), this could lead either to the perpetuation of the black market, or to consumption practices that are harmful to health (for example, increased frequency of use involving combustion).

Persons and organizations authorized to produce

From the outset, the choices made regarding the designation of persons or organizations authorized to produce will be indicators of the size and degree of competitiveness that the government intends to allow the legal cannabis industry to attain. Specifically, government authorities must decide if they will assign the right to cultivate cannabis to licensed commercial producers, or if they consider that

not-for-profit production, whether in homes or in an organizational setting, may be desirable (Kleinman & Zisking, 2014). This choice will be a particularly structuring one for the entire system to be implemented.

Except in the state of Washington, **production for personal use** is authorized in all the jurisdictions that have legalized non-medical cannabis (Uruguay, Colorado, Oregon, Alaska). The number of plants, however, is limited to 4 to 6 plants per household, depending on the place, to avoid the risk of diversion (CCSA, 2016). Nevertheless, **home production** raises some public health concerns. These relate, in particular, to the quality of the product, the risk of mould in homes and the safety risk for residents (unlawful entry, fires caused by product transformation). Self-production at home could also encourage the trivialization of cannabis use and prompt its use, especially by youth with access to the home. Another limitation associated with this type of production is referred to as the "zucchini problem," an expression that refers to the tendency of harvests to be either too paltry or, conversely, too abundant for one person. In the latter case, it is plausible to assume that the surpluses produced encourage over-consumption or redistribution of the substance (Caulkins et al., 2015).

Production for personal use outside the home, for example in a **user cooperative** such as those found in Belgium, Spain and Uruguay, could be a not-for-profit alternative which would circumvent the concerns associated with home production. This regulatory scenario requires users to plan their consumption, whereas a commercial logic fosters easy access to cannabis and creates the opportunity for impulse buying (Transform, 2015; Caulkins, et al., 2015). If it is not strictly regulated, this model, despite being a not-for-profit one, can serve as a screen for a criminalized industry (Decorte, 2015). The novelty or the quasi legal character of this regulatory model does not allow for assessment of its real and long-term effects on population health.

Licensing of **large scale commercial production** offers another form of supply management. This mode of regulated for-profit production is the one preferred by the American states that have legalized cannabis. This form of management not only makes it possible to limit the number of producers and their size, but can also provide an opportunity to establish quality standards for products. However, the control exercised over the production costs and sales price of cannabis is relative. In particular, a decrease in the substance's sale price has been observed in the event of overproduction when the producer is allowed to distribute directly to the user, as is the case in Oregon and Colorado. Washington State tried to limit the development of the market by limiting the number of producers and their total production capacity (Spithoff, Emerson & Spithoff, 2015; Transform, 2013). Uruguay, in addition to its system of not-for-profit cooperatives, also allowed commercial production. However, it exercises tighter control, particularly over prices, by ensuring that industrial production is sold to a government purchasing monopoly. In the United States, a government monopoly similar to those established for alcohol was not an option, because it would violate federal law which prohibits the substance (Kilmer, 2014).

Authorized forms of cannabis

The various forms of cannabis authorized as well as the concentrations of active agents are also important regulatory issues. Here again, the literature demonstrates that the choices made in this area will have a significant impact on the size of the legalized cannabis market. It is also reasonable to assume that this has an impact on the success of the legalization process and on the flattening of the illicit market.

Product diversification in the tobacco industry has been well documented as an effective way to attract new consumers or to make tobacco use accessible and acceptable. By arousing curiosity, especially among youth and young adults, diversification leads to an increase in consumption. In

addition, some products create the impression that they are less harmful to health. This is the case for example with flavoured tobacco products and water pipes. The fabrication of cannabis products that are easily consumed (e.g., cannabis cigarettes, chocolate-flavoured products, for example), or attractive (e.g., candies) would thus be an offshoot of an effective business strategy of product diversification, which could stimulate demand and create new clienteles, in this case youth. Cases involving intoxification of young children who require hospitalization or the intervention of poison control centres have also been documented in the United States. These situations illustrate the risks associated with the attractiveness of certain flavoured and processed products for which standard doses have not been established. This also applies to medical cannabis (Ghosh et al., 2015).

The prohibition of all processed products is part of the anti-commercial strategy preferred in Uruguay, where only the **dried flower** can be legally produced and distributed. However, because this restriction would encourage consumption through combustion, the processing and distribution of **products intended for vaping** could be part of a coherent public health strategy. However, relevant standards should be developed and controls put in place to ensure the safety and harmlessness of these products and to prevent the development of flavoured products intended to appeal to youth.

The issue of product diversification also relates to the authorized **concentration of active agents**. In particular, the advantages and disadvantages of limiting levels of THC, the main psychoactive agent, must be carefully weighed. While some higher concentrations may be justified for medical use, the overall increase in concentrations observed over the years in cannabis available through the illicit market raises fears that an increased risk of severe intoxication or dependence could result. However, based on current scientific knowledge it is not possible to conclude definitively that cannabis with higher levels of THC is more "addictive."[7] Some users, seeking lower THC levels, therefore prefer self-cultivation or join user cooperatives to gain more control over the potency of cannabis (Decorte, 2014; Haden & Emerson, 2014). Dried products with high THC levels generally have between 10% and 25% and seldom exceed 30%. Processed products like hash oil, however, can reach levels of over 80%. To discourage the non-medical use of products with too high a concentration of THC, restricting THC levels in non-medical cannabis to15%, for example, is being considered in the Netherlands. As with the taxation of alcoholic products, which public health authorities would like to see adjusted according to their alcohol content, the taxation of cannabis products could be tied to their THC levels. In any case, all choices concerning the authorized concentrations and forms of cannabis products should be carefully considered so as to ensure that users are not tempted to return to the black market for supplies (Kilmer, 2014; Kleiman & Ziskind, 2014; Caulkins et al., 2015).

Quality and safety of cannabis and its cultivation

Added to the issue of THC concentration, is the regulatory issue of the possible presence of contaminants, additives or other active agents in cannabis. The presence of **mould** and pesticides in cannabis products is frequently reported in the literature and by the media,[8] and this is a quality criterion for some users. In fact, organic cultivation is sometimes a required standard of user cooperatives (Decorte, 2015).

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7 https://www.drugabuse.gov/publications/drugfacts/marijuana (retrieved on September 30, 2016).

8 Last August, the *Globe and Mail* investigated the presence of traces of pesticides, moulds, fecal bacteria, and other residues in the cannabis products sold in nine illegal dispensaries in Toronto. While it is not possible to assess the methodological quality of these analyses, this report had the merit of recalling the importance of the issue. (Online. Retrieved September 15, 2016: http://www.theglobeandmail.com/news/investigations/globe-investigation-whats-in-your-weed-we-tested-dispensary-marijuana-to-findout/article31144496/ .)

Although poorly documented, the **risk of exposure to pesticides** contained in cannabis seems real. Thus, it is important to establish regulations aimed at ensuring the protection of consumers and cannabis production workers. Some American states have chosen to allow the use of pesticides for which no food tolerance value has been set,[9] but this choice is not necessarily adequate. It is the view of the INSPQ, that if the use of pesticides is permitted in the production of cannabis, these products must first be subject to a risk analysis focused specifically on the context of cannabis use, and include combustion breakdown products. Otherwise, the absence of such a process could open the door to the use of relatively toxic products. Moreover, because some of the less toxic products can be ineffective in the case of large infestations, producers may be tempted to use more toxic pesticides whose risks have not been assessed in the context of cannabis production (Borel, 2015). It is important to ensure that producers do not use pesticides other than those that would be authorized.

Moreover, the United States Environmental Protection Agency (USEPA) reminded the Colorado Department of Agriculture of the importance of having a complete toxicity database, of carrying out pyrolysis tests to identify combustion breakdown products, of examining methods and locations of pesticide application, as well as use on crops with similar agronomic characteristics to determine which pesticides the state could authorize for use on cannabis (USEPA, 2015). It should be noted that some American states have prohibited the use of pesticides in the production of cannabis due to the absence of a full risk analysis by the USEPA (Feldman, 2015). In Canada, approved pesticides are not potentially very toxic, but we do not know if they have been assessed within the specific context of cannabis production.[10]

Labelling and packaging of products distributed

Another regulatory issue connected to the safety and quality of the cannabis, is regulation of the labelling and **childproof resealable packaging** of the substance. Ensuring **product traceability** and **product safety information** are also explicit objectives pursued by jurisdictions that legalize cannabis. Uruguay also requires that a six-month preservation period be indicated on packages, which may not contain more than 10 g of dried cannabis.

Here again, the experience gained in relation to alcohol and tobacco and within the context of medical marijuana use in Canada will certainly be helpful in ensuring that requirements are respected, in particular those concerning health risk warnings and the precise description of quantities, additives and other active agents (Haden & Emerson, 2014). Whether they operate according to a for-profit or a not-for-profit logic, except in the case of self-production at home, all producers should have to comply.

Product packaging is itself a promotional tool. This is why some jurisdictions, such as Australia and France, have chosen to require **plain packaging** for tobacco products. Canada is seriously considering adopting this measure, as became apparent during the public consultation held on the

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9 The notion of a tolerance value refers to the maximum quantity of pesticide residues that regulatory agencies consider acceptable.

10 In Canada, whether before, during or after the drying process, medical marijuana cannot be treated with a pest control product unless it is approved for use with marijuana under the *Pest Control Products Act* or the use of the product is otherwise permitted under this Act (Medical Marijuana Program Regulations, 2014). As of May 12, 2015, seven pesticides were approved for use on cannabis produced commercially in an indoor environment (Health Canada, 2016b). The latter generally have low toxicity both for acute and chronic use when used in a food context (SAgE Pesticides, 2016). It was not possible to discover whether these products had been evaluated within the context of cannabis use, but the data produced by Health Canada for the approval of active substances suggests that this was not the case.

subject in the summer of 2016.[11] The obligation to use plain packaging (no logo, brand or attractive colours) is frequently referred to as a promising pathway in the literature on legalized cannabis (Caulkins et al., 2015).

Licensing and oversight agency

Regardless of the choices made concerning the regulation of production, it is clear that a **government agency** specifically devoted to the enforcement of regulations will be necessary. Not only issuing production licenses, but also overseeing the application of the other regulations tied to production (e.g., quality, safety, labelling, etc.) will play a key role in reducing harms related to legalized cannabis. The American experiences have shown that this requires considerable resources, which have not always been allocated. In Colorado, for example, a shortage of laboratories seems to have impeded the analysis of samples, while in the state of Washington, this led to an inspection system that relied more on whistle-blowing than on proactive control measures (CCTC, 2015).

The identification of the **home department** of the agency responsible for licensing and oversight, as well as the definition of the latter's mandate (for example, revenue generation, or health-related harm prevention and reduction) constitutes a particularly structuring decision. The **composition of its board of directors**, including the seats that will be given to industry representatives and other stakeholders including public health actors, can also indicate the orientation the legislature intends to give the system. Certain variations can be observed among jurisdictions. Most American states have designated liquor boards as the agencies responsible for enforcing the regulations, except in Colorado, where this responsibility falls to the Department of Revenue. In accordance with its more interventionist approach in this area, Uruguay has established a government agency (the IRCCA) with a specific mandate for regulating and controlling cannabis, and a mission focused on harm reduction (CCSA, 2015).

5.2.2 Issues related to distribution and to regulatory options

The issues surrounding the distribution of cannabis are in part contingent on the choices made concerning the regulation of its production. They concern the choice and degree of oversight of persons or businesses that will be authorized to distribute directly to consumers, the visibility of the distribution channels chosen and the physical and economic accessibility of the product. The successful transition of users from the illicit to the licit market, and even the success of the process of legalizing non-medical cannabis, depends largely on the modes of distribution preferred. These choices, indicative of whether or not there is a willingness to commercialize the substance, more broadly determine the extent to which the product is trivialized. They raise issues, among others, concerning the planning of use, measures that could minimize the impulsive purchase of cannabis, and its distribution concomitantly with other psychoactive substances (alcohol, tobacco, prescription drugs).

Designation and definition of the mandate of organizations authorized to distribute

The designation and the definition of the mandate of authorized organizations is a regulatory issue of primary importance insofar as these organizations are in direct contact with users and are likely to influence their cannabis consumption practices. Here again, the logic, either commercial or not-for-profit, adhered to by the organizations responsible for distribution may affect the evolution of prevalence of use, and ultimately of population health.

[11] Online (retrieved October 4, 2016) http://canadiensensante.gc.ca/health-system-systeme-sante/consultations/tobacco-packages-emballages-produits-tabac/document-eng.php

Integral to the constitutions of **user cooperatives**, such as those developed in Spain, Belgium and Uruguay, is the intent to promote planned cannabis use and non-impulsive purchasing among their members. They also help to protect users from the commercial pressures that private producers/distributors could exert on them. As part of a harm reduction approach, user cooperatives could also play a key role in the legalization process by becoming pivotal partners in the implementation of prevention activities targeting excessive users and by participating more broadly in the establishment of healthy social norms guiding usage practices. Distribution within a not-for-profit framework can also be organized in such a way as to minimize the illicit resale of the substance (Transform, 2015; Decorte, 2015). The official legalization of the status of cooperatives should provide an opportunity to establish a licensing and oversight system for regulating their activities and prevent the commercial tendencies observed in Spain. The Autonomous Community of Navarre and the city of San Sebastian in the Basque Country introduced legislation in 2014 to regularize and better control its user clubs (Transform, 2015). In this regard, one promising avenue would be to impose specific criteria relative to the composition of boards of directors (members from public health or youth protection organizations, for example), or the obligation to reinvest surplus operating income in treatment or prevention programs (Caulkins et al., 2015).

In contrast, as with producers, **licensed for-profit distributors** are encouraged by their financial interests to promote practices and levels of use that are potentially harmful to population health. A licensing and oversight system administered by a government agency could, nevertheless, be established to ensure compliance with the regulations governing the accessibility and traceability of the substance. However, in the absence of a purchasing monopoly that disrupts the production-distribution chain, the government agency's ability to manage the supply and price of the substance is rather limited. There is less control over prices when producers can act as distributors, as in Colorado and Oregon (Spithof et al., 2015). The case of non-specialized distributors, such as convenience stores, for example, which would enable the concurrent sale of other psychoactive substances, including alcohol in particular, is a central public health concern. Specialized distribution was preferred in Colorado and Washington State to restrict minors' access to the substance and to counteract retail cross-selling tactics (Caulkins et al., 2015).

Nevertheless, experience with alcohol demonstrates that a distribution monopoly held by a Crown corporation ensures direct control over the entire chain and can function as an effective prevention measure provided it is mandated to be socially responsible and it pursues public health objectives (April et al., 2010). Information on the quality and content of the products sold is more likely to be accurate, as is information about the risks associated with use. Respect for rules regarding opening hours, product display and placement, and verification of the legal age for purchase would also be greater. In addition, a monopoly facilitates government tax collection, as well as the identification and sanction of illegal distributors posing as legitimate (Pacula et al., 2014).

Accessibility of cannabis

Once authorized distributors have been designated, the regulation of criteria governing access to the substance will require choices to be made that are particularly structuring for the distribution system, which will also have a bearing on the harmful health effects associated with use. In this regard, lessons drawn from experiences with tobacco and alcohol that relate to the economic, physical and legal accessibility of those substances may prove particularly instructive.

Legal accessibility of the substance refers to the minimum age at which one may legally obtain it. This is set at 18 in Uruguay and at 21 years old in the American states that have legalized non-medical cannabis (CCSA, 2016). Given that Québec teenagers (aged 15-17) and young adults (aged 18-24) are the groups with the largest proportion of cannabis users and that one of the aims of

legalization is to exercise greater control over what they consume, setting the minimum age at 21 as in the American jurisdictions could be considered counterproductive. It is true that the data suggest that cannabis use may have negative effects on the developing brain up until 21 years of age. However, setting the age limit too high is tantamount to encouraging young users to continue to rely on the illicit market, a situation at odds with one of the often cited aims of legalization. Moreover, the Canadian Senate report on the subject (Nolin & Kenny, 2002) called for legalizing access as early as age 16. Such an initiative would, however, be met with certain objections, given that delaying as much as possible the age of initiation would limit the harmful effects of cannabis on the developing brain, as well as the risk of developing a dependence. Lowering the legal age would, moreover, seem to run contrary to a measure increasingly being considered to combat smoking, namely setting the legal age for purchase at 21. This initiative has also been taken in two American states (California and Hawaii) and in more than 170 American cities, including New York, Chicago, Boston, and Portland (IOM, 2015).

Economic accessibility is one of the key determinants of alcohol consumption and its associated problems (Babor et al., 2010; Meier et al., 2008). Many studies have shown that raising the selling price of alcohol, in particular by adding taxes and surcharges, is a highly effective manner of reducing alcohol consumption and its associated problems within the population. High prices help to delay the age of initiation for alcohol consumption, to limit "binge" type drinking, and to reduce the risk of impaired driving, as well as the incidence and prevalence of many chronic diseases (Anderson et al., 2009; Babor et al., 2010; Meier et al., 2008; Pacula et al., 2014). Three ways to set prices have been well documented and are the subject of consensus among experts: setting minimum prices (as is done for beer in Québec), adjusting prices according to alcohol content, and regularly adjusting prices to reflect the consumer price index (Stockwell et al., 2015; Thomas, 2012). With regard to the fight against smoking, there is conclusive evidence that high prices indexed to the cost of living through regular tax increases are an effective means of reducing the prevalence of smoking, particularly among vulnerable groups, such as youth and disadvantaged populations. Interventions targeting contraband tobacco sales have to be implemented in parallel with price increases so as to disrupt the black market, which is able to offer low prices without, moreover, having to control for the legal age. At the population level, the positive effects of price increases have been shown to outweigh the negative effects of contraband sales (Zhang & Schwartz, 2015).

The literature concerning the economic accessibility of cannabis points in the same direction. In the case of cannabis, it is estimated that a 10% price reduction leads to an approximate 3% increase in the amount purchased (Kilmer, 2014). In economic terms, cannabis can be considered an elastic product. The price declines that could occur within a context of commercial competition would thus, represent a public health concern, especially since cannabis production costs are low. On the other hand, the price elasticity of cannabis presents an opportunity to control demand by setting high enough prices, as is done to combat smoking. Moreover, there appears to be a consensus among experts that the price of cannabis should be kept high in the long term. Some have raised the possibility of tying taxation to THC levels or to the THC/cannabidiol CBD composition, rather than to product weight, in order to discourage the riskiest forms of use (Kleiman & Ziskind, 2014; Kilmer, 2014; Pacula et al., 2014). Other options could also be considered, such as establishing a price floor. Regulating quality control and product safety could also add to production costs, which would likely increase the sale price of the substance (Caulkins et al., 2015). Some, however, stress that in the short term it is important to keep prices in line with black market prices in order to facilitate the transfer of users to the legal distribution network (Kilmer, 2014; Haden & Emerson, 2014).

The issue of the economic accessibility of legalized cannabis also arises within the context of not-for-profit production. Although self-production at home considerably diminishes the issue of price for users, in the case where not-for-profit organizations handle production and distribution, the absence of a profit motive should not be confused with a failure to generate revenue. In Belgian user clubs, for example, the price varies between 5 and 8 euros per gram of dried cannabis. This covers the clubs' production and administration costs, and the surplus revenues generated are reinvested in courses and conferences for users, and in medical and legal consultation. Given that cannabis remains illicit in Belgium, some of these surpluses are also used to finance activities to raise awareness among political authorities with the aim of normalizing use (Decorte, 2015).

Physical accessibility is another determinant that significantly influences the prevalence of use of psychoactive substances and their harmful impacts on health. Physical accessibility refers the number of distribution points (for take-out or on-site use), as well as the opening hours and days of these distribution points. It is argued that limiting the number of sales outlets makes it easier for the government to strictly control them (Pacula et al., 2014). The issue of physical accessibility concerns not only the density of distribution points, but also their location relative to specific elements of the built environment, such as schools, training centres, parks and other places frequented by youth. Given the risks associated with the concomitant use of alcohol and cannabis, their distribution points should be separate, or even far removed from each other (Haden & Emerson, 2014; Caulkins, et al., 2015). Another concern tied to location concerns the access to cannabis of socioeconomically disadvantaged groups. The need to specifically consider these groups is illustrated by studies examining the higher density of video lottery terminals (VLTs) in disadvantaged neighbourhoods (Biron, Bazargani, & Robitaille, 2016; Houle, 2014; Papineau, Lemétayer, Barry & Biron, 2015).

By restricting the number of licenses for its territory, Washington State demonstrated its sensitivity to the issue of the physical accessibility of legalized cannabis (CCSA, 2015). The density of sales outlets was matched to the number of liquor stores prior to their privatization in 2013 (for a total of 334 licenses, the approximate equivalent of one sales outlet per 20,000 inhabitants), and they were not allowed to be located near schools. In Colorado, despite a smaller population, the number of sales outlets is more than twice as high, resulting in the approximate equivalent of one distributor per 7,500 inhabitants (Caulkins et al., 2015). The high density of shops in parts of Denver, and their proximity to schools in some cases, are a source of concern among certain stakeholders in Colorado (CCSA, 2015).

The physical accessibility of the product directly gives rise to the **issues of the visibility and the trivialization of cannabis**. In addition to leading to unplanned consumption, greater accessibility and visibility of distribution points can be associated with the acceptability, or social normalization, of the product and its use. It is reasonable to assume that this interpretation could be particularly common among young people, especially if cannabis were to be distributed along with other products, at convenience stores or grocery stores, for example, as opposed to being distributed by specialty shops or an organization devoted exclusively to the sale of cannabis (Caulkins et al., 2015).

The **online distribution** of products, as used for medical cannabis in Canada, could provide a more discreet means of distribution than that of retail outlets. It is also plausible to assume that this would ensure a level of interregional equity in terms of the physical accessibility of the product outside of large urban centres. Online sales would also require consumption to be planned, which further limits the impulsive buying of the product facilitated by a high level of physical accessibility. This distribution channel, however, raises some concerns, particularly regarding control over the identity and age of users. Indeed, in the United States, the issue of the lack of diligence of specialty shop personnel making home deliveries of cannabis has been raised (Caulkins et al., 2015). Online

distribution does not even allow for direct contact with users. However, such contact is needed to effectively implement a harm reduction approach aimed at limiting the health effects of cannabis.

In short, the regulation of physical accessibility must be considered from a very broad perspective and allow for adaptation. Although physical access should not be facilitated to the point of trivializing the substance and its use, particularly among youth, neither should it become an obstacle to the successful legalization of the substance. Indeed, if distribution channels are overly restricted, it is very possible that users, particularly regular users, will be tempted to continue to purchase supplies from their more accommodating current distributors.

Advertising and marketing of the product

The issue of the trivialization of cannabis that could result from its legalization and commercialization is directly tied to questions surrounding the product's advertising and marketing. The literature on the subject points unequivocally to the negative impact that advertising and marketing practices can have on the prevalence of use, particularly among youth. The experience of commercializing alcohol has shown that marketing encompasses various promotional expenditures, including: advertising through the media, at sales outlets, on the Internet and using social media; sponsorship of websites, sports or cultural events or sports teams; the distribution of promotional items and product placement; industry-sponsored social responsibility messages and programs (Barry et al., 2016; Jernigan, 2009). To these can be added representations of alcohol use in movies and TV shows as well as promotions involving price reductions or volume-based discounts. Innovation in these areas is a constant and it is difficult for researchers to keep up with its pace and to evaluate its effects (Jernigan, 2009).

Studies show that youth are widely exposed to various forms of alcohol marketing even though they are not of legal age and are not, in principle, the target audience (Barry et al., 2016; Jones, 2016). Advertising in print and electronic media and exposure to movies or TV shows in which alcohol is consumed have modest but significant effects on the age at which consumption begins, and on the amount of alcohol consumed by youth who have already begun drinking (Anderson et al., 2009; Jernigan, Noel, Landon, Thornton, & Lobstein, 2016; Smith & Foxcroft, 2009). Studies indicate that the number of ads to which youth are exposed is significant and that their effects appear to be cumulative (Anderson et al., 2009; Smith & Foxcroft, 2009). A California study on medical cannabis identified a similar relationship: greater exposure to advertising for medical cannabis was found to be associated with a higher probability of use among youth (Subritzky et al., 2016).

The alcohol industry opposes the regulation of marketing, insisting that the industry behaves responsibly and that **self-regulation** is effective. It also challenges the effectiveness of government regulation, laying emphasis on individual responsibility (Savell, Fooks & Gilmore, 2016). Arguments based on the responsible conduct of the industry are often strengthened by reference to activities demonstrating "corporate social responsibility" (Yoon & Lam, 2013). However, it has been demonstrated in many countries and through many studies that voluntary codes of industry self-regulation are not effective at limiting the exposure of youth to alcohol marketing or at controlling the content of the advertising (Babor et al., 2010).

Restricting or prohibiting marketing can, however, deflect marketing activities toward less regulated media, such as the Internet (Babor, 2010). For example, a study of YouTube videos related to cannabis estimated that more than a third of them were promoting, reviewing and/or recommending products (Subritzky et al., 2016).

A regulatory framework should target the content and volume of marketing, direct marketing, sponsorship activities and new marketing techniques. According to some, restricting the promotion of cannabis should also include regulating distribution outlets, so as to prevent product displays and ensure the most neutral and standardized setting possible (Haden & Emerson, 2014).

As regards tobacco, it is fortunate that more restrictive measures were established in accordance with the Framework Convention on Tobacco Control, which could serve as a reference text for cannabis regulation in Canada and in the United States. Unlike Uruguay, which prohibits all forms of advertising and marketing, the American states concerned have adopted a less restrictive approach. Product promotion restrictions are essentially limited to advertising directed at youth in the states of Washington and Colorado (Spithoff et al., 2015). Also, certain practices observed within the Canadian medical cannabis system, such as the distribution of products bearing commercial brand names (e.g., hats, cups), raise concerns and should be avoided.

Training and prevention mandate of personnel assigned to distribution

Cannabis is a complex consumer product, comprising several psychoactive agents whose chemical interactions may be numerous and are sometimes unknown. The pharmacological complexity of cannabis clearly distinguishes it from tobacco and alcohol. Therefore, an approach aimed at reducing the harmful effects of this substance on public health requires the presence not only of clear and accurate labels indicating product composition, but also of personnel trained and qualified to interpret those labels and properly advise users. Such personnel would be more akin to pharmacists, for example, than to clerks or bartenders (Kleiman & Ziskind, 2014). Because they are placed in direct contact with users, distribution personnel must be able not only to communicate information about the psychoactive effects that can be expected, but also to limit the risks associated with use (Caulkins et al., 2015). Training of personnel also relates to the issues of identifying minors seeking to procure cannabis, and detecting the possibility of excessive use. On this subject, the literature dealing with the control of alcohol sales is unequivocal (April et al., 2010). When mandated to be socially responsible and to uphold public health objectives, Crown corporations are best placed to ensure personnel are qualified and able to prevent distribution to youth and to problematic users.

Limitation of quantities supplied

In addition, if distribution personnel are to be given a real health promotion and prevention mandate, the issue of regulations limiting the quantities supplied should be addressed. **Regulation of the quantity of cannabis** that a user can procure is frequently discussed in the literature in relation to the risks inherent in commercialization of the substance. Retail salespersons have every reason to try to retain and increase their client base of excessive users, who consume approximately 80% of the cannabis sold on the market. In order to limit excessive use, some suggest that there should be formal limits on the quantities one can purchase. An approach that resembles rationing has been shown to be moderately effective in limiting use among heavy drinkers. Moreover, such limits offer the potential advantage of preventing the resale of substances to users below the legal age (Haden & Emerson, 2014).

However, such limits on quantities remain difficult to establish, and would seem rather arbitrary, given that the limits in effect would often be too high to be consistent with the goal of reducing cannabis use in Québec.[12] Indeed, generally, the amount permitted to be sold in American jurisdictions has been established at 28.5 g of dried flower, or the equivalent of the legal limit for possession without intent for criminal resale. In Uruguay, where the system provides for cannabis to be sold in pharmacies, it is possible to buy up to 40 g of dried flower per month (CCSA, 2016). Limits on quantities are often established in user cooperatives, but wide variations are also observed. In Belgium, limits fluctuate between 10 g and 30 g per month (Decorte, 2015), while in Spain the average limit is 3 g per day (Transform, 2015).

In place of a formal limit on supplies which would not necessarily accommodate users' practices, some would prefer instead a system of **voluntary self-limitation**. Already in effect in several user cooperatives in Belgium, such self-limitation mechanisms set a weekly or monthly threshold beyond which it is no longer possible to obtain supplies. They are part of a real harm reduction approach tied to each user's pattern of consumption, preventing casual users from slipping into undesirable patterns of use or supporting excessive users in their attempts to reduce consumption and not give in to their impulses (Kleiman & Ziskind, 2014).

It is, moreover, reasonable to assume that the voluntary nature of such a system would spare it the criticism that might be levelled against the need to establish a supply registry to ensure respect for formally imposed quantity limits. Such a registry does not exist for alcohol or tobacco sales, and also raises the issue of safeguarding the anonymity associated with obtaining cannabis for non-medical purposes. Even under a system of legalized cannabis, it is quite plausible that some users may be reluctant to have a public record kept of their consumption practices and may therefore prefer to continue supplying themselves through the illicit market.

Licensing and distribution oversight agency

Whether it takes the form of a government agency that regulates licensed distributors (for-profit or not-for-profit), or a government purchasing monopoly accompanied by public retail outlets, a government agency should be established to oversee the distribution of legalized cannabis. Experience with alcohol regulation has shown that a government distribution monopoly is an effective choice for ensuring the application of regulations governing the economic, physical and legal (age) accessibility of alcohol. Several international public health experts also prefer this distribution channel as a means of reducing the potential harms associated with legalized marijuana.

The rules framing the composition of this agency's board of directors, and ultimately the influence that could be exerted by stakeholders from the cannabis industry, must also be considered. In the United States, particularly in Colorado, the influence exerted by the industry on the legalization process, to the detriment of public health, has been denounced (CCSA, 2015).

[12] The amount of cannabis required to make a joint varies considerably, in particular according to users' practices and the level of THC in the substance. Users also seem to have difficulty measuring their consumption practices in terms of grams of dried substance, especially since cannabis cigarettes often include tobacco. Nevertheless, if we accept as plausible an estimate of between 0.3 and 0.5 g of dried cannabis for an average joint (Kilmer & Pacula, 2009: 12), or the estimated average use of 1.6 g of dried cannabis per day by regular users in Washington State (Kilmer et al., 2013: 11), then it is reasonable to suggest that the limits on quantity proposed by jurisdictions that have legalized cannabis could have harmful effects on the health of users.

5.2.3 ISSUES RELATED TO CONSUMPTION AND TO REGULATORY OPTIONS

The regulation of cannabis use raises public health issues that are well known, inasmuch as they bear similarity to those related to alcohol and tobacco use. Also, a challenge is posed by the call to introduce action that is consistent with measures currently in effect for controlling the use of these psychoactive substances. Many of the issues related to consumption are largely contingent on regulatory choices made earlier on in relation to the production and distribution of the substance. For example, the age of users depends largely on the legal age criterion for distribution as well as on measures or penalties put in place to discourage illegal supplying of minors. Some of the factors associated with prevalence of use are the visibility, trivialization and normalization of cannabis use, and here again, these are linked to certain distribution issues, such as the regulation of advertising and marketing. Regardless of scenario, all issues related to use point to the necessity of monitoring the evolution of use portraits and contexts.

Locations where use is authorized

The identification of places where cannabis use is allowed raises the important issue of its use in public. The ban on smoking in public places is generally justified, in part, by the desire to avoid trivialization of the substance, particularly among youth. This can have the beneficial effect of raising the age of initiation for youth. In addition, the ban on smoking in public is intended to limit exposure to second-hand smoke and the harm it can cause to non-users (Pacula et al., 2014). Three regulatory options are generally advanced: a complete ban on smoking in public, a ban on smoking where tobacco smoking is banned, or permission to consume in privately owned spaces open to the public, such as bars or cannabis clubs.

So far, all the American jurisdictions having legalized non-medical cannabis have prohibited its use in public in full view, including in licensed distribution sites. In Uruguay, the use of cannabis in public must comply with the regulations established regarding the use of tobacco. However, it is forbidden to consume cannabis in licensed distribution sites, including even user cooperatives (CCSA, 2015; Pardo, 2014; Walsh & Ramsey, 2016).

While a ban on smoking in public is preferred as it limits exposure to second-hand smoke, its corollary, namely, limiting use to the home, also raises concerns. It is indeed reasonable to assume that the family and friends of daily users will be exposed to potentially harmful second-hand smoke, although the health effects of exposure to second-hand cannabis smoke are not as well documented as those of tobacco smoke (Pacula et al., 2014). It is also reasonable to assume that limiting use to the home may lead to the early initiation of children in a user's entourage. In order to limit trivialization of the substance among such children, the option of allowing users to consume in user cooperatives could be considered. It is important, however, to prohibit the concomitant use of cannabis and alcohol, and to ensure that personnel in these cooperatives are not exposed to second-hand smoke, for example, by requiring the installation of separately ventilated smoking areas.

Modes and contexts of higher-risk forms of use

It has been reported that 20% of cannabis users are responsible for 80% of the total amount of the substance consumed (Caulkins, 2016; Kleiman & Ziskind, 2014). Insofar as smoking remains the most common form of use, there are concerns tied to combustion and to the exposure to second-hand smoke of those in proximity to users. Combustion poses significant health risks, by resulting in the direct absorption of several potentially highly toxic products. Consequently, it would seem that some diversification of cannabis products could be desirable.

In particular, it seems that **consuming cannabis through vaporization** (or vaping) could be less harmful to the health of smokers and those around them. In addition to being a form of use that is more discreet and odourless, the vaporization of cannabis would create substantially fewer carcinogens (Caulkins et al., 2015; Subritzky et al., 2016). Although the switch from smoking cannabis to vaporizing it seems to have gained popularity in California, Colorado and Washington State, it would nevertheless require some effort to foster its social normalization. The tradition of smoking cannabis remains deeply rooted among users, and it is difficult to predict whether they will adopt this mode of use (Caulkins et al., 2015; Kleiman & Ziskind, 2014). Recent experience with electronic cigarettes has also taught us that better control over products (for example, the content of vaporizing liquids), technology and the way devices are used (for example, how much heat is produced) should be exercised. Otherwise, the presence of concentrated residues, or combustion at excessively high temperatures, could counteract the potential harm reduction associated with this technology (WHO, 2016; Subritzky et al., 2016).

Other contexts of use are also likely to cause unintentional injuries that could be avoided if safe practices were preferred. **Impaired driving** and **intoxication in the workplace** are the two types of higher-risk use most often mentioned in the literature. There is no clear evidence that legalization of the substance will increase the frequency of these behaviours (ICSDP, 2015). The increase in the prevalence of cannabis use which could occur if a commercialization model is preferred justifies concern over these issues. Jurisdictions that have legalized cannabis have taken the opportunity to regulate in this area, to minimize the risk of road or work accidents. Two options are favoured for controlling these higher-risk contexts of use: zero tolerance, or the establishment of a threshold of permissible use, defined according to measurable blood THC levels. As examples, the states of Washington and Colorado have set the permissible threshold of blood THC levels at 5 ng/ml of blood. Uruguay formally banned the use of cannabis while driving, as well as during work shifts or in the workplace (Pardo, 2014). In both cases, the regulatory options chosen nonetheless raise important ethical, legal and social issues. There is currently no non-invasive technology that can objectively measure impaired faculties in real-time and available tests often detect false positives (Subritzky et al., 2016; Pacula et al., 2014).

6 Conditions of success and scenarios to consider

As the previous section demonstrates, the legalization of non-medical cannabis raises many public health issues and confronts policy makers with a range of possible regulatory scenarios. Based on the prospective analysis of potential impacts and the contextualization of the various components of these scenarios or models, the INSPQ wishes here to draw the attention of policy makers to several pathways that merit consideration and debate. This section first presents a few conditions that can facilitate the establishment of a regulatory structure for managing legalized marijuana that would be most conducive to the achievement of public health objectives. It then sets out a few regulatory scenarios that should be further considered and that could be submitted to the various actors concerned for their consideration.

6.1 Conditions conducive to the achievement of public health objectives

6.1.1 To the extent possible, avoid a commercial logic

For all the reasons previously invoked in this document, particularly in section 5.1, a regulatory model that essentially follows a commercial logic in its approach to cannabis production and distribution (for-profit producers and distributors, selling directly to users) should be excluded from the outset. In fact, the regulatory model chosen should be as far removed as possible from a free market logic based on growth and profit motives. The latter is associated with the promotion of levels of use and practices that have negative effects on public health.

Indeed, the legal sale of cannabis, if associated with various business strategies, could logically lead to an increase in its consumption. Therefore, whether it takes the form of licensed private distributors (e.g., tobacco), of licensed producers who distribute directly to users (e.g., Canadian medical cannabis) or of a Crown corporation with a mandate to generate revenue (e.g., the Société des alcools du Québec), a commercial logic is hardly compatible with public health objectives as defined by the INSPQ.

6.1.2 Establish one or more government agencies for regulating cannabis

Regardless of the approach preferred (commercial or not-for-profit), the need to create a government agency specifically devoted to the application of the regulations is apparent. Depending on its intentions, which remain unknown, the federal government could decide to create an agency with the power to regulate, license and oversee the various activities related to cannabis production. As with alcohol and tobacco, the provincial and territorial governments will be probably responsible for regulating the distribution of this substance. Québec will therefore need to establish a government agency exercising various powers of regulation, licensing and oversight connected to cannabis distribution. This agency may be entrusted with much, if not all, of the responsibility for carrying out or coordinating the efforts incumbent on public authorities.

In particular, the licensing power of such government agencies would allow them to designate which persons or organizations would be allowed to produce and distribute cannabis, and under what conditions. For example, production licenses could require producers to refrain from advertising and marketing; to produce no more than a certain number of plants; to refrain from using pesticides; etc. Distribution licenses (if distribution is not restricted to government owned sales outlets) may be issued exclusively to NPOs with a harm reduction mandate. This license could, in particular, require them to have a board of directors composed of members from the health and social services network

(or other areas of government activity with a social vocation), prohibit them from using any form of display, require them to verify the age of buyers, etc.

Drawing on the example of Uruguay, where the Institute for the Regulation and Control of Cannabis both fulfils a regulatory role and controls the purchasing monopoly, the to-be-created Québec agency could also be responsible for controlling both distribution and the purchasing monopoly to which all cannabis destined for resale would be sold.

6.1.3 DEVELOP QUALITY ASSURANCE MECHANISMS AND PROCEDURES

One of the major expected benefits of the legalization of non-medical cannabis is that it will enable quality control of products. Thus, regardless of the production-distribution system established, it will be necessary for governments to create mechanisms for controlling the quality of cannabis sold. Quality here refers to the psychoactive properties of products and their safety.

Earlier in this document, the issue of limiting the **concentration of THC** in cannabis was discussed. Many experts are concerned about the rise in THC levels that has occurred in recent years, probably because of a perceived increase in the risk of dependence or acute intoxication that could result. However, it is difficult to determine a threshold concentration above which cannabis would be more addictive or would cause acute intoxication that could have consequences in terms of mortality or morbidity. Lowering THC levels could, moreover, have undesirable effects, such as encouraging users to smoke more to obtain the effects to which they are accustomed.

What seems important here is the standardization of THC concentrations, the mandatory display of product information and the establishment of mechanisms and procedures for monitoring concentrations. Also in this regard, it seems preferable that content and testing standards be established by a public authority rather than by producers or processors, and that a public authority also be the one to perform tests.

As regards **pesticides**, great care is required in regulating their use in the production of cannabis. It seems advisable to follow the example of some American states which have prohibited their use until complete risk analyses have been performed and guidelines for evaluating the effects of smoking pesticides, as well as an effective risk management strategy, have been developed. Moreover, it would be appropriate for the agency responsible for regulating production to develop the means of evaluating alternatives to using synthetic pesticides, such as for example, the integrated management of cannabis cultivation.

With respect to **mould and other contaminants**, Health Canada already requires authorized producers of medical cannabis to test for microbiological agents, as well as for heavy metals. However, the agency's policies and practices relative to this are not completely clear. A request was sent to Health Canada for certain documents but these have yet to be received. According to some observers in the United States, these tests have little scientific validity, especially since they are based on food safety standards which do not take into account that cannabis is commonly smoked (Holmes et al., 2015). To better judge the adequacy of current Canadian standards, one would need to explore certain questions. For example, do Canadian measurements and standards apply to the "right" contaminants, that is, do the tests detect contaminants that pose proven health risks? Do they take into account the fact that cannabis is usually smoked?

6.1.4 MANAGE UNCERTAINTY THROUGH MONITORING AND THE ESTABLISHMENT OF A FLEXIBLE SYSTEM

The legalization of non-medical cannabis carries its share of uncertainties. The real impact of legalization on public health is made even more unpredictable by the broad range of potential scenarios for cannabis regulation. Of course, it is possible and advisable to take into account experiences with tobacco and alcohol and with cannabis legalization elsewhere in the world, but the fact remains that the effects of legalizing cannabis in Québec and the Canada, whether they prove positive or negative, direct or indirect, cannot be fully documented until the legalization process has been completed. Consequently, two factors should be taken into account by the architects of the system which will be designed to regulate the production, distribution and consumption of cannabis.

On the one hand, it is imperative that a **surveillance and monitoring system** be put in place to monitor the evolution of cannabis consumption within the population before-during-after the legalization process. It will be necessary to consider both consumption practices and the types of products consumed (CCSA, 2015). This will make it possible to verify whether consumption trends observed elsewhere in the world during implementation of a similar process (MacCoun, 2011) will be observed in Québec.[13]

On the other hand, given the evolving portrait of cannabis use and new scientific knowledge, it is necessary to **build in the margin of flexibility required to reverse regulatory choices** so as to respond adequately to unexpected phenomena. Given that no policy is perfect, the better the system's evaluation and response capacity, the better it will be able to adjust the regulatory model to the public health objectives being pursued (Kilmer, 2014; Kleiman & Ziskind, 2014). In addition, it is important to note that jurisdictions having already legalized cannabis are faced with the fact that a significant share of the market remains under illicit control. As experience with tobacco has shown, changes in users' habits are likely to occur only over the long term. Logically, some choices for regulating cannabis should therefore be examined with an eye to encouraging transfer to the licit market, while projecting the possible adaption of measures, in the medium and long term, once the licit market has been consolidated, so as to achieve public health objectives. For example, it is often argued that prices should not initially be set at so high a level as to encourage users to continue to obtain supplies from the illicit market. However, once users have abandoned this market, it would be advisable to gradually raise prices so as to control the economic accessibility of the substance.

Experience with the tobacco industry has taught us that the more legislation opens the door to private interests, the more the industry is able to mobilize and oppose policy changes that go against its commercial interests. Regulatory models that entrust production and distribution to a government monopoly or to not-for-profit organizations would be easier to adapt. Therefore, these models are considered to be more prudent choices than legalization based on a competitive market logic (RAND, 2015; Kleiman & Ziskind, 2014).

6.1.5 RAPIDLY IMPLEMENT INFORMATION ACTIVITIES

Experience with tobacco and alcohol has shown that the choices made concerning economic and physical accessibility and the regulation of marketing are the principal means of effectively preventing use. With respect to information campaigns intended to influence behaviour, they are generally ineffective when used alone. In fact, some authors claim that large-scale anti-cannabis prevention campaigns can arouse curiosity and increase use of the substance (Haden & Emerson, 2014). Such

[13] In this regard, the INSPQ is working on the development of an information and monitoring space for psychoactive substances (EivSPA) in Québec. This informational space will be intended, firstly, to inform partners in the health and social services network and to support decision-making related to the implementation of preventive action tied to drug addiction and harm reduction.

increases were observed at the beginning of the legalization process in some American states. However, public information could play a role in facilitating greater social acceptance of legalization and regulation. It could also promote better understanding of the underlying reasons for legalization, stressing that it is not because it is an ordinary product, but rather because the negative effects of prohibition outweigh its advantages. Thus, **the information would aim to prevent trivialization of the product's use**. A clear and comprehensive communication strategy would also allow the population to gain a better understanding of the regulations. This would prevent **misinterpretations of the rights and duties of citizens** relating to the use of the substance, such as have been observed in the states of Washington and Colorado (CCSA, 2015). The question of how to frame the informative messages, and the identification of target audiences, should be the subject of sustained reflection, along with the timing of these information activities.

Indeed, it is often argued that by using revenues from the sale of cannabis (taxation or direct revenues), the government will be able to finance information activities to counteract any increase in cannabis use. However, to produce the optimal effect, these activities should be undertaken before the legalization is enacted, and the required funds, beyond those allocated for public health, should already have been set aside. The experience of Colorado indicates that additional resources should also be allocated to the health care system so it can better respond to the potential increase in the number of emergency hospitalizations, calls to poison control centers and requests for treatment (CCSA, 2015). These are all pressing considerations, which call for effective and rapid decision making even before the sale of cannabis becomes legal.

6.1.6 Detail the mechanisms for regulating medical and non-medical cannabis while ensuring respect for their distinct functions

The experience gained under the Canadian Access to Cannabis for Medical Purposes system, both by government agencies and by cannabis producers, will certainly be of great value to the process of legalizing non-medical cannabis. However, should a public health framework that limits commercialization of the substance prevail, it would be incongruous to fully reproduce the system currently in effect, particularly as it applies to the distribution and promotion of products. Furthermore, some concerns remain regarding the control of pesticides and contaminants in medical cannabis crops.

Experiences in the states of Colorado and Washington, however, attest to the difficulties associated with controlling a two-tier system where different provisions coexist (minimum age, quantities permitted, additives in the crop) for regulation of the medical and non-medical cannabis markets. This contributes to the emergence of a grey market that opens the door to distribution practices that are neither authorized nor regulated, without, however, being explicitly illegal (CCSA), 2015.

Despite this, harmonization of the systems is not necessarily desirable insofar as each has its own vocation. Indeed, if cannabis is acknowledged to have medicinal value, should it not be treated the same as any medication, and its regulation kept separate from that of non-medical cannabis? Medical cannabis should perhaps be distributed according to prescription in a pharmacy, among other reasons, so that potential drug interactions can be managed, rather than grown at home or made available directly from producers. The age or THC concentration limits that may apply to the use of cannabis for non-medical purposes would not be appropriate in the context of a therapeutic system. Finally, it is plausible to assume that the existence of a grey market in the United States stems partly from the continued prohibition of the substance by the U.S. federal government. Given the Canadian context of legalized cannabis, maintaining a clear distinction between the jurisdictions and functions of the two systems would appear to be more feasible. In short, details remain to be clarified, and further reflection concerning the structures of the two systems is needed.

6.2 Regulatory scenarios that merit deliberation

These scenarios are outlined in Figure 1 presented on page 43 of this document.

6.2.1 Consider a not-for-profit production-distribution system

This approach prevents direct contact between cannabis users and actors promoting increased use. Under this approach, cannabis could be produced:

- **At home for personal use**

  Individuals could produce it at home for their own use. The designated government agency would regulate such activity, including by limiting the number of plants per household.

Production and distribution could also be carried out:

- **In licensed user cooperatives**

  User-producers would gather in not-for-profit-type cooperatives ("cannabis clubs"). Under this system, the cannabis produced would be shared among members of a cooperative. Cooperatives would have to obtain a license from the designated government agency and would be subject to specific production and distribution rules (e.g., limits on the number of plants and on the weekly quantities allowed to members, a ban on pesticides, adequate ventilation, etc.) as well as inspections. Such cooperatives could produce their cannabis themselves or sub-contract its production to a licensed NPO that would directly supply them with the cannabis produced (without the intermediary of a government purchasing monopoly). In such cases, the production contract would have to be forwarded to the regulatory agency for approval and the producer would be subject to agency oversight and inspections.

- **By licensed not-for-profit organizations**

  Not-for-profit organizations having obtained a license from the designated government agency, could produce cannabis on behalf of a government purchasing monopoly. This purchasing monopoly would redistribute cannabis to licensed NPOs with a harm reduction mission.

6.2.2 Open the door to commercial producers subject to regulation by a government purchasing monopoly

This approach straddles both supply logics. It opens the door to private for-profit producers. Under this scenario, cannabis could, indeed, be produced by:

- **Licensed private producers**

  Private commercial producers could supply the government purchasing monopoly responsible for supplying distributors. The designated government agency would regulate their activity.

  The government purchasing monopoly could assess the volume of product needed and invite tenders based on this assessment. These invitations for tenders could still be designed to favour NPOs from the social enterprise sector. Given their experience, medical cannabis producers could be interested in submitting bids. It is reasonable to assume that other agricultural actors, like producers of hemp for the food industry, might also be in a position to support large scale production.

The government purchasing monopoly could then coordinate distribution, either with *a Crown corporation* with publicly owned retail outlets, or with licensed NPOs:

- **A Crown corporation (government distribution monopoly)**

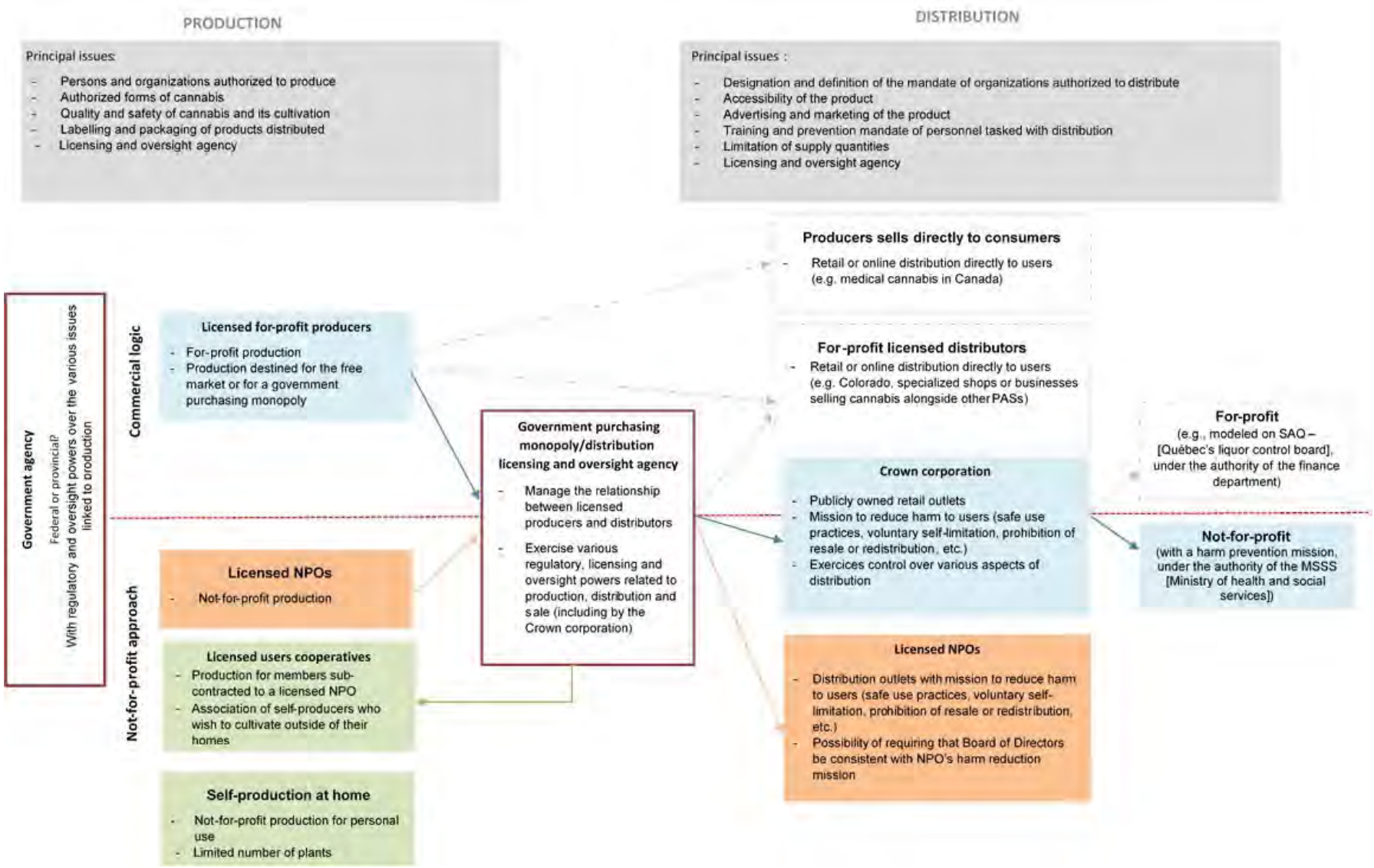
  Publicly owned retail outlets could sell legalized cannabis. As discussed earlier in this document, a Crown corporation enables better control over economic and physical accessibility, as well as over advertising and marketing. In addition, it is the option most likely to ensure that personnel are qualified to prevent distribution to youth and to problematic users.

  In Québec, despite a government distribution monopoly for alcohol (SAQ), some commercial tendencies have been observed, especially in terms of product marketing practices (April et al., 2010). The need to generate revenues for the government could explain these impositions upon public health objectives. That is why, in this case, no sales quotas or financial performance requirements should be imposed on public retailers. It is reasonable to argue that the choice of home department for the Crown corporation will be determinant in defining its mission and mandate, and ultimately in preventing harmful effects on the health of the population. In the case of legalized cannabis, the Crown corporation should have a real harm prevention and reduction mission and, ideally, be under the authority of the *Ministère de la Santé et des Services sociaux* (MSSS) in collaboration with partner departments.

- **Licensed not-for-profit organizations**

  Not-for-profit organizations having obtained a license from the designated government agency would be guided by a real harm reduction mission that involved, for example, offering a voluntary program for self-limitation of purchasing with each user transaction.

Figure 1 Issues and potential components of a regulatory model



Conclusion

Cannabis is not an ordinary consumer product. Indeed, although its illicit nature has always made researching the drug difficult, the available scientific data indicate that cannabis can cause health problems. This is why some still question whether the legalization of this substance for non-medical use is desirable from a public health point of view. In the opinion of the INSPQ, the answer to this question must be qualified. To produce a satisfactory answer it would be necessary to examine both the new regulatory model that will replace the current system of prohibition and the concrete measures that will be adopted in Québec to control the production, distribution and consumption of legalized cannabis.

What health benefits for the population are expected to result from ending the current system of prohibition? An initial potential advantage is an end to the criminalization and prosecution of cannabis users, which has social and health consequences for detainees and their relatives. However, the police, judicial and correctional activities related to cannabis in Québec seem relatively relaxed, if compared to the United States at least, in particular due to the province's program to deal non-judicially with certain criminal offences committed by adults. Putting an end to prosecutions could, therefore, result in less significant gains for Québec, as compared to the United States. Moreover, the choices made could lead to an increase in prosecutions if, for example, the legal age for access were set quite high or personal cultivation at home were prohibited and considerable police resources were devoted to the enforcement of this ban.

Another potential public health benefit of legalizing cannabis is that it would put an end to a production-distribution system which offers no guarantee as to the quality or safety of products. Here again, this observation must be qualified. This benefit would depend on the quality assurance mechanisms and procedures implemented and these remain unknown for the moment. Given the current system for controlling the quality of medical cannabis, it is legitimate to be concerned, particularly because no analysis of the risks associated with pesticides seems to take combustion into account as the main mode of cannabis consumption. A significant effort is required here to analyze the current regulatory situation and, possibly, to develop new standards and procedures applicable to the use of pesticides in the production of cannabis.

Finally, the role assigned to a commercial logic in the future regulatory model will have an impact on health benefits and harms. In all likelihood, the establishment of a system in which for-profit actors are predominant would boost the prevalence of use that has been observed in the general population. Such a system could also slow, or even reverse, the downward trend in cannabis use observed in recent years in Québec among high school youth and among adults who are frequent users of the substance. The actors operating in such a system have a fundamental interest in increasing use and expanding the pool of cannabis users. For this reason, several options are being presented for consideration during upcoming discussions, all of which make it possible to avoid, to the extent possible, a commercial logic and for-profit actors, or to restrict these actors to a very specific role overseen by a government regulatory agency that also exercises a purchasing monopoly.

In short, the legalization of cannabis is, a priori, compatible with an improvement of public health in Québec. However, the achievement of this potential depends on numerous conditions which will be the subject of public deliberations whose results are uncertain. A harm prevention and reduction approach should be advocated for the regulatory choices to be made.

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