NOVEMBER
2017

Legalizing & Regulating Cannabis in Saskatchewan

JOHNSON SHOYAMA
GRADUATE SCHOOL OF PUBLIC POLICY
UREGINA USASK

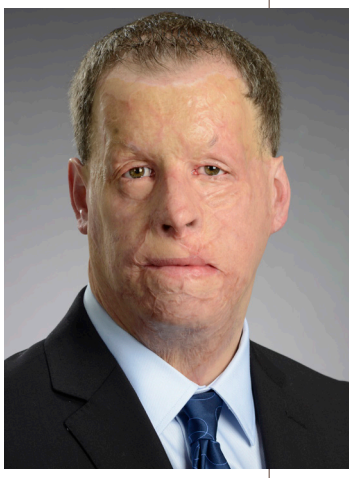
Table of Contents

The Authors

Cynthia Bojkovsky, Doctoral Student, Johnson Shoyama Graduate School of Public Policy, University of Regina campus

Cynthia Bojkovsky is a second-year doctoral student at the Johnson Shoyama Graduate School of Public Policy at the University of Regina. She is interested in health and social policy, and applies this knowledge by contributing to research and participating in course instruction. Her PhD dissertation topic pertains to policies related to autism spectrum disorder. Ms. Bojkovsky obtained a B.Sc. in Occupational Therapy from the University of Alberta and a M.Sc. in Occupational Therapy (post-professional) from Dalhousie University. Her clinical experiences are diverse and she has developed a speciality in tertiary pediatric rehabilitation. Prior to commencing doctoral studies, Cynthia was a faculty member at Saskatchewan Polytechnic, where she provided classroom instruction and curriculum design for several Human Services programs, and coordinated distance education for Health Sciences. Her other research experiences include topics such as online youth cognitive behavioural therapy and inter-professional education as a method of supporting health for culturally and linguistically diverse populations.

Photo credit: University of Regina Photography



Derrick Callan, Master's Student, University of Regina campus Government Relations, Policy and Programs Research Branch, Government of Saskatchewan

Derrick Callan, apart from being a Masters student, is currently interning with Government Relations in their Policy and Programs Research Branch, completing research and analysis for legislation that impacts municipalities. Derrick's research interests are poverty, power differentials, and governance in disciplines ranging from psychology, to sociology and philosophy. He just arrived back from doing research in New Zealand and is doing comparative work on local governance and poverty for his thesis work. Derrick is very active within his community, sitting on multiple boards and volunteering. He has completed many contracts dealing with strategic plans, program reviews, and governance documents.

Photo credit: University of Regina Photography

Jason Childs, Associate Professor, University of Regina Department of Economics

Dr. Jason Childs is an Associate Professor of Economics at the University of Regina who teaches experimental/behavioural economics as well as the Economics of Beer. His primary research area is experimental economics focusing, of late, on dishonesty and trust. He has also examined the demand for alcoholic beverages in Canadian provinces, focusing on the ability of pricing to manage consumption. He has conducted a wide variety of policy work for provincial governments and professional organizations. He is also a co-author of introductory level texts in macroeconomics and microeconomics. Most recently he contributed to a report on the effective regulation and management of the soon to be legal cannabis market in Saskatchewan. His work has been published in a wide variety of academic outlets including the Journal of Public Economics (2004), Review of International Economics (2006), Computational Economics (2007), Journal of International Financial Markets, Institutions and Money (2009), Economics Letters (2012, 2013), Business and Society Review (2012), International Journal of Liberal Arts and Social Sciences (2014), and Applied Economics Letters (2017).

Photo credit: University of Regina Photography

George Hartner, Lecturer, University of Regina Department of Economics

George Hartner is a Lecturer in the Department of Economics at the University of Regina. George's academic areas of focus are in Financial Economics and Economic Evaluation. George has extensive professional experience in the areas of public policy development, program evaluation and in strategic operational and financial management.

Photo credit: University of Regina Photography

Jerome Konecsni, Executive-in-Residence Johnson Shoyama Graduate School of Public Policy

Jerome Konecsni is an Executive-in-Residence Johnson Shoyama Graduate School of Public Policy. In his previous role as CEO as Innovation Saskatchewan he helped develop key partnerships between the province, industry and academia in sectors. Konecsni joined the province after serving as the Director General of the National Research Council's Plant Biotechnology Institute. In this capacity he was part of a team that was awarded the National Public Service Award of Excellence for contribution in science for the first 100 per cent bio jet flight in the world. He has also served as the CEO of Genome Prairie and BioSmart Technologies, and as Vice-President of Corporate Development for Bioriginal Food and Science Corporation. In the latter role, he helped the company grow from a small start up to a successful international enterprise with a presence on four continents. Jerome received his MA, BEd and BA (Honours) from the University of Saskatchewan. In 2011, he was recently awarded a Honourary Doctorate from Karunya University in India.

Photo credit: Dave Stobbe

Kathleen McNutt, Executive Director Johnson Shoyama Graduate School of Public Policy

Kathleen McNutt is the Executive Director of the Johnson Shoyama Graduate School of Public Policy with campuses at both the University of Regina and University of Saskatchewan. Kathleen is a full professor at the University of Regina, and an adjunct professor at the University of Saskatchewan. She holds a PhD for Simon Fraser University, a Masters of Arts from the University of Alberta and a Bachelor of Art honours from the University of Regina. Professor McNutt regularly facilitates professional development workshops for the school's executive training program and teaches various public policy courses at the school. Kathleen has over 30 scholarly peer reviewed publications, a variety of academic chapters and public reports, and has presented her research all over Canada and Europe. Her main research interest include social media, public engagement, energy and climate change, and she commonly studies complex policy issues using advanced policy analysis techniques. She sits on a number of energy and climate change working committees including projects focused on carbon capture and storage, nuclear power, and clean energy.

Photo credit: Tammy Zdunich, Boehmer Photography

The team would like to express our appreciation to all of those individuals who provided support and advice on the report. First we would like to thank the Drummond Group for funding us to conduct the research and sponsoring student participation. We are also very grateful for the writing support from Anne Ballantyne and Trent Blezy and the expert research assistance from Sherie Millington and Angèle Poirier. Thanks also go to the internal and external reviewers whose commentary and insights were critical to the final report. We also wish to express our gratitude to those who provided expert editorial and design support including Erica Schindel, Deanna Miller and the Editing Press.

01

Executive Summary

Photo credits: iStock by Getty images

Executive Summary

By July 2018, the production, distribution, and sale of cannabis will be legal in Canada. The Government of Canada's decision to legalize and regulate was driven by three core objectives:

1) Dismantle the illicit market
2) Restrict youth access
3) Minimize harm

In very short order, provincial governments have to develop policy regimes and in some instances without the necessary evidence typically required to ensure effectiveness. One of the biggest problems is that a fully legalized cannabis sector is so new that we lack any system of best practices and must instead rely on piecing together evidence from across a number of policy lens, including public health, public safety, economics, and innovation. While some provinces and professional associations have understandably requested more time to prepare for the *Act* coming into force, the Federal Government has had little appetite for putting off legalization. The underlying logic is that any delay would mean another year of doing nothing to keep cannabis out of the hands of youth and to keep profits out of the illicit market.

Cannabis is the most commonly used illegal drug in Canada and young Canadians are the most common users. The heaviest cannabis use group is young people between the ages of 18 and 24, while the second highest use group is youth from 12 to 17. No other segment of the population is more at risk from cannabis use than young Canadians. Young people commonly perceive cannabis as safe, believing it is 'natural' or 'just a plant,' yet illicit cannabis can be tainted with containments and—in some cases—synthetic toxins that are very harmful. Medical research has repeatedly shown that cannabis does impair childhood development both in-utero and throughout youth. Restricting youth access to cannabis is critical to protecting young Canadians from harm.

Minimizing harm to protect public safety and public health and to ensure a safe supply chain is also critical to legalization. The illicit cannabis market is thriving, with millions of Canadians and more than 150,000 people in Saskatchewan buying cannabis products illegally every year. There is also an explosion of illicit market activity, with store-front retailers popping up all over the country. In addition, Canadians are buying adult-use cannabis and cannabis-induced products online. The economic activity associated with the illicit cannabis market is staggering. Canada will not be able to eliminate the illicit cannabis market for years. Instead, the goal will be to mitigate its effects.

One of the most challenging issues will be the prevention and prosecution of cannabis-impaired driving. Impaired driving is a major policy problem in Canada and in Saskatchewan, with tremendous human and financial costs. Research suggests over one in four cannabis users have driven under the influence, that driving under the influence has become normalized, and that cannabis impairment is associated with higher rates of road accidents. The resources required for police to combat cannabis-impaired driving are different than alcohol-impaired driving with oral-screening roadside testing devices needed to measure levels of cannabis. Besides being expensive, these devices do not measure the actual amount of drug in the person's body; rather, they simply indicate the presence of the drug. They also are incapable of determining levels of impairment. To further complicate matter cannabis is fat-soluble and can stay in an individual's system for up to 30 days; therefore, while a person may have legally used cannabis days earlier, such as on the weekend, the substance may still be in their system the following Wednesday.

Preparation for the new *Act* in policing will require significant public investment. For example, the high costs associated with impaired driving will include equipping police cruisers with new devices, training and on-going certification for officers to use the tools and become qualified drug recognition evaluators, and expansions in community policing initiatives. Responsibility for these costs is unclear but it is incumbent on the government to ensure law enforcement officials have the resources and technologies necessary to present credible evidence before the courts. Legal expertise on impaired driving will be required to close current loopholes in the court system. Within the current court system, Drug Recognition Evaluation (DRE) evidence is routinely challenged and rejected, and defence counsel commonly questions the validity of the officer's initial request for impairment testing. Canadian Courts remain skeptical about the link between the mere presence of drugs in a driver's system and the actual impairment of driving ability.

In the context of public health, adult members of the public also have the mistaken impression that cannabis is not harmful. Since the early 1990s, the potency of cannabis has significantly increased, resulting in new health concerns. Recent research into the effects of cannabis has linked it with a heightened risk of having heart attacks, strokes, testicular cancer, and lung disorders. There is also a long history of associated mental health concerns. For some people, cannabis is addictive and recovery from dependence is difficult. Taxation revenue from cannabis sales should be used to minimize harm by re-investing in policing and healthcare-related costs and also to support research and evaluation in the cannabis sector.

Recent research into the effects of cannabis has linked it with a highlighted risk of having heart attacks, strokes, testicular cancer, and lung disorders.

The opportunities for economic development are staggering with Deloitte estimating that the value of the retail market will be between $4.9 billion and $8.7 billion, and this is without any consideration of security, testing labs, agronomy, paraphernalia, tourism, packaging, transportation, digital analytics, and many others ancillary markets. Cannabis legalization opens new doors for innovation and economic growth in Saskatchewan. Current legal production of cannabis and hemp in Canada is significantly lower than projected demand after legalization. Saskatchewan's unique expertise in agriculture creates an industry opportunity that could help bolster and sustain the provincial economy.

Successful legalization of adult-use cannabis requires policies that will enable the legal market to significantly diminish the illicit market. Although the illicit market has had a very long time to establish a consumer base, it is suspected that most people would prefer a safer and more reliable method of obtaining cannabis. This has implications for the supply chain, both through production and retail, in terms of establishing regulatory practices that ensure consumers purchase a safe product in a safe space, which can be supported by a public awareness campaign.

There are also considerations for taxation, cost of production, and retail profits, as the purchase prices associated with legal products must be competitive with the illicit market. Furthermore, catering to consumer preferences, such as through edibles or craft products, may be another method of enhancing partiality towards the legal market. Many people will experience a behaviour change in moving from the illicit market to the legal market. Therefore, mitigating the illicit market will require a long period of time which will be directly impacted by the successes of early policy choices.

In this report, we examine the many implications of adult usage-cannabis in Saskatchewan. Analyzing legalization of the production, distribution, and sale of cannabis in Canada, the report will examine the various policies through public safety, public health, economic, innovation, and comparative lenses to identify barriers and highlight opportunities in the adult-use cannabis sector. Often these lenses are competing and we offer potential solutions to balance the objectives in the context of the key federal goals of illicit market mitigation, restricted youth access, and minimization of harm both to the user and to others.

The report suggests 40 policy and programming recommendations that will provide Saskatchewan with a significant opportunity to achieve these objectives while also maximizing economic opportunities and capitalizing on innovation. Given the complexity of this policy shift, the response must be multi-faceted and collaborative, and allow for flexibility.

RECOMMENDATIONS:

PUBLIC EDUCATION

- **Recommendation 1:** Design a large-scale, multi-pronged public information campaign to educate citizens about health impacts, changes to the law, and impairing driving.
- **Recommendation 2:** Design a large-scale preventative public information campaign for youth and parents.
- **Recommendation 3:** Develop an educational campaign about the dangers of cannabis use during pregnancy and breastfeeding.
- **Recommendation 4:** Design a public information campaign on misuse and treatment.

RESTRICT YOUTH ACCESS

- **Recommendation 5:** The minimum legal age to purchase and consume cannabis in Saskatchewan is set at the same level as the minimum legal age to purchase and consume alcohol.
- **Recommendation 6:** Put in place strong disincentive (penalties, fine) for licensed retail outlets selling to minors.
- **Recommendation 7:** Saskatchewan Government Insurance (SGI) creates an information campaign on impaired driving designed specifically for young persons under the age of 24.
- **Recommendation 8:** Recommendation 8: Justice Canada funds a national information campaign of the new laws prohibiting selling/providing cannabis to minors.

POLICING RESOURCES AND CAPACITY DEVELOPMENT

- **Recommendation 9:** Seek adequate funding from the Government of Canada to provide money for police training and education.
- **Recommendation 10:** The main goals/expectations for policing should be to mitigate the illicit market and to combat drug impaired driving
- **Recommendation 11:** Reinvest a percentage of all taxation in policing resources.

PROTECTING PUBLIC HEALTH

- **Recommendation 12:** Design and implement a health promotion framework for cannabis use.
- **Recommendation 13:** Use revenues from cannabis to fund programs for prevention, education and treatment.
- **Recommendation 14:** Design and implement treatment programming to address misuse.
- **Recommendation 15:** Limit public consumption by disallowing smoking and vaping in locations where smoking bans are in effect and restricting social consumption to licensed premises.
- **Recommendation 16:** Regulate packaging to ensure potency and quality is clearly labelled for consumers.

MARKET STRUCTURE

- **Recommendation 17:** Align market forces and regulation through a limited number of licensed private retailers to ensure the retail market for cannabis is responsive to market conditions and consumer preferences, effectively competing with the illicit market.
- **Recommendation 18:** Establish a single point of entry for bulk cannabis, seeds, and clones coming into the province through a private single distributor that tests, packages, and tracks all products sold in the province, ensuring only safe, cost-effective, and legal cannabis reaches consumers and that there is a level playing field for both small and large producers.
- **Recommendation 19:** License and regulate the distributor through a central cannabis advisory board that coordinates the implementation of policies and programs, centralizes expertise, facilitates medical and policy related research, disseminates information and transfers knowledge, and supports innovation and economic growth in the cannabis industry.
- **Recommendation 20:** Work with the distributor through the advisory board to utilize the single distributor's infrastructure to reduce the barriers to entry of Saskatchewan firms in becoming licensed cannabis producers, and facilitate innovation in new product development in the Saskatchewan economy.
- **Recommendation 21:** Work with the distributor through the advisory board to facilitate opportunities to import cannabis to relieve shortages and develop a channel for Saskatchewan producers to export cannabis.
- **Recommendation 22:** Support the Federal regulation allowing home cultivation of cannabis within certain limits.

- **Recommendation 23:** Taxation levels on legalized adult-usage cannabis must ensure that the legal market is competitive with the illicit market.
- **Recommendation 24:** Allow the market to set the pricing to ensure the supply of cannabis starts to balance with demand.
- **Recommendation 25:** Establish a distributor model that includes a mandate to source and test all cannabis entering the Saskatchewan market to reduce barriers to Saskatchewan producers entering the market.
- **Recommendation 26:** License a limited number of private cannabis retailers to enhance the links between consumer demand and production while limiting outlet density.

INNOVATION SYSTEM

- **Recommendation 27:** Establish a multi-ministry team to coordinate efforts and evaluate an industry-wide branding effort.
- **Recommendation 28:** Innovation Saskatchewan and the Saskatchewan Ministry of Agriculture offer support for market and product development through existing programming and facilitation.
- **Recommendation 29:** Industry partners establish a provincial industry association.
- **Recommendation 30:** Deregulate the hemp market and remove the current red tape.
- **Recommendation 31:** The Ministry responsible for monitoring Federal regulatory development provide regular updates to other Ministries and agencies.

DISTRIBUTION/RETAILING

- **Recommendation 32:** Do not distribute cannabis in the same retail outlets as tobacco and alcohol.
- **Recommendation 33:** Municipalities develop zoning bylaws to limit the density of licensed retail outlets and their proximity of retail outlets to schools and youth centers.
- **Recommendation 34:** Implement a single licence retail outlet system for both medial and adult-usage cannabis.
- **Recommendation 35:** Set industry standards for packaging that allow for adult-usage branding.

LICENSING

- **Recommendation 36:** Develop a merit-based model of licensing that rewards meeting security and quality expectations or standards.
- **Recommendation 37:** Grant a limited number of licenses to private retailers to minimize the illicit market.
- **Recommendation 38:** The mandate of the Saskatchewan Liquor and Gaming Authority should be expanded to include cannabis regulation.

HOME CULTIVATION

- **Recommendation 39:** Prior to legalization engage in careful planning for home grown cultivation within the defined limits.

MONITORING IMPACTS

- **Recommendation 40:** Invest in data collection and further research to accurately monitor the short-, mid-, and long-term outcomes of the legalization of adult-use cannabis.

On November 21, 2017, an amendment was made to the report to clarify a statement on page 40.

Introduction

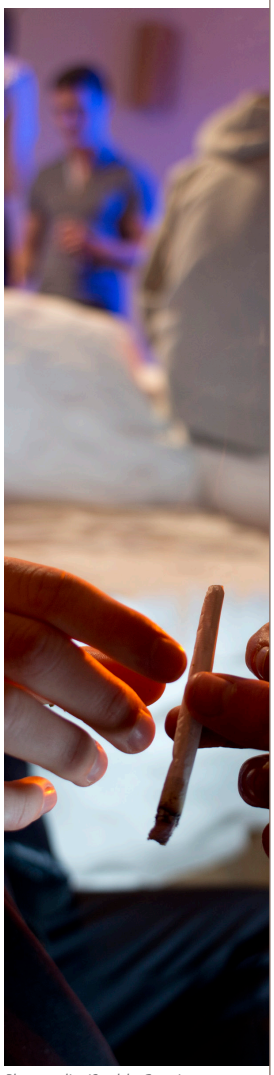


Photo credits: iStock by Getty images

Introduction

In the summer of 2018, the adult-use cannabis market will be legal across Canada. The *Cannabis Act* (Bill C-45) will come into force, legalizing and regulating cannabis in July 2018. The *Act* is extensive, with a focus on restricting youth access, protecting public health, reducing illegal activities, and relieving pressure on the criminal justice system. In addition, changes are being made to the criminal code to better combat drug impaired driving (Harris 2017). According to the Liberal Government mantra, they will "legalize, regulate, and restrict access to marijuana" (Liberal Party of Canada 2017). While medical cannabis has been a national conversation for a number of years, adult-usage cannabis is new to the sector and will present a number of opportunities and challenges to the province.

Across Canada, provincial governments are engaged in activities to prepare for the new *Act*. Alberta plans to hold a series of province-wide consultations and has established a secretariat; Ontario has announced government-owned retailing, and Quebec will be tabling legislation in the fall. The Government of Saskatchewan has publicly stated that it has concerns with the federal government's 'patchwork' legislation that leaves a number of questions unanswered. Currently a number of committees have been formed within government to begin developing a framework, with some stakeholder engagement occurring.

The legalization of adult-usage cannabis will convert a large illicit market into a large legal market, which will in turn generate visible and taxable economic activity. Scholars have estimated that British Columbia's illicit cannabis market is worth hundreds of millions of dollars annually (Werb 2012). As a result, provincial governments across Canada will have to develop policies to ensure as much of the benefit of this emergent industry can be captured for the benefit of provincial residents.

Economic activity will follow three distinct stages in the supply chain: production, distribution, and retail sales. Separate policies will need to be developed to ensure each stage of production is well-regulated, safe, and generates economic benefit for the province. Policy choices will influence the location, scale, and economic viability of activity at each stage in the supply chain. Understanding the size, scope, and sensitivity of the Saskatchewan market to various policy choices at all stages, both within the province and its municipalities and in other jurisdictions, will be critical to ensuring the province is able to enjoy the benefits of this new economic activity and not just endure the costs.

Creating a substantive plan for Saskatchewan will require that a number of decisions be made quickly; this will be difficult, as there are numerous policy questions to be asked and answered. For example, while the penalties for selling and giving youth cannabis or using youth to engage in illegal cannabis activities will be established in the *Cannabis Act*, how will Saskatchewan restrict youth access to cannabis? How will public information campaigns be designed? Even with the federal commitment of $9.6M for this purpose, the province will be responsible for creating a provincial awareness program that further explains the Saskatchewan guidelines. What model will be adopted for the retail regulatory framework? How accepting will the public be of these changes? How many licensed retail outlets should there be? How will the government handle the inevitable misuse?

It will fall upon the province to develop an entire suite of policies, regulations, and guidelines to prepare for the retail aspect of the emerging sector. Indeed, decisions will be required for defining the age of majority, sales and distribution, locations of consumption (restaurant, coffee shops and so forth), possession limits (if lower than federally defined), home growing (if lower than the plants per residence suggested in the federal framework), and production (edibles and such). If the province does not develop a regulated retail framework, then Saskatchewan citizens will also be able to buy cannabis online, which presents other risks.

The Saskatchewan moral compass has traditionally been somewhat socially conservative. The federal government's decision to legalize and regulate cannabis lacked any real commitment to co-operative federalism and was not a decision the provincial government was prepared for or necessarily agreed with. Adult-usage cannabis was, until recently, very low on the provincial policy agenda. Now, with the July 2018 implementation date and the end of cannabis prohibition looming, the province will have to be ready.

The cannabis sector offers many opportunities for economic development and tax revenues; however, there are also several risks, such as youth access, impaired driving, prenatal use, and others. Coordinating policy frameworks for the sector will require extensive collaborations between the Ministries of Economy, Finance, Health, Innovation Saskatchewan and Justice. While some policy lessons can be drawn from other jurisdictions, we must be cautious, as many existing models are experiencing problems. The most common cause of policy failure during implementation is a lack of coordinated efforts.

For some, this will be a value-based conversation, as cannabis has a long history as a social evil. We will not be contributing to this debate. Instead, this report will examine smart practices to provide some comparative context to the issues by drawing potential lessons from other jurisdictions. With a focus on public safety, public health, economic development, and the innovation chain, the report identifies critical problems associated with the sector and suggests various tools to pre-empt some of the issues. In addition, we explore various opportunities that may play a role in the Saskatchewan Advantage. The report will be evidence-informed as it provides context for and analyzes the opportunities and threats arising from the legalization and regulation of cannabis.

CHAPTER SYNOPSES

Research and policy focused on medical cannabis are fairly well established; however, work on adult-usage cannabis in Canada remains nascent. This report begins with a brief historical overview and provides context on the sector. This initial chapter details how cannabis became known as a social evil and outlines a brief profile of current users and public opinion. The chapter will then situate the government legislative jurisdiction, the introduction of medicinal cannabis in Canada, and the recent activities and recommendations of the federal Task Force on Cannabis Legalization and Regulation. The chapter will conclude with a detailed overview of the current federal framework.

The second chapter examines the legalization and regulation of cannabis from a public safety perspective. The chapter begins by outlining a number of public safety considerations around drug intoxication and road accidents, laws against driving under the influence, and testing for drug impairment. Under the new legalization, the role of law enforcement will increase significantly; thus the discussion moves into an examination of the impacts on law enforcement in achieving their mandate to suppress the Canadian illicit cannabis market and uphold criminal law. Finally, the chapter examines the potential impact cannabis may have on communities when it is legalized. Issues such as consumption in public spaces, crime rates, location of retail outlets, and home cultivation will all impact public safety.

The third chapter examines the legalization and regulation of cannabis from a public health perspective. There are many physical and mental health concerns that result from cannabis use, which intensify in conditions of chronic use. The vulnerability of the developing brain, both for infants in-utero and adolescents, highlights the importance of a health promotion framework that educates the public about harm prevention. There are grave concerns about the danger of the current public misperception regarding the harmlessness of a "natural product" like cannabis. A better-informed public can make healthier decisions about their own well-being.

The fourth chapter examines the legalization and regulation of cannabis from an economic perspective. The positive and negative potential outcomes for private and public distribution and retail are closely outlined. It is suggested that a central distribution unit, resulting from a public-private partnership, may have value. This could be accompanied by a minimal number of licensed private retail outlets organized through an approved geographic distribution. Furthermore, home-grown cannabis of four plants should be permitted, while retail sales of equipment to support this process should be regulated. This regulatory framework creates the best opportunities to minimize the growing illicit market, protect youth health, and produce a safe and high-quality cannabis product that may lead to an economy of scale and contribute to Saskatchewan innovation.

The fifth chapter will examine smart practices through a comparative framework. There are no 'best practices' in North America, as the sector is too new and long-term policy outcomes are unknown. Instead, we consider smart practices with somewhat of a focus on the American experience regarding economic development, health, justice, and social welfare. The chapter begins by providing the current Canadian and American cannabis sector contexts. The comparative case of Colorado and Washington State, the first two jurisdictions to legalize adult-usage cannabis, are explored next. Oregon and Uruguay are also analyzed to highlight key differences between the previous two states' approaches. Next, a comparative analysis focuses on governance structures and a variety of social indicators, including prevalence of use, arrests, impaired driving, youth consumption, hospital visits, tax revenue, economic impact, and ancillary sector growth.

The sixth chapter explores the innovation chain that may contribute to the Saskatchewan Advantage. Opportunities exist to expand Saskatchewan's current supply chain, which has been established through three medical cannabis producers. Given Saskatchewan's agricultural base, it is prudent to consider the future potential of cannabis as an export crop for the province. Economic growth can also be anticipated for ancillary product supplies and services that are not directly part of the cannabis sector, but are related to it. Saskatchewan's agricultural industry is already a leader in hemp production, which may also experience growth. An innovative regulatory framework that supports economic growth in the cannabis sector, hemp sector and ancillary services will result in province-wide opportunities.

01

Cannabis: History and Context

Photo credits: iStock by Getty images

01

Cannabis: History and Context

An extensive history of the utility of cannabis and a long-standing prohibition precedes modern discussions surrounding the use of cannabis. In the current context, there has been a recognition of the medicinal value of cannabis resulting in increased value for a product that was previously entirely illicit. For the past several decades, it has been recognized that despite a predominantly illicit status, cannabis use is prevalent and long standing. Therefore, a Task Force on Cannabis Legalization and Regulation was formed to determine a safer approach for public use of cannabis. Ultimately, the *Cannabis Act* (Bill C-45) was designed to regulate the federal and provincial jurisdictions regarding legalization of adult usage cannabis.

1.1 HISTORICAL CONTEXT

Historical records show that human use of cannabis dates back 10,000 years to Asia and Africa, where it was used to produce clothing, as a food source, for medicinal purposes, in religious ceremonies, and for personal use. Most historians believe that hemp was introduced in the west during the slave trade. In South America, Brazil, then a Portuguese colony, was one of the first places smoking cannabis became popular. It quickly spread to Mexico and eventually found its way into the Unites States. Hemp was also popular in pre-Confederation America, with many colonial farmers forcing slaves to grow the crop for fiber (Lee 2012). North America has a long history of racializing cannabis through anti-Asian discourse in Canada and anti-Mexican sentiment in the U.S..

On April 23, 1923, Canada became one of the first countries in the world to add cannabis to its list of prohibited substances (Giffen et al. 1991; Carstairs 2000). At the time, the use of cannabis was minimal in Canada and, from a public policy perspective, this decision is a classic case of a solution looking for a problem (Erickson and Oscapella 1999). The pressure to criminalize was largely driven by lobbyists and the prohibition orthodoxy, which considered cannabis a social evil. Racist propaganda that Chinese-Canadians were responsible for corrupting white youth with drugs was championed by such social crusaders as women's groups, religious organizations, and fraternities (Carstairs 2000; Lucas 2008). Once cannabis was added to the list of illicit drugs (other substances in this category included heroin, cocaine, and opium), its use was highly prohibited and tightly controlled (Spicer 2002; Carstairs 2000).

With the help of some Flower Power, cannabis use in Canada became widespread in the nineteen sixties, marking a generational shift in opinion (Green and Miller 1975). In 1969, the federal government commissioned an inquiry into the non-medical use of drugs, which is popularly known as The Le Dain Commission. The mandate was to look at the rising number of cannabis-related arrests, particularly among the middle-class. The Commission's recommendations to end prohibition were ultimately rejected and, in 1979, Ottawa signed the United Nation's Convention on Psychotropic Substances. This marks the beginning of 'The War on Drugs'—a textbook example of policy failure. This went on for almost 20 years, with strict legislation and policing of use with the advent of Canada's Drug Policy (Spicer 2002) until 1999, when Canada became the second country in the world to legalize medical cannabis (Lucas 2008).

1.2 MEDICINAL CANNABIS

The Government of Canada has implemented three frameworks for regulating medicinal cannabis: one in 2001, another in 2013, and a third in 2016 (Fischer, Kuganesan, and Room 2015; Canada Gazette 2012; Canada Gazette 2016). Court rulings initiated the changes that essentially reduced regulations on who can obtain medicinal cannabis and in what form (R. v. Parker 2000; Canada Gazette 2012; R. v. Smith 2015; Allard v. Canada 2016; Task Force 2016, 6). The updated framework allows physicians to prescribe cannabis for therapeutic reasons, where the patient can purchase it from mandated producers or grow some in their own home and use it in many different forms (Government of Canada 2016c).

Other jurisdictions, such as in Austria, Belgium, Chile, Columbia, Czech Republic, Finland, Israel, the Netherlands, Spain, the UK, and some states in the US, have liberalized their cannabis control regimes when it comes to medicinal use (Fischer, Kuganesan, and Room 2015). Many of these countries have different approaches to cannabis use; while none permit distribution, many of them allow small-scale possession and use. Countries like the Netherlands, Austria, Czech Republic, Israel, and Spain argue that cannabis is relatively safe and that it is better to have a controlled cannabis sector than to have users going to the illicit market.

1.3 PROFILE OF USERS

Cannabis is the most used illicit drug in Canada. The group with the highest rate of usage are young adults between the ages of 18 and 24, followed by youth from 12- to 17-years-old (Task Force 2016). Canada has the highest rate of cannabis use among youths of any developed country, which poses significant problems for policy makers (UNICEF 2013). The rate appears to be increasing for adults over twenty-five, while remaining stagnant for young adults, suggesting that it may be a generational shift. Further, males are more likely to use than females, though there has been an increase in use among females (Task Force 2016).

In 2012, Statistics Canada reported that 12.2 per cent of Canadians aged 15 and over confirmed that they had used cannabis (Rotermann and Langlois 2015). In a survey completed by Health Canada, almost a quarter of respondents reported using cannabis for medical purposes, regardless of whether they have a prescription (Task Force 2016). There does not appear to be a significant difference in usage rates among rural or urban users (Pirie and Simmons 2014; Cronk and Sarvela 1997; Scheer, Borden, and Donnermeyer 2000). The median age for first cannabis use was 17-years-old (Task Force 2016).

In a national study by Pirie and Simmons (2014), just under half of the respondents reported trying cannabis as least once. Of those, only 9 per cent had tried it within the past year and 5 per cent within the past month. In an Ekos Research (2016) poll commissioned by Health Canada, almost 3 out of 5 respondents had used cannabis at least once in their life, with 38 per cent using it in the past year. In other words, the Ekos poll suggests 1 out of 5 Canadians has used cannabis within the last year. According to the same poll, those with high household income are more likely to have tried cannabis once. Of those that use, 1 in 5 respondents reported using cannabis daily; another 1 in 5 use a few times a week, and roughly a quarter responded that they use a few times a year (Ekos Research 2016).

Ultimately, according to the Health Canada survey of those who do use cannabis, a large portion used it frequently within the past three months, and a third of users prefer it daily. Across Canada, British Columbia has the highest rate of use in the past year, with Nova Scotia second and Saskatchewan coming in at sixth. Out of the Prairie Provinces, Saskatchewan has the lowest rate of use.

1.4 PUBLIC OPINION

The legalization of cannabis has incrementally gained public acceptance over the past decade, with most Canadians supporting the idea—albeit with leeriness of how it will be done (Angus Reid 2017; Nanos 2017). In fact, in a poll completed by NRG Research Group (2017a), the highest support for legalization was in Saskatchewan. This supports other polls that focused on Saskatchewan only, where the majority of respondents agreed with legalization (Insightrix 2017; Forum Research 2015). However, this appears to be a change from 2012, when an overwhelming amount of Saskatchewan residents said they strongly disagreed with even decriminalizing cannabis, in a survey conducted by the University of Saskatchewan (CBC News 2012). One poll done in 2016 by Hill+Knowlton Strategies disagrees, saying that only two in five Canadians support cannabis legalization and the same amount believe the federal government is pushing for legalization too fast (Wright 2017). Even though it appears as though the majority of Canadians agree with legalization, especially young adults (NRG Research Group 2017a), they have some issues with how it will roll out (NRG Research Group 2017b).

There are implications in the economic, public, and social policy realms. For example, around sixty per cent of respondents believe that use among minors will increase (NRG Research Group 2017b); however, current users will not increase their quantity or pattern and those who abstain will continue to do so (NRG Research Group 2017a; Ekos Research 2016; Forum Research 2015; Nanos 2017). Another important consideration is driving under the influence (NRG Research Group 2017b). In one poll that was completed with cannabis users, over a quarter of respondents admitted to having operated a vehicle while under the influence (Ekos Research 2016). Other concerns are over the safety of the cannabis sector (Wright 2017; Forum Research 2015), the legal age of use (Angus Reid 2017), access to dependable information (Ekos Research 2016), and stopping organized crime (Angus Reid 2017). These are all valid concerns that will be addressed in this report.

1.5 LEGISLATIVE JURISDICTION

Sorting through the responsibilities and accountabilities of the legalization and regulation of cannabis in Canada remains a fairly significant policy challenge for the sector. Coordination will be critical, and there may be some challenges related to coordinating the multiple levels of governance. More specifically, the federal lens is based on a criminal-justice framework while there is an emerging trend provincially towards a public health framework, and municipalities will be focused on a commercial regulatory framework.

The *Cannabis Act* (Bill C-45) outlines the roles and responsibilities for both federal and provincial jurisdictions. While the federal government is responsible for a large portion of the cannabis sector, the retail environment is left to the provinces.

> While the federal government is responsible for a large portion of the cannabis sector, the retail environment is left to the provinces.

Federal responsibilities include, but are not limited to:

- Establishing restrictions on adult access to cannabis;
- Establishing criminal penalties;
- Creating rules surrounding promotion, packaging, labelling, and displaying of cannabis or cannabis products (to protect youth);
- Instituting a federal licensing regime for production; setting and enforcing health and safety requirements;
- Establishing industry-wide rules on types of products allowed for sale; standardizing serving size and potency as well as certain ingredients;
- Creating minimum federal conditions that provincial and territorial legislation for distribution and retail sale would be required to meet, to ensure a reasonably consistent national framework to promote safety;
- Establishing the ability for the federal government to license distribution and sale in any province or territory that does not enact such legislation;
- Enforcing the law at the border, while maintaining the free flow of legitimate travel and trade; and
- Continuing to maintain the medical cannabis program.

Provincial responsibilities include, but are not limited to:

- Licensing the distribution and retail sale in their respective jurisdictions, and carrying out associated compliance and enforcement activities;
- Setting additional regulatory requirements to address issues of local concern. For example, provinces and territories could set a higher minimum age or more restrictive limits on possession or personal cultivation, including lowering the number of plants or restricting where it may be cultivated;
- With municipalities, establishing provincial zoning rules for cannabis-based businesses;
- Restricting where cannabis may be consumed; and
- Amending provincial traffic safety laws to further address drugged driving (licence suspensions for new and experienced drivers and zero tolerance for new drivers are existing Saskatchewan laws).

In accordance with their own jurisdictional power, municipal governments will have a part to play in the legislation of cannabis as well. For instance, they will work with the province to implement the legislation. Further, they will be responsible for enforcing local zoning, building standards, public nuisance complaints, and where cannabis can be consumed in public (Bill C-45).

1.6 CURRENT FEDERAL FRAMEWORK

In the recent 2016 federal framework for medicinal cannabis, governed by the Access to Cannabis for Medical Purposes Regulations (ACMPR), patients, directed by their physician, can obtain or grow cannabis for medicinal needs in the form of fresh or dried cannabis or cannabis oil. The ACMPR consists of four parts, two of which regulate the cannabis sector: the framework for commercial production, which regulates the production and selling of cannabis, and personal production, which also includes production by a designated person and regulates authorized activities (Government of Canada 2017i).

The first part is very similar to the previous framework, but it allows mandated producers to sell dried or fresh cannabis as well as cannabis oil. The current framework regulates these activities, as well as the selling of starter materials such as the seeds and plants, to approved patients, as opposed to Health Canada. As a result of the court ruling in *Allard v. Canada* (2016), the second part improves access to medical cannabis by allowing a small quantity to be grown or by designating an individual to grow the cannabis on their behalf in the form of dried or fresh leaves or cannabis oil. The patients and designated producers are certified by Health Canada. The patients can still purchase cannabis from licensed producers at any time (McMillan 2016).

Individuals who wish to obtain cannabis for medical reasons have to follow multiple steps, all of which are regulated by the ACMPR. First, they must to consult with a health care practitioner and obtain a medical document to provide specific information. The next step is to register with a licensed producer, which is the process through which they obtain the product. The patient is permitted to possess "the lesser of thirty times the daily amount stipulated by your healthcare practitioner or 150 grams" at any one time (Government of Canada 2016a).

When the proposed legislation to legalize cannabis is passed by Parliament, the Access to Cannabis for Medical Purposes Regulations will continue to be in effect (Government of Canada 2017e). However, because the ACMPR is temporary, and in light of

the anticipated legalization of cannabis, it is postulated that the *Act* will be amended to adapt to the new developments in the cannabis sector (McMillan 2016).

1.7 THE TASKFORCE AND ITS FINDINGS

On June 30, 2016, the Canadian government assembled a Task Force on Cannabis Legalization and Regulation (TFC) to provide recommendations on how cannabis should be regulated (Mas 2016). The TFC was mandated to advise on how to "legalize, regulate, and restrict access" by engaging with multiple stakeholders from governments, indigenous and youth representatives, and patients and experts in relevant fields (Task Force 2016, 8). This was to be inclusive of all peoples and issues while respecting human rights and shared responsibility.

The government set out the parameters in a discussion paper, making sure that the recommendations protected children and youth, emphasized public health, minimized illegal activities, relieved pressure on the criminal justice system, and provided strict regulation of the cannabis sector. On November 30, 2016, based on the findings, a final report was provided, consisting of four parts that are relevant to provincial jurisdictions: minimizing harms of use, creating a safe supply chain, enforcing public safety, and medicinal cannabis (Task Force 2016).

1.8 MINIMIZING HARMS OF USE

Minimizing harms of use considers the health risks for the public and how to best incentivize using cannabis in a way that avoids those risks. The recommendations include everything from the minimum age of use to taxes and advertising guidelines, but some stand out specifically for Saskatchewan. It is recommended that the minimum age of use is 18, as is set by the federal government, but the provinces can harmonize it with their minimum age for purchasing alcohol—or set it even higher, if they wish. The intention of Saskatchewan in not setting a higher legal age is to mitigate the illegal market and to minimize inter-provincial purchasing, knowing that individuals in the 18 to 24 age range are the most populous group of users.

Taxation is also an important consideration. Recommendations suggest a fair tax regime for both the federal and provincial governments to use for funding administration, education, research, and enforcement. One strong suggestion, due to the difficulty in controlling the amount of THC ingested, is to tax based on potency, similar to the pricing of beer, wine, and spirits. This can also "encourage consumers to purchase less-potent products" (Task Force 2016, 24). Ultimately, there is a need for a flexible system that can adapt to a new legal market and that can be created within an appropriate economic framework.

Other recommendations for the harms of use are to look at occupation health and safety and workplace impairment. For example, there is a need to work with Labour Relations and Workplace Safety in Saskatchewan to create policies similar to those of alcohol impairment. This will be of use in order to reduce accidents. Proper tools and methodology for testing intoxication levels will also be required.

Effective public education strategies directed towards youth, parents, and the vulnerable population are necessary. Education, coordinated with the federal government, about the risks of potency and problematic use should be swiftly developed and dispensed so that the general public has more basic information, which can be supplemented by evidence-based technical information in the education, health and legal sectors.

Proper tools and methodology for testing intoxication levels will also be required.

1.9 CREATING A SAFE SUPPLY CHAIN

The cannabis sector consists of production, distribution, and retail. The Task Force's recommends provinces deal with distribution and retail sides of the sector with production falling under federal jurisdiction. They further recommend that cannabis not be sold alongside alcohol or tobacco. Alcohol and cannabis have increased negative effects when taken together, while tobacco and cannabis are commonly used together. It is believed that co-use of tobacco and cannabis "could undermine the progress achieved over the last few decades on reducing smoking" (Task Force 2016, 22). Another aspect of policy that will be needed related to retail is vendor training for all staff who sells cannabis products, in order to ensure the information provided to customers is accurate and consistent with industry standards. Cannabis is currently being sold online illegally; according to the TFC, this needs to be regulated as well.

There should be restrictions regarding the locations of where cannabis can be sold to protect public health and safety. This includes avoiding close proximity to places such as schools and community centres. The Task Force suggest that a maximum of four plants be allowed for personal cultivation, with plants being properly secured from youth, and that this be subject to regulation from local authorities (Task Force 2016).

1.10 ENFORCING PUBLIC SAFETY

Public safety is a broad subject that requires a partnership between the federal and provincial governments. It is important that Canadians know what is legal and what is not legal, in order

to make it easier for law enforcement to apply the laws. Municipal governments will also have a role to play in ensuring public safety. For example, the municipalities are responsible for determining smoking bylaws and permitting dedicated places for smoking, such as cannabis lounges.

In order to promote public safety, the TFC recommends laws on driving while under the influence of cannabis. Federal jurisdiction on cannabis-impaired driving will exist, but provincial regulations will also be required. One suggested model is to have graduated sanctions that increase with the severity of infraction. It is also recommended that restrictions on cannabis use for new and young drivers are similar to that of alcohol restrictions, with zero tolerance initially (Task Force 2016).

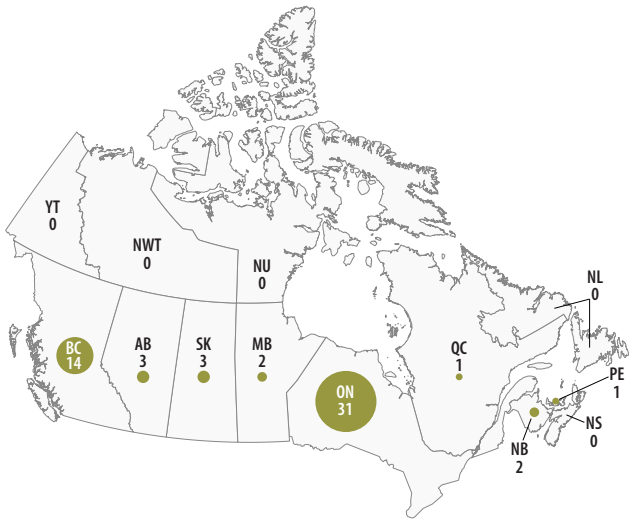
1.11 MEDICINAL CANNABIS

While there is currently separate legislation for medical cannabis, the *Cannabis Act* contains recommendations for amendments. This is a task for the federal government, with the main provincial concern focused on ensuring that the same tax regime applies to adult-usage cannabis (Task Force 2016).

1.12 THE CURRENT CONTEXT

Health Canada is the licensing body for medical cannabis under the Access to Cannabis for Medical Purposes Regulations. In June 2017, there were 201,398 Canadians registered to access cannabis for medical purposes, with 6,108 in Saskatchewan (Government of Canada 2017f). Growth of Canadians using medical cannabis has recently tripled following the implementation of new rules that require patients to purchase cannabis from licensed producers. Home cultivation was previously the preferred method for medical cannabis users but, due to the regulatory changes, large commercial producers that sell products by mail rocketed to the forefront of the industry (Miller 2016). The most successful of these companies is the Smiths Falls, Ontario-based firm Canopy Growth Corp, the parent company of the popular Canadian company Tweed. In 2015, 20 per cent of registered Canadians using medical cannabis were Canopy Growth Corp. customers (Koven 2016). By the end of 2016, the company's revenue was up 180 per cent but profits were constrained, as supply could not keep up with demand (Freeman 2017). There are currently 69 licensed producers of medical cannabis in Canada (Figure 1.1).

Figure 1.1: Authorized Licensed Producers of Cannabis for Medical Purposes as of 2017-10-20



Source: Government of Canada 2017j

Ontario has by far the largest national share, with 39 licensed producers or 56.5 per cent of the market, while Saskatchewan only has three, as can be seen in Table 1.1.

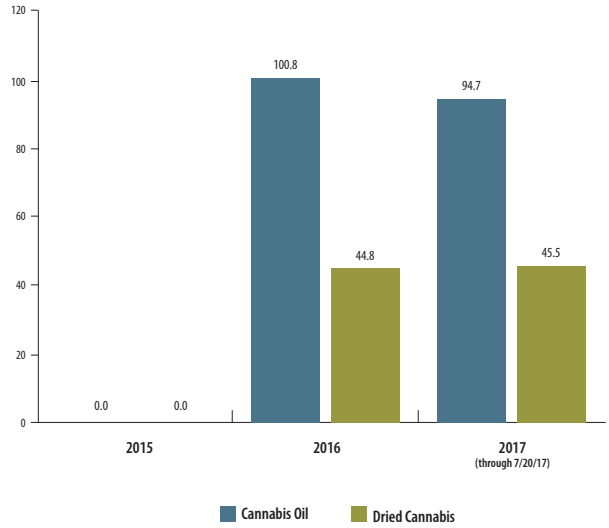
Table 1.1: Authorized Saskatchewan Licensed Producers of Cannabis for Medical Purposes

Producer	License Type		Date of Initial Licensing
	plants / dried	fresh / oil	
CANNIMED LTD.	Sale	Sale	Sept 19, 2013
PRAIRIE PLANT SYSTEMS INC.	Cultivation	Production	Sept 19, 2013
rTREES PRODUCERS LIMITED	Cultivation	$150	June 16, 2017

Source: Government of Canada 2017j

Canada's licensed producers enjoy a significant global market share, due to their first-mover advantage. There are currently 29 countries that import medical cannabis, but only Canada and the Netherlands export the product. To export cannabis to an international buyer a licensed producer must obtain a permit from the Minister of Health Canada; the producer is limited to exporting medical cannabis to a single and specified importer. As can be seen in Figure 1.2, exports are considerable.

Figure 1.2: Canadian Cannabis Export 2015- August 15, 2017



Source: Marijuana Business Daily 2017

Recently, Canopy Growth Corp. purchased MedCann GmbH, a German-based pharmaceutical distributor, resulting in their products being available in German pharmacies. Canadian licensed producers are currently shipping medical cannabis for pharmaceutical sales and research studies to Australia, Brazil, the Cayman Islands Chile, Croatia, Cyprus, the Czech Republic, Germany, Israel, New Zealand, and the Netherlands (Government of Canada 2017j). As can be seen in Figure 1.2 exports have been considerable.

1.13 CONCLUSION

After many years of criminalization and moral regulation, Canada's decision to legalize the adult-usage use of cannabis poses many policy questions. Measures to balance harm reduction and benefit maximization will cut across ministries and require partnerships with community-based organizations, businesses, municipalities, educators, health care professionals, and others. Previous prohibitionist policies and associated discourses will slow the process of normalizing adult-usage cannabis. Despite the gradual public acceptance of cannabis legalization, policy design and implementation will be critical in ensuring communities are protected and that citizens remain confident in government actions taken.

The entry of medical cannabis in Canada is not unique, as medicinal usage is legal in a number of jurisdictions globally. While a few policy lessons might be gleaned from the frameworks and processes around medical cannabis, adult-usage cannabis use comes with a number of unique challenges. First, there is the issue of high usage among young people, making youth access and education critical policy considerations. We also know that there will be misuse, and so we must develop programs that address treatment and prevent abuse. There is also the jurisdiction hodgepodge and competing frameworks (criminal-justice, public health, and commercial-regulatory) that will guide implementation across the sector. The findings of the Task Force on Cannabis Legalization and Regulation that facilitated implementation of the *Cannabis Act* (Bill C-45) provide a framework for federal and provincial roles and responsibilities for legalization of adult usage cannabis. While this chapter establishes historical and current context, there is a significant amount of uncertainty ahead with many details still to be determined. Given that one of the primary purposes of this policy change is to minimize harm resulting from the cannabis sector, chapter two addresses the many aspects of public safety.

02

Public Safety

Photo credits: iStock by Getty images

Public Safety

Cannabis legalization has a number of implications for public safety that must be accounted for in the design and implementation of policy and programs targeted at the cannabis sector. Attention has arisen for some safety issues, such as drug-impaired driving and youth access, but other issues, such as crime rates around licensed retail outlets and personal cultivation, have received less consideration. Cannabis legalization will have a number of ramifications on the justice system and policing. Arguments suggesting policing resources will decrease following the legalization of cannabis are deeply flawed. Impacts on policing resources will include the need for new training, new equipment, new programs, and new administrative practices. This will be in addition to regular policing enforcement duties around illegal cannabis activities. As demands for services rise, police must be well-equipped to protect public safety.

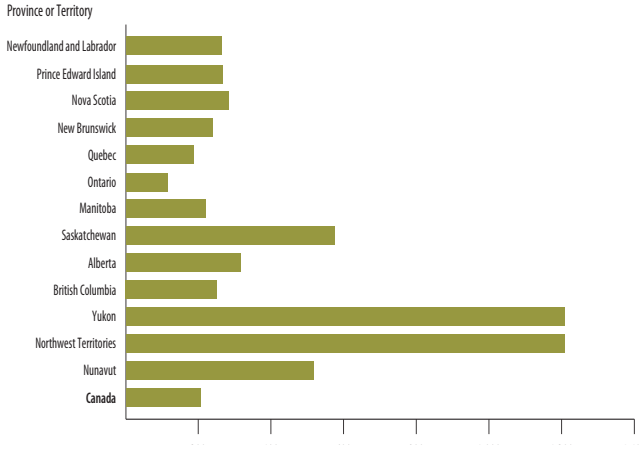
This chapter considers a number of public safety considerations surrounding the legalization of cannabis. The first topic is drug-impaired driving, including associated impacts and resources required to address this problem. Next, the impacts on policing are explored with a focus on training and capacity. Finally, community well-being is examined to highlight some of the key public safety challenges that communities might face following legalization.

2.1 DRUG INTOXICATION AND ROAD ACCIDENTS

The federal, provincial, and municipal governments all have concerns about drug intoxication and associated road accidents as a result of cannabis impairment. Drug-impaired driving and alcohol/drug-impaired driving are significant problems in Canada, with tremendous human and financial costs. Research suggests over one in four cannabis users have driven under the influence of cannabis (Ekos Research 2016), that driving under the influence has become normalized (Ogborne and Smart 2000; Parker 2002), and that cannabis impairment is associated with higher rates of road accidents (Asbridge, Hayden, and Cartwright 2012; Elvik 2013; Li et al. 2011). Some Canadian drivers admitted to driving after using cannabis more frequently than driving after drinking (McGuire et al. 2011) and cannabis-impaired driving is associated with a two to six times increased chance of getting in a road accident as compared to driving while sober (Stewart 2006). Given that every three hours there is a drug-impaired driving offence in Canada, cannabis impaired driving requires serious consideration (Perreault 2015).

In 2015, as shown in Figure 2.1, Saskatchewan had the highest impaired driving rate among the provinces, with 575 incidents per 100,000 people (Statistics Canada 2016, 7).

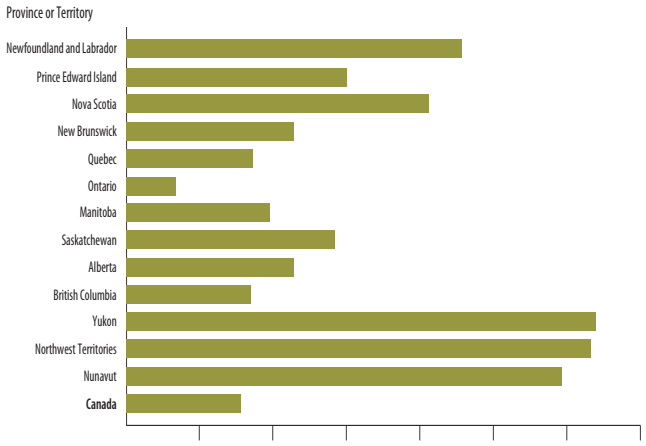
Figure 2.1: Statistics Canada's Impaired Driving Rates for the Provinces and Territories



Source: Statistics Canada 2016, 7

However, Saskatchewan had a lower drug-impaired driving rate and some of the Maritime Provinces and Territories were highest, as seen in Figure 2.2 (Statistics Canada 2016, 8).

Figure 2.2: Statistics Canada's Drug-Impaired Driving Rates for the Provinces and Territories



Source: Statistics Canada 2016, 8

There is enough scientific support to say that cannabis-impairment results in a significantly increased risk of crash involvement (Li et al. 2012). Cannabis affects many functions related to driving any motorized vehicle safely (Ramaekers et al. 2004; Drummer et al. 2004). While there are some individuals who believe the risk is lower than alcohol or that they can compensate for cannabis impairment (Fischer et al. 2006), cannabis and alcohol impairment have nearly opposite effects on brain functions related to driving skills (Sewell, Poling, and Sofuoglu 2009). For example, individuals with cannabis impairment appear to have "delayed or inappropriate reactions, attention deficits, poor speed and distance judgment, and poor hazard perception", increasing the chances of hitting obstacles, delayed braking, or missing road signs (Ogden and Moskowitz 2004, 193). This occurs when the body fully absorbs the cannabis (see Argurell et al. 1986 and Iversen 2003 for further review) and parts of the brain required for thought processing, emotions, sensory processing, and movement are affected by cannabinoids interacting with cannabinoid receptors throughout the brain (Ashton 2001), which results in impairment through a variety of neurotransmitter responses (Iversen 2003; Tanda and Pontieri 1997).

Research sheds light on the types of individuals more likely to drive under the influence of cannabis and other substances. The rate of driving under the influence increases for younger drivers and individuals who have used cannabis recently or more frequently (Adlaf, Mann, and Paglia 2003; Ekos Research 2016; Macdonald et al. 2004; Fischer et al. 2006). Individuals who have completed high school and some post-secondary education are at a higher risk of being involved in a collision (Mann et al. 2010). Additionally, consistent with higher risk-taking (Balodis et al. 2009), individuals who binge drink and drive after consuming alcohol are more likely to use cannabis and drive (Mann et al. 2010). Over a third of Canadians in one poll admitted they have accepted a ride from someone under the influence of cannabis; on the other hand, a larger percentage of respondents stated they would not accept a ride from an impaired driver (Ekos Research 2016).

2.2 LAWS AGAINST DRIVING UNDER THE INFLUENCE

Following the decision to legalize cannabis for non-medical use, the federal government made legislative changes governing drug-impaired driving. Back in 2008, when enforcement was based strictly on observation alone, the Canadian Government amended the Criminal Code to enhance enforcement of drug-impaired driving by allowing field sobriety tests and narrowing defenses (Solomon, Chamberlain, and Lynch 2010). Now, in 2017, the government has proposed Bill C-46, implementing laws that would be among the most stringent in the world. The laws would limit any cannabis use within two hours of driving, with summary convictions or a blended offence for two nanograms of THC per milliliter of blood or more.

The proposed legislation has two parts, one of which comes into effect immediately on Royal Assent and the other 180 days after, to allow preparation time for the provinces. The first part supplements the Criminal Code by legislating the permissible levels of THC concentration in the blood, clarifying investigative grounds for drug testing and court admissibility of drug driving evidence, and the use of oral fluid drug screening tools. The second part amends transportation offences by strengthening the laws of driving under the influence of both alcohol and drugs (Government of Canada 2017g).

2.3 TESTING FOR DRUG IMPAIRMENT

The proposed legislation indicates that when an officer has reasonable grounds to suspect the driver is under the influence, (s)he may request completion of a field sobriety test or an oral fluid screening. A positive result in the screening phase results in a more comprehensive investigation. A field sobriety test or an oral fluid screening test cannot be refused, otherwise criminal charges will be laid (RCMP 2014). An oral fluid screening only indicates whether THC is present and not its amount, nor the level of intoxication; therefore, if the driver tests positive, the officer is permitted to demand a Drug Recognition Evaluation (DRE) which includes a blood sample conducted by a qualified technician (DepaoJ 2015; 2017), or to make a blood demand directly.

Presently, there is a lack of capacity for testing drug-impaired drivers in Canada (Canadian Association of Chiefs of Police 2017a). There are not enough accredited DRE experts in Canada to properly conduct evaluations for the new hard-line driving laws (Laucius 2017). Further, due to lack of capacity for training, officers need to be certified in the U.S. where the training is not based on Canadian laws and context (Canadian Association of Chiefs of Police 2017b). This makes the training expensive and decreases the amount officers that are trained.

The current lack of capacity to test drug-impaired drivers is being addressed by the RCMP and Public Safety Canada, through the use of road-side testing oral fluid screening devices across Canada. An oral fluid screening device is considered a non-invasive method that can reliably detect the presence of drugs in the body (Canada 2015; Beirness and Smith 2017). The pilot project on use of oral fluid drug screening devices for drug-impaired drivers included 53 officers from police departments across Canada. The pilot project took place between December 18, 2016 and March 6, 2017, during which a total of 1,140 samples were collected. Of the participating volunteers, approximately 15 per cent registered a positive drug reading (Government of Canada 2017d).

The pilot found that given proper training and guidelines, these devices would be useful in the Canadian context (Keeping and Huggins 2017). The saliva sample testing takes approximately 5 minutes and can be done at the roadside (DepaoJ 2015). As it stands right now, testing for drug-impaired drivers is a costly measure, and at an estimated $20 to $40 per test, it limits the cost-effectiveness of the device (Laucius 2017). Added to this high cost, the police service or municipality has to pay for the adequate training for officers to do sobriety field tests and DREs, and blood sampling by qualified medical technicians.

The oral fluid screening devices were deemed effective in detecting the recent presence of several drugs, including THC/cannabis, cocaine, methamphetamines, opioids, benzodiazepines, and amphetamines. Officers reported that the devices were easy to use at the roadside with some standard operating procedures. They also said they were able to successfully use them in various weather, temperature, and lighting conditions. The officers also noted that their comfort and confidence increased the longer they used the devices, and they were able to adapt and trouble-shoot problems encountered at the roadside (Government of Canada 2017d).

2.4 IMPACTS ON POLICING

Cannabis use and possession in Canada has long been a criminal offense, with police officers playing a frontline role in law enforcement, community engagement, and public education. One of the main objectives of legalizing and regulating cannabis is to suppress the Canadian illicit cannabis market. Under the new legislation, the role of law enforcement will increase significantly. The long-term goal of legalization is to shift the role of policing and reduce the pressure on the court system, but this will take years to achieve. If the legal regime (e.g., production, distribution, taxation, consumer access, etc.) is too complex or onerous for compliance with enforcement and regulation, organized crime addressing demands in the illicit market will persist (Task Force 2016a).

The long-term goal of legalization is to shift the role of policing and reduce the pressure on the court system, but this will take years to achieve.

In 2014, cannabis possession offenses accounted for 57,314 police-reported drug offenses, with prosecution of these offenses becoming very resource intensive for the criminal justice system. The new *Act* minimizes or eliminates criminal prosecution for possession, but strengthens laws to punish those who provide cannabis to youth or engage in illegal production or unregulated trafficking, including across Canadian borders.

One of the major promises of the legalization of cannabis is to eliminate the illicit market (Liberal Party of Canada 2017). As previously mentioned cannabis is currently illegal and there are laws and processes in place to reduce organized crime; however, with legalization comes difficulty. It is already known that organized crime is involved in the regulated medical cannabis sector and it is suspected this will persist in the legalized cannabis sector. The Canadian Association of Chiefs of Police recommends that stronger security screening and regulation be implemented within the cannabis sector in order to minimize organized crime (Canadian Association of Chiefs of Police 2017b).

Preparation for the new *Act* with regard to policing will require significant public investment. For example, the high costs associated with impaired driving will include equipping police with screening devices, the training and on-going certification for officers to use the tools and become qualified standardized field sobriety testers or drug recognition evaluators, and expansions in community policing initiatives. Responsibility for these costs is unclear within the partnerships between municipalities, the

provincial government, and the federal government. It will be critical to ensure law enforcement officials have the resources and technologies necessary to present credible evidence before the courts.

Finally, legal expertise on impaired driving will be required to close current loopholes in the court system. Within the current court system, DRE evidence is routinely challenged and rejected, and defence counsel commonly questions the validity of the officer's initial request for impairment testing. Canadian Courts remain skeptical about the link between the mere presence of drugs in a driver's system and the actual driving ability impairment.

Among the emerging concerns relative to cannabis legalization is the need to identify a suitable method of screening for drug-impaired drivers. Currently, drug-impaired drivers are screened under the standardized field sobriety tests (SFST) and Drug Recognition Evaluation (DRE) processes; however, a few drawbacks have been pinpointed with the existing mechanisms. Specifically, SFSTs (e.g., walk and turn) provide evidence that the driver may be impaired, but there is still a need for more extensive testing to determine the type and volume of the drug. If the evaluating officer identifies a potential impairment, they may demand a biological testing process (i.e., blood, urine, or oral fluid) to determine the presence of a drug. Currently, there is no legal mechanism for taking a blood sample to determine the presence or concentration of drugs in the blood, without first undergoing a DRE or obtaining a warrant.

2.5 IMPACTS ON COMMUNITY

Cannabis will impact communities when it is legalized. Issues such as consumption in public spaces, crime rates, location of retail outlets, and home cultivation are all important to public safety in communities in Saskatchewan. These are valid concerns that can be tested and compared to other jurisdictions that have already legalized adult-usage and medicinal cannabis.

2.6 CONSUMPTION IN PUBLIC SPACES

The most common way to use cannabis is through smoking (Singh et al. 2016), and, while second-hand cannabis smoke contains many of the same carcinogens as tobacco smoke, the carcinogenic effects are weaker than tobacco because of certain properties and chemical interactions in cannabis (Melamede 2005; Price et al. 2004). However, this does not mean there are no harmful effects of second-hand cannabis smoke. Inhaling cannabis smoke negatively affects the lungs (Tashkin 2002), and may be a psychological annoyance for some individuals that have implored governments to ban it from public spaces. This complaint has led to many jurisdictions implementing a smoking ban in public spaces.

In fact, many Canadian jurisdictions plan to include cannabis in anti-smoking bylaws, including regulation of smoke-free public spaces. For example, in 2016, New Brunswick put restrictions on smoking cannabis in any public space much like "where cigarettes, electronic cigarettes and water pipes are currently prohibited" (Taylor 2016). It is shown that smoking bans have been correlated with lower hospital admissions and better health (Tan and Glantz 2012), so the belief that banning smoking can effectively aid in public health is a strong one.

...many Canadian jurisdictions plan to include cannabis in anti-smoking bylaws, including regulation of smoke-free public spaces.

Whether it is used for a medical reason or adult-usage, cannabis is an intoxicating substance that alters an individual's brain chemistry and functional abilities. In Canada, drinking alcohol in public spaces is illegal, except in rare conditional circumstances. A major function of government is to make sure public spaces are safe for everyone (Fernando 2006), and contribute to general public health. Restricting alcohol use in public can aid in deterring problematic use; therefore, it is reasonable to consider that the same restrictions on cannabis would result in similar positive effects (Mello et al. 2013).

2.7 LOCATION/DENSITY OF LICENSED RETAIL OUTLETS

Locations and the density of cannabis retail sales impacts the community in various ways. In neighbourhoods where there is a high density of licensed retail outlets, there is more frequent use of cannabis (Freisthler and Gruenewald 2014), which is related to increased hospital visits for cannabis abuse and dependence (Mair et al. 2015). It is possible that these statistics are indirectly influenced because choices are made to establish licensed retail outlets in already existing high-risk areas for frequent cannabis use. It is unknown if the presence of a retail outlet actually causes increased hospital use or if these numbers are just correlated.

The enforcement of location and density of cannabis licensed retail outlets is mostly regulated by municipalities through their bylaws. In fact, many municipalities have already amended or made proposals to amend their bylaws to limit where cannabis can be sold. For instance, in Calgary, Alberta, it has been legislated that the location of licensed retail outlets be at least 150 metres from a school and 300 metres from another retail outlet (City of Calgary 2017). This was also one of the suggestions within the Task Force (2016) report.

Municipalities should take actions to minimize the density of licensed retail outlets in high risk neighborhoods, as these communities also commonly include higher proportions of racial and ethnic minority populations and people in lower income brackets, as well as higher crime rates (Shi, Meseck, and Jankiwska 2016; Mair et al. 2015). In Los Angeles, California, the regulation and zoning of licensed retail outlets was limited to commercial areas, which had the unintended effects of placing a surplus of retail stores near alcohol outlets (Thomas and Freisthler 2015). Because smart regulation of retail cannabis stores can negatively affect crime and use, it is important that governments make these decisions carefully (Pacula et al. 2015).

2.8 CRIME RATES

Many legislators have the impression that the location and density of licensed retail outlets is associated with high crime rates (Rucke 2014). On one hand, many cannabis stores in the US and Canada have been victimized by crime (Ingold and Lofholm 2011; Schmunk 2015), while on the other hand, crime has decreased around licensed retail outlets due to heightened security, increased foot traffic, and building a sense of community (Sankin 2013; Kepple and Freisthler 2012). Research in this area delivers mixed messages.

Some research in this area indicates no causal relationship between the location of licensed retail outlets and the crime rate. In Colorado in 2010, for instance, there was a decrease in general crime around licensed retail outlets as compared to the previous year, and fewer cannabis stores were robbed than liquor stores (Ingold 2010). Further, according to Kepple and Freisthler (2012), licensed retail outlets in Sacramento, California were not associated with violent or property crime.

Research indicates lower crime rates in other areas as well. A study from Long Beach CA, for example, proposes that property and violent crimes are unrelated to the density of licensed retail outlets, but positively correlated to adjacent areas. Additionally, the study measured crime around alcohol outlets and found that property and violent crime increased near high density locations, suggesting that alcohol and cannabis stores relate to different crime patterns (Freisthler et al. 2016). Licensed retail outlets that employ multiple security strategies, such as surveillance cameras and signs indicating identification requirements, experience reduced crime within 250 feet of the licensed retail outlet (Freisthler et al. 2013). There must be consideration for the safety of the licensed retail outlets and the surrounding neighborhood.

One study shows that closing a licensed retail outlet does not result in a reduction of crime in that vicinity. The same study finds that closure of a restaurant located nearby a licensed retail outlet results in an increase of crime as compared to locations where restaurants near licensed retail outlets remain open. It was postulated that the increasing crime was negatively correlated to the walkability of the neighbourhood. These findings suggest that increased foot traffic in a neighborhood, such as exists with customers accessing a licensed retail outlet, may result in lower crime levels (Chang and Jacobson 2017).

2.9 HOME CULTIVATION

Recently, home cultivation has become more popular world-wide, most likely due to the introduction of the legal medical cultivation of cannabis for serious health conditions (Hakkarainen et al. 2015). Under the proposed legislation, growing at home will become legal, with four plants per household allowed. One study indicates that in American states with legalized home cultivation, cannabis use has not increased, although this is not the primary concern with home cultivation (Pacula et al. 2015). The federal decision to allow the manufacturing of cannabis at home opposes the recommendations from the Canadian Association of Chiefs of Police, who identify concerns of over-production, youth exposure, fire hazards, in-home mold development and diversion into illicit markets (Canadian Association of Chiefs of Police 2017a). Some of these risks are more typical of large-scale growing, but some attention must be given to the potential of home over-production supplying the illicit market.

During the period of prohibition, beliefs have been that increased personal cultivation increases crime and, therefore, small scale grow operations have been subject to law enforcement activities. However, this model has resulted in higher crime rates and increased organized crime (Decorte 2010). It is suggested that an increase in personal cultivation can crowd out organized crime, because illicit markets involve greater negative consequences (Hough et al. 2003). When one can grow at home, they have no need to seek out the illicit market to meet their demand and as such small-scale cultivation is more likely to remain small scale and not attract organized crime (Decorte 2010). While personal cultivation is most likely a low risk for diversion to the illicit market, the Canadian Association of Chiefs of Police (2017a) identifies potential issues and indicates the need for regulation and increased municipal responsibility to ensure public safety.

Cannabis potency has increased drastically over the last two decades, which is partly a result of indoor cultivation (McLaren et al. 2008). However, research shows that home-growers have less interest in the psychoactive product or are inefficient in their efforts; the higher potency has mostly resulted from professional large-scale operations in this area (Sevigny, Pacula, and Heaton 2014). It has been found that regulations surrounding medical cannabis do not increase potency, but rather create a distinction between high and low potency cannabis products, a phenomenon possibly further entrenched by legalization (Sevigny, Pacula, and Heaton 2014). Higher cannabis potency may potentially negatively affect an individual's health, although there are strategies available than can reduce the harm, even though most people are unaware of these options (McLaren et al. 2008). Minimizing the effects of higher potency products is an important policy consideration.

2.10 CANNABIS AT HOME IN SHARED UNIT

Using cannabis in a shared or multi-unit dwelling (e.g. apartment building) poses the risk of second-hand smoke moving between suites. There have been court decisions that have upheld the right of non-smokers to be safe in their own residence from second-hand smoke if it "unreasonably disturb[s] [a] neighbour's enjoyment of [their] property" (Young et al. v. Saanich Police Department 2004). As there is already a set precedent, provincial governments need to ensure this is covered in the residential tenancies acts. Saskatchewan's *Act* already contains a statutory condition that the landlord can discriminate based on smoking in their units. They can also evict someone if the tenant is creating a "nuisance or disturbance to other persons in adjacent residential premises" (*Residential Tenancies Act 2006*). While this offers a means to reduce smoking in the multi-unit complexes, this does not offer an opportunity to regulate personal cultivation in shared units.

Home cultivation affects neighboring units because it can lead to fire hazards, mould, and odour. The current medical cannabis laws dictate that home growth must comply with applicable health and safety codes, including building, fire, and electrical codes, which may be appropriate for the adult-usage cannabis sector. However, the issue is that regulations have not been adequately extended for rental properties (Hoffer 2017). The Government of New Brunswick is currently proposing legislation that will enable landlords to prohibit tenant home cultivation.

Home cultivation affects neighboring units because it can lead to fire hazards, mould, and odour.

Cannabis legalization will have a wide range of community level impacts that can be considered when developing policies. In the interest of minimizing harm, public spaces should remain free from cannabis use. It will be important to plan the density and locations of retail outlets in a way that meets public demand but minimizes harm, especially regarding youth. Research on crime rates associated with legalization is currently mixed and Saskatchewan would benefit from evaluating local outcomes. Home cultivation to a maximum of four plants will be permitted, which results in challenges with regulation and enforcement, particularly for shared units and rental properties. Advance planning for these aspects of public impact will facilitate greater success with cannabis legalization in Saskatchewan.

2.11 CONCLUSION

This chapter examines the legalization and regulation of cannabis from a public safety perspective. Public safety considerations include drug intoxication and road accidents, policing considerations, and community impacts. The chapter discusses the need for significant public investment to prepare law enforcement officials for the new *Act* coming into force. Finally, the chapter deliberates on the potential impact that legalized adult-usage cannabis may have on communities. Issues such as consumption in public spaces, crime rates, location of retail outlets, and home cultivation are all of importance.

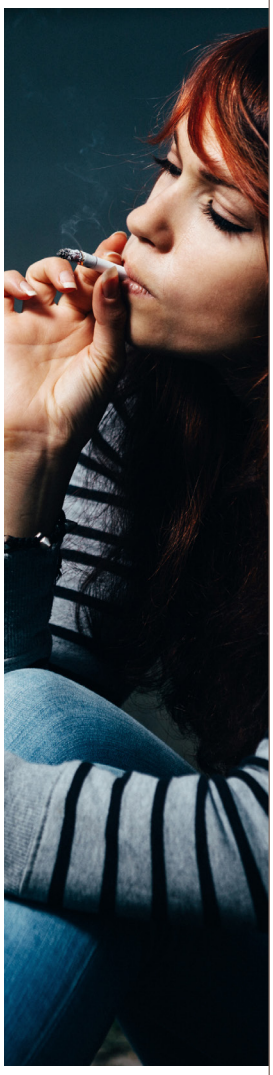
Drug-impaired driving and alcohol/drug-impaired driving are significant problems in Canada with tremendous human and financial costs. Cannabis-impaired driving results in a significantly increased risk of being involved in a car accident. The federal government's legislative changes to drug-impaired driving establish the new laws as some of the strictest in the world. However, charges can only be laid when an officer has reasonable grounds to believe the driver is under the influence. Successful implementation of this process means that law enforcement officers will require new resources, including but not limited to accredited Drug Recognition Evaluators, new road side testing technologies, and up to date training regarding cannabis laws.

Community well-being should be given extensive consideration in the design and implementation of the various cannabis initiatives. Public spaces are intended to be safe for everyone, thus decreasing the acceptability of using cannabis in a public place. Expansion of regulations and laws that limit cigarette and alcohol use to apply to cannabis would assist in minimizing the harmful effects of second-hand cannabis smoke. As higher densities of licensed retail outlets are associated with an increase in cannabis usage rates and crime (except in cases of heightened security), municipalities will need to give careful consideration to the location of licensed retail outlets. Policies from other jurisdictions currently advise against establishing licensed retail outlets in high risk neighbourhoods or near schools. Home cultivation presents risks of fire, over-production, youth exposure, and diversion to illicit markets; both usage and cultivation may pose risks for shared or multi-unit dwellings.

Increasing public safety is one of the primary goals with the initiative to legalize cannabis and chapter two highlights various considerations for the role of policy makers in keeping Saskatchewan communities safe under the *Cannabis Act*. Ensuring the safety of Saskatchewan's citizens will require financial investment for a variety of measures and other jurisdictions have found that addressing these issues at the outset results in more effective implementation of new policies for the enforcement and regulation of issues related to public safety and cannabis legalization. Harm reduction related to the cannabis sector is not only an issue of public safety but also one of public health. Chapter three identifies pertinent aspects of public health related to the use of cannabis.

03

Public Health



03

Public Health

Public health must be a critical feature of Saskatchewan's legalization of cannabis. It will require careful consideration regarding how to restrict access by youth, educate the public about prenatal exposure and other harms, protect the public from tainted product, and create programs and services for those that misuse. Understanding the health effects of non-medical cannabis will be a major component of the evidence-informed policy the sector will require.

Chief Medical Officers of Health of Canada and Urban Public Health Network (2016) define a public health approach as

> *an organized, comprehensive, multi-sectoral effort directed at maintaining and improving the health of populations; based on principles of evidence-informed policy and practice, social justice, equity, and human rights; and which is driven by identifying and then acting on the determinants of health across the life course (2).*

Use of cannabis can result in a variety of negative health outcomes for physical and mental well being. Examples of physical health concerns include lung disorders, heart disorders and increased chances of stroke (Hall, 2015). Cannabis is also linked to mental health concerns and cognitive decline, especially for heavy users who begin use at a younger age (Hall, 2015). Most research studies on the health aspects of cannabis highlight the negative effects of delta-9-tetrahydrocannabinol (commonly known as THC) on the brain and body. Intake of THC is especially concerning for in-utero fetuses and adolescents because the brain has an increased level of THC-sensitive receptors that can be highly influenced during those critical developmental periods (Chadwick, Miller, and Hurd 2013). Therefore, it is imperative to limit exposure to cannabis during the periods of fetal development and adolescent development. The increasing THC potency in cannabis products, alternative delivery methods, and cannabis imitation products are of increasing concern for the public's health and safety. Addiction rates to cannabis are increasing worldwide and recovery is difficult (Hall, 2015). While there is a component of cannabis that offers limited therapeutic benefits, the research overwhelmingly describes the negative health concerns that widespread use creates. There is an immediate need to correct the mistaken public impression that cannabis is a non-harmful natural product.

3.1 GENERAL HEALTH IMPACT

In the fall of 2016, The Canadian Centre on Substance Use and Addiction amassed an expert team to address existing knowledge and gaps about the health impacts of non-medical cannabis use in preparation for Canada's legalization plans. Six main themes emerged to guide best practices and research. They indicate that it is difficult to research cannabis health outcomes because potency varies, there are multiple ways to use it, and people have biological differences in their reactions (The Canadian Centre on Substance Use and Addiction, 2017). Many questions remain from this working group but there is now a starting point for cannabis-related health research in Canada.

The themes from The Canadian Centre on Substance Use and Addiction 2016 report provide an overview of the health impact considerations in the cannabis sector. Research on the Endocannabinoid System (ECS) has been emerging during the last two decades in pursuit of cannabis as a medicinal therapeutic option. Researchers have been able to establish how cannabis is metabolized, including adverse effects in the brain and body tissues, which are linked with negative physical and mental health outcomes. Frequency, duration, potency and methods of use are important considerations in the severity of negative health outcomes, and the impact of long term chronic use is just beginning to be understood.

Canada's available cannabis strains contain variable amounts of active ingredients, and the exact composition varies in different locations. Many people who use cannabis also use other substances, such as tobacco and/or alcohol, which can make it difficult to determine each substance's individual health impacts. However, poly-substance use is a reality, and researching cannabis' interactions with other drugs is also important. The expert team stresses the importance of preparing health, mental health, and addiction service systems for the potential health problems that may result from cannabis legalization.

The Canadian Centre on Substance Use and Addiction 2016 report also suggests proper supports will be required for individuals experiencing cannabis use disorder, some of which will also have additional mental health concerns. Public awareness campaigns and regulatory frameworks will be required to address acute cannabis outcomes, such as delayed fine motor reactions and slower mental processing, that will impact driving and workplace safety. There will be a necessity for a health promotion and harm prevention approach to public education, as it has been shown that the public is confused about the potential harmful impacts, perhaps due to conflicting messages about a substance that also has medicinal properties.

There must also be consideration of the social determinants of health, psychosocial impacts, and epidemiology related to cannabis use. Examples of other important points include cultural factors, media and social media aspects, and political considerations. The authors of the report feel that consistency in language around the health impacts of cannabis, including product type and methods of use, are important. The themes of the Canadian Centre on Substance Use and Addiction 2016 report have been categorized to guide future research, build community infrastructure, and support regulatory decisions about the health impacts of cannabis.

The report identifies a need for central coordination, established research infrastructure, and governance related to the cannabis sector. Amongst other priorities, the authors of the report recognize the need for nation-wide collaborative efforts to monitor and report on the health impacts of cannabis and compare this information to the growing body of international evidence. A sustainable source of funding is needed, and this group suggested that a minimum of 10 per cent of cannabis profits should be allocated to research. Overall, the Canadian Centre on Substance Abuse (2016) stresses the importance of placing evidence for cannabis-related health impacts high on the political agenda, with the goal being to improve the health of citizens through healthcare system best practices and to minimize potential cannabis-related harm.

3.2 HEALTH AND THC

There is now solid evidence that the level of THC dramatically increased during the 1990s and early 2000s in illicit market cannabis, but it is still unclear if it has been at the expense of the cannabinoids (CBD) potency (Hall 2015). In cannabis, THC is the highest-level chemical present and causes the psychoactive responses, followed by CBD which has health-protective properties. Early research shows that higher a THC content increases anxiety, depression, and psychosis, particularly in naïve users, which may explain the increased frequency of cannabis-related problems presenting at emergency rooms in recent years (Hall 2015).

It is also believed that higher THC levels increase psychotic symptoms and dependence for regular users, but new research suggests that it may potentially reduce the risk of respiratory problems because regular users may smoke stronger products less frequently (Hall 2015). Most health studies on cannabis focus on THC, but Chadwick, Miller and Hurd (2013) confirm that cannabis contains at least 70 different CBDs that have the potential to interfere with human physiology.

Early research shows that CBD has positive health impacts, including protective mechanisms against dependence, cognitive impairment, mood problems, and psychotic responses, and it may reduce cigarette intake (Chadwick, Miller and Hurd 2013). Most current CBD research evaluates short-term effects on adults; but there is limited long-term evidence or information about adolescents. Unfortunately, some findings do show that modern strains of illicit market cannabis have decreased CBD content and increased THC content, thus increasing potential harm and decreasing potential benefits (Chadwick, Miller and Hurd 2013). Researchers are also concerned that the rapid increase in THC content diminishes the relevance of older studies about cannabis use (Porath-Waller, Notarandrea, and Vaccarino 2015).

3.3 CANNABIS DEPENDENCE

Hall's (2015) research shows that one in ten users becomes cannabis-dependent, although some studies suggest that addiction rates are as high as one in six users because risk increases when cannabis use begins at a younger age. People who develop a cannabis dependence will experience withdrawal symptoms upon cessation of use that include anxiety, insomnia, appetite disturbance, and depression that will interfere with daily life functions (Hall 2015). A recent study has shown that withdrawal symptoms can be mitigated with an oral cannabis extract (called Sativex). Over the past two decades, there has been a significant international increase in mental health services for cannabis addictions. This correlates with increasing rates of cannabis use in adolescence, thus suggesting that the potential for developing dependence increases when youth use cannabis. Even the Netherlands, which has had legalized cannabis for over 40 years, has seen an increased demand for cannabis addiction treatments more recently (Hall 2015). Social consequences of use have been reported as less impairing than alcohol or opioid use but recovery from cannabis dependence has similarly poor rates of success as other addictions.

3.4 COGNITIVE DECLINE RELATED TO CANNABIS

People who use cannabis regularly over a long period of time, begin at a young age, and absorb high levels of THC are at a high risk of poor physical health outcomes. Chronic use of cannabis increases severity of long-term cognitive deficits related to verbal learning, memory, and attention (Hall 2015). Recent studies have been able to separate the lasting effects of cannabis on cognition from pre-existing intellectual challenges, and findings are concerning. More research is still needed to determine if cognitive recovery occurs after people stop using cannabis, but recent studies in brain imaging suggest that lifelong deficits may persist (Hall 2015).

3.5 PHYSICAL HEALTH ISSUES RELATED TO CANNABIS

Early studies on cannabis and lung health were complicated by tobacco use, but recent studies have been able to separate these effects to show that, by middle age, heavy cannabis smoking causes lung tissue damage that appears pre-cursory to chronic obstructive pulmonary disorder (COPD) but not emphysema (Hall 2015). Interestingly, infrequent users demonstrate increased lung volume either because of the deep inhalation associated with cannabis smoking or the bronchodilation effects of THC (Hall 2015). Cannabis is also linked to cardiovascular problems (e.g. angina) for middle age and older users, which intensifies with heavier use. A study of 3000 heart attack patients shows that cannabis use quadruples the risk of heart attack in the proceeding hour after use (Hall 2015). Younger users are better able to counteract the increased stress on their heart, except in the case of a pre-existing heart condition (which may be unknown at the time of cannabis use) which increases the risk of a fatal disorder (e.g. stroke or heart attack) (Hall 2015).

Cannabis smoke is carcinogenic and is therefore linked to cancer of the mouth, tongue, esophagus, and bladder, although these results have been difficult to separate from tobacco use because they are so frequently combined (Hall 2015). Higher cancer risk is mostly associated with cancer-causing cannabis smoke because other chemical components of cannabis are not carcinogenic. However, the male reproductive system contains a high concentration of cannabinoid receptors and men have twice the risk for non-seminoma testicular tumors (cancer) when they use cannabis more often than once per week—especially if they began use before age 18 (Hall 2015). Cannabis use at a minimum frequency of weekly within the last year also results in a 2.3 times increased chance of a stroke or transient ischemic attack ("mini-stroke") (Hemachandra et al. 2016). This wide range of health concerns demonstrates the significant need for policy development, public system support, and public education about the risks of cannabis.

3.6 MENTAL HEALTH ISSUES RELATED TO CANNABIS

For a long time, it was unknown if people with mental health concerns choose to use cannabis or if cannabis use causes mental illness. The clinical connection is still not fully understood, but a lot of work has been done in this area. Historical documents link cannabis to "mental aberration" and "alleged hemp drug insanity" in asylum patients as far back as 1895 (Burns 2013). Yet, current debate persists about this issue. Burns' (2013) findings suggest the research community is divided as to whether cannabis causes psychosis and how it relates to schizophrenia. Burns (2013) determines a definite connection, in that cannabis users have approximately twice the chance of developing a schizophrenia psychotic type disorder.

Early cannabis exposure (during adolescence) and regular use increase the chances of schizophrenia for individuals who have a predisposition (Burns 2013). If individuals have a psychotic episode after first use, their outcome will be much better if they never use cannabis again. Especially for these individuals, persistent cannabis use can result in a chronic debilitating psychotic disorder. There is an underlying genetic vulnerability associated with schizophrenia and cannabis use, although this does not explain all cases and thus exceptions to this biological vulnerability need to be studied.

There is an underlying genetic vulnerability associated with schizophrenia and cannabis use, although this does not explain all cases and thus exceptions to this biological vulnerability need to be studied.

Hall (2015) identifies further cause for concern in an overview of many of the best studies related to cannabis use and schizophrenia. A Swedish study suggests that 13 per cent of all schizophrenia cases could have been avoided if cannabis use had been prevented; these findings have been supported by studies in the Netherlands, Germany, and New Zealand. The links between cannabis and depression, cannabis and bipolar disorder, and cannabis and suicide are less robust but are currently under investigation (Hall 2015). Finally, it is important to recognize that many people use cannabis regularly without developing psychiatric conditions, perhaps because they do not have a genetic predisposition or biological vulnerability (Burns 2013).

There is a small minority of researchers who are skeptical about the link between cannabis and schizophrenia, especially because international rates of use have significantly increased over several decades, but prevalence rates of schizophrenia have been documented with extreme inconsistency as increasing, remaining stable, and decreasing (Hall 2015; Gage, Zammit and Hickman 2013). Gage, Zammit, and Hickman (2013) point out that psychotic symptoms are much more prevalent in the general population than amongst cannabis users; they suggest that acute intoxication may be responsible for falsely inflating the prevalence of psychotic disorders, particularly in the case of daily users, because it can be difficult to determine the difference between psychotic symptoms and cannabis intoxication. They also argue that it is challenging to eliminate the influence of complicating factors such as polysubstance use, lifestyle, and early traumatic experiences, although they recognize that recent research practices have improved in this area. Gage, Zammit, and Hickman (2013) provide findings from Hickman et al. (2009) that show it would be necessary to prevent thousands of people from using cannabis in order to prevent one case of schizophrenia. Regardless, these researchers admit to other health risks of cannabis and support a health promotion approach for harm reduction related to cannabis use. They just feel that it may be premature to suggest an anti-cannabis health promotion campaign as a method to decrease schizophrenia prevalence. Furthermore, they suggest that to reduce schizophrenia rates, a more targeted approach for the most at-risk individuals will be more beneficial than a general health campaign.

3.7 YOUTH AND THE IMPACT OF CANNABIS ON DEVELOPMENT:

3.71 ADOLESCENT BRAIN DEVELOPMENT AND CANNABIS

Cannabis use is more prevalent amongst today's youth than cigarette smoking (Chadwick, Miller, and Hurd 2013). THC negatively impacts both pre-natal and post-natal neural development through the endocannabinoid system by interfering with the function of the cannabinoid receptors. This system is so critical to brain development that components of it are identified by day 11 of gestation (Chadwick, Miller, and Hurd 2013). The endocannabinoid system continues to be important in adolescent brain development because, during this period, there is a dense network of cannabinoid receptors in areas of the brain involved with motor learning and recognition of reward. In early adulthood brain maturation processes, the cannabinoid receptors eventually deplete to about half the amount that existed during the peak in adolescence. This factor, in combination with other faster acting adolescent brain changes, makes the teen brain highly sensitive to THC at certain critical periods. However, because every person develops differently, it is impossible to determine an exact critical period. THC makes the adolescent brain vulnerable and increases the chances of maladaptive neurological development, such as difficulties with motivation, mood regulation, and psychosis (Chadwick, Miller, and Hurd 2013).

Studies link early cannabis use to depression, addictions, and —especially—schizophrenia (Chadwick, Miller, and Hurd 2013). Adolescent use of cannabis has also been linked to changes in brain structure and the functions responsible for memory, decision making, and executive functioning (Porath-Waller, Notarandrea, and Vaccarino 2015). Exact effects of cannabis on IQ have been under debate in the academic literature, but these authors indicate that there is recent evidence to show that early and frequent cannabis use results in short-term cognitive challenges, reduced IQ, and academic problems, all of which contribute to non-completion of high school. Only a small fraction of teens that use cannabis develop psychiatric disorders, but the use of this product greatly magnifies the chances, especially for youth who try cannabis when young and also have a family history of a disorder (Chadwick, Miller, and Hurd 2013; Hall 2015; Porath-Waller, Notarandrea, and Vaccarino 2015). Therefore, minimizing cannabis use amongst youth should be a health priority.

3.72 CANNABIS AS A GATEWAY DRUG

Cannabis as a gateway drug has been an international discussion and topic of research. Youth who use cannabis are twice as likely to not complete high school and are also far more likely to experiment with other drugs, perhaps because of increased access to the illicit market (Hall 2015). Twin studies have proven that cannabis is a gateway drug (Hall 2015). The relationship between cannabis and tobacco seems to have changed over the last two decades. In 1993, youth who smoked cigarettes were more likely use cannabis regularly. In recent years, cannabis smoking is often done by youth who do not smoke cigarettes, a success that has been attributed to public health campaigns against tobacco. The new terminology "reverse gateway" refers to youth who start with cannabis and follow with tobacco (Hall 2015). Therefore, minimizing youth cannabis use will also reduce use of other harmful substances.

In recent years, cannabis smoking is often done by youth who do not smoke cigarettes, a success that has been attributed to public health campaigns against tobacco.

3.73 YOUTH AND CANNABIS DEPENDENCE

Addiction to cannabis is a problem that often begins in adolescence. The Canadian Tobacco, Alcohol and Drug Survey from 2013 that showed 22 per cent of 15-19 year olds and 26 per cent of 20-24 year olds reported cannabis use within the last year (Porath-Waller, Notarandrea, and Vaccarino 2015). Canadian stats on youth daily use of cannabis are not available, but a 2014 Monitoring the Future study shows that 5.8 per cent of high school seniors in U.S. report daily use and a 2013 UNICEF study suggests that Canadian youth use cannabis more than any other developed country. American longitudinal studies show that one in six individuals who begin using cannabis in adolescence becomes dependent, which is a higher rate than users who begin in adulthood (Porath-Waller, Notarandrea, and Vaccarino 2015). The Canadian Community Health Survey (2012) determined that one in 20 Canadians between ages 15-24 met the criteria for cannabis dependence. A study done by the Canadian Institute of Health Information (2006 to 2011) shows that for individuals who have mental and behavioural disorders and are between the ages of 15-24 years, cannabinoid use results in the greatest number of days spent in hospital, and that the length of the average hospital stay for these issues increased 40 per cent during this five-year period. Dependence and addictions treatment are unavoidable for many youths who use cannabis.

3.74 MINIMIZING YOUTH ACCESS

Youth are often unaware of the harmful side effects of cannabis and make poorly informed decisions about a product that is regularly considered "natural" (Porath-Waller, Notorandrea, and Vaccarino 2015). These authors feel that youth have been confused by mixed messages since cannabis was legalized for medicinal use; this warrants a public health campaign to fully inform Canadian youth about potential cannabis harm. Additionally, family physicians and other primary care providers will need training in identifying cannabis dependence and access to tools and supports for adequate treatment. There is enough evidence to validate that early cannabis use is linked to dependence and psychiatric disorders, at least when there is a genetic predisposition. Research is unable to determine an exact critical period for cannabis exposure on the adolescent brain because the factors are too variable. Therefore, it is in the best interest of all youth that the age of use be delayed for as long as possible.

Palali and van Ours (2015) describe Dutch cannabis policy as "quasi-legalized," in that an individual can purchase a small amount for personal use at a regulated "coffeeshop". In the mid-1990s, policy changes in the Netherlands made owning a "coffeeshop" less lucrative, thus reducing the legal access to cannabis. Therefore, Palali and van Ours (2015) were able to study if growing up closer to a "coffeeshop" makes any difference in how old adolescents are when they first begin using cannabis, believing that youth who live closer to a cannabis shop have a more favourable perception of the drug. In their study, they found that the peak age to start using cannabis was 16 and that accounted for 12 per cent of all youth who live near a "coffeeshop" but only 5 per cent of users who lived further away. They also report that 40 per cent of youth living near a "coffeeshop" fit into the category of being regular users as compared to 25 per cent of those who do not. Overall, they show that if someone has not tried cannabis by age 25, they are very unlikely to do so; the earliest age of first use in this study is 13-years-old. Regulation and limiting geographical access to cannabis could be a very useful policy tool for minimizing harmful impacts of cannabis on youth.

3.8 PRENATAL EXPOSURE:

3.81 PRENATAL BRAIN DEVELOPMENT AND CANNABIS

The Canadian Centre on Substance Use and Addiction provides information online regarding cannabis use during pregnancy. They highlight that pre-natal cannabis use harms fetuses; the effects intensify with heavier usage and pregnant cannabis users often have other health risks (e.g. psychosocial issues or mental health concerns). According to the website, babies exposed in-utero to cannabis are five times more likely to be born with the facial features that are usually associated with Fetal Alcohol Spectrum Disorder. In-utero cannabis exposure is minimally noticeable for children under age 2 but becomes more obvious by ages 3-4, when developmental expectations increase and challenges are more obvious. Problems emerge like attention issues, mood disorders, language delays, memory recall difficulties, challenges with reading and spelling and other academics, as well as delinquency and problem behaviors (Hall 2015; Jacques et al. 2014; The Canadian Centre on Substance Use and Addiction 2017). Jacques et al. (2014) report that adolescents have neurological circulatory differences and encounter functional academic and life difficulties that begin by age 6 when they were pre-natally exposed to cannabis.

In-utero cannabis exposure is minimally noticeable for children under age 2 but becomes more obvious by ages 3-4, when developmental expectations increase and challenges are more obvious.

The highest risk babies are born to women from low socio-economic conditions who are heavy cannabis users (Hall 2015; Jacques et al. 2014). However, more research is needed to fully understand maternal cannabis use. For example, a recent finding shows that children exposed to cannabis have increased chances of depression but the same risk of a more complex psychiatric problem (Jacques et al. 2014). Ultimately, the negative long-term impact on higher level thinking skills may lead to challenges

for pre-natally cannabis-exposed individuals in developing employment skills in preparation for adulthood. There is enough high-quality evidence to warrant policies and programs to support children who have been expose to cannabis in effort to mitigate other complicating life factors and skill deficits from in-utero exposure. Given the range of emerging evidence, pregnant women should abstain from using cannabis.

Research is slowly mounting about fetal brain development and growth related to cannabis exposure. The endocannabinoid system begins developing very early for a fetus and it has been proven that cannabinoids do cross the placenta and blood-brain barriers, thus increasing concern that cannabis use by a pregnant woman does impact the fetus (Mark and Terplan 2017). Breast-feeding babies can also be affected, as cannabinoids can also be found in the breast milk of mothers who use cannabis. Mark and Terplan (2017) feel that cannabis-related outcomes from fetal exposure are likely similar to alcohol in that the impact varies depending on dose and timing over trimesters. High quality human studies in this area are challenging. Hurd et al. (2005) as presented in Metz and Stickrath (2015) explores the impact of cannabis on post-mortem fetal brains after abortions that were completed between 17-22 gestational weeks. Findings indicate that dopamine receptors in the amygdala are reduced, with males being more affected than females; the severity is directly correlated with the amount of cannabis use during pregnancy. Research that proves fetal structural brain changes from cannabis exposure during pregnancy is very concerning.

3.81 PREVALENCE OF CANNABIS USE DURING PREGNANCY

There are many challenges in obtaining accurate data about use of cannabis during pregnancy. Studies during the late 1980s and 1990s were often complicated by alcohol and tobacco use, poor antenatal care, or nutritional concerns (Gunn et al. 2017; Hall 2015; Mark and Terplan 2017). In current studies, it is often difficult to account for the potency of the THC levels (Mark and Terplan 2017). In a meta-analysis by Mark and Terplan (2017), the 2014 National Survey on Drug Use and Health in the U.S. indicates that 9.5 per cent of all reproductive age women reported cannabis use in the last month, which is highest amongst ages 18-25. Self-report of illicit drug use tends to be under-reported, particularly for pregnant women who experience greater stigma. Jacques et al. (2014) report that up to 5 per cent of all pregnant women have self-reported using cannabis in western countries.

Most health care practitioners who choose to screen for cannabis approach the topic in a punitive way and emphasize the illegal aspects of the drug, often because the health outcomes are unclear (Jacques et al. 2014), which may harm the patient-physician relationship and be a difficult position for a physician after cannabis is legal (Mark and Terplan 2017). Mark and Terplan (2017) feel that physicians may have difficulty expressing concerns about the negative developmental impacts of cannabis because the evidence does not suggest severe long-term medical concerns such as premature death or chronic illness. However, this absence of severe medical outcomes should not be mistaken as support for the safety of cannabis because less severe health effects, such as cognitive impairments, should also be taken seriously. Some researchers believe the number of pregnant users is less concerning than the potency of the THC, and the medical preoccupation with the lack of "severe" health outcomes in a cannabis exposed infant is misdirected given the lifelong implications. In some jurisdictions, legalization has increased opportunity for the edible forms of cannabis, which can be much more potent (Mark and Terplan 2017). Responsible pre-natal care includes providing information about the harmful effects of pre-natal cannabis use.

There are concerns that pregnant women continue using cannabis throughout pregnancy because there is widespread social acceptance of cannabis as a harmless adult-usage drug (Jacques et al. 2014). Medical tests take time and cost money, so the best first screening tool for cannabis use is a clinical interview. Screening tools should be administered several times throughout pregnancy because chances of disclosure increase as patient-physician relationships develop; additionally, if other drug use or mental health concerns are revealed, there should be direct inquiry about cannabis (Jacques et al. 2014). In cases where self-report cannot be trusted, it is also possible to use urine analysis or hair analysis of mothers. Metz and Stickrath (2015) indicate that, while urine testing can be the most accurate, it is also inconsistent due to frequency and timing of cannabis use and maternal absorption rates. In a newborn baby, meconium testing within two days will prove cannabis use from the second trimester on and newborn hair analysis can prove third trimester cannabis use (Jacques et al. 2014). Early identification of cannabis use during pregnancy allows for application of a harm reduction model of intervention.

3.83 MATERNAL CANNABIS USE AND NEONATAL PHYSICAL HEALTH OUTCOMES

The most researched cannabis-related fetal health concern is growth, but evidence remains inconclusive (Metz and Stickrath, 2015). Some believe that maternal cannabis use leads to stimulation of receptors that impair fetal growth, thus resulting in low birth weight, which increases in severity with increased levels of exposure (Jacques et al. 2014). Early studies about growth restrictions often did not control for similar effects from substances like tobacco and alcohol, and recent studies that separate these outcomes have shown mixed results. The renowned Gen R Study completed in the Netherlands after legalization shows that there are small growth restrictions due to cannabis use that significantly increase if a mother continues use into the third trimester. However, given that the overall growth difference is about 100 g, it is unknown if this has any long-term implications (Metz and Stickrath 2015). Recognizing that effects of tobacco may be a factor in studies on pre-natal exposure and birth weight, some researchers consider it reasonable to study the combined effects of these two substances because it often fits a typical patient profile (Gunn et al. 2017). Gunn et al. (2017) determines that newborns who are exposed to cannabis in-utero

(combined with tobacco in some cases) are more likely to be born with decreased birth weight and spend more time in the neonatal intensive care unit (NICU), which may have some correlation to recent findings about the increased rate of heart problems (Gunn et al. 2017).

Maternal cannabis use is linked to higher rates of stillbirth, as studied by evaluating cannabis levels in umbilical cord blood (Varner et al. 2014 in Metz and Stickrath 2015). Furthermore, researchers determine that cannabis use with tobacco further increases risk of stillbirth, suggesting a need to study the effects of the interaction of these two substances. Metz and Stickrath (2015) find mixed results linking cannabis to pre-term delivery and no evidence linking cannabis to physical malformations or genetic disorders. Therefore, the main early neonatal concerns include low birth weight, increased need for NICU support, cardiac anomalies and stillbirth.

> ...the main early neonatal concerns include low birth weight, increased need for NICU support, cardiac anomalies and stillbirth.

3.84 MATERNAL HEALTH AND CANNABIS

Much of literature on pre-natal use of cannabis has focused on the developing infant, but there are also concerns related to the mother. In Colorado, Metz and Stickrath (2015) have noticed an increase in the use of cannabis to ease the effects of nausea during pregnancy. These authors caution that medical cannabis use for nausea is acceptable for cancer treatments, but this idea should not be applied to pregnancy. They found two studies on this topic, one of which shows nausea actually increases with cannabis use and the other shows 92 per cent of the pregnant women self-report improvements. However, Metz and Stickrath (2015) are critical about the methodology used in that particular study and conclude that the effects of cannabis on nausea are unknown. Cannabis use can also affect anesthesia for women in labour and delivery (Metz and Stickrath 2015). High doses of cannabis cause slowing of the heart and blood pressure, whereas low doses cause the heart to speed up. Furthermore, smoking cannabis can cause upper-airway irritation and edema, which can also complicate anesthetic delivery during labour. Gunn et al. (2017) found anemia rates are higher in pregnant women who use cannabis. Also, they believe that cannabis is linked to precipitate labour (lasting under three hours), although more research is needed. There were several maternal health concerns that were found to have no connection to cannabis use including: maternal diabetes, membrane rupture, premature onset of labour, prolonged labour, dysfunctional labour, prenatal care, duration of labour, secondary arrest of labour, elevated blood pressure, hyperemesis gravidarum, maternal bleeding after 20 weeks, ante/post-partum hemorrhage, maternal weight gain, maternal post-natal problems, days in hospital or hormones (Gunn et al. 2017). Ultimately, it is important to consider the negative health outcomes of cannabis use during pregnancy for both the mother and her child.

Components of cannabis freely cross the placenta and can be found in breast milk (Metz and Stickrath 2015). One study suggests THC levels could be up to 8 times higher in concentration than in maternal blood plasma (Jaqcues et al. 2014). Studies on cannabis use in breast-feeding are limited, but Metz and Stickrath (2015) conclude that support for lactation should continue for these mothers with an emphasis on education about the potential adverse effects. Concerns arising from the limited evidence include decreased lactation and delayed infant psychomotor abilities. Nursing mothers should be informed about the potential effects of using cannabis on their child's long-term health and well-being.

Cannabis use for adults will become a legal activity, but exposing a baby in-utero or through breastfeeding to this toxic substance is still considered problematic for child protection (Mark and Terplan 2017). Many authors feel that the perceived safety continues to perpetuate high use of cannabis during pregnancy. Similar to Colorado, it is likely that local policy will be unable to prohibit pregnant or breast-feeding mothers from purchasing or possessing cannabis. A review of provincial child protection laws with respect to cannabis is a necessary step in efforts to reduce harmful impacts during the legalization of cannabis. From a more positive perspective, Mark and Terplan (2017) indicate that legalization of cannabis creates an opportunity for physicians and other medical practitioners supporting pregnant women to focus on the health impacts of cannabis rather than the punitive legal ones.

3.9 SYNTHETIC CANNABINOIDS

Synthetic cannabinoids are a stronger drug that is neither cannabis nor a derivative of cannabis (Antoniou and Juurlink 2014). They are typically chemical compounds sprayed on herbs and have street names like "spice" or "K2" and can be easily purchased online (Antoniou and Juurlink 2014). Smoking these products is the most common method of use but studies show ingestion, vaporization, and rectal administration has also been used. In March 2014, the Canadian Community Epidemiology Network on Drug Use issued a bulletin stating that they are monitoring the use of synthetic cannabinoids in Canada. Synthetic cannabinoids were designed to mimic THC and, by 2013, 84 different types had been identified globally and exact compositions are mostly unknown. These products are untested, inconsistent, and have been linked to adverse physical health effects such as seizures, heart problems, kidney injuries, respiratory damage, and death in at least three cases (Antoniou and Juurlink 2014).

Mental health side effects of cannabis imitation products include panic attacks, agitation, hallucinations, and psychotic breaks or onset of schizophrenia (especially in the case of other risk factors). Long term effects are unknown, although recent evidence suggests dependence can occur and therefore include withdrawal symptoms upon cessation. Usage of these products by youth in the U.S. has been higher than in Canada (12 per cent compared to 1.8 per cent in Ontario) and this has led to epidemiological tracking of related emergency room visits and calls to poison control (Antoniou and Juurlink 2014). One of the main motivators for use of this product is to avoid positive results from drug testing, as the chemicals are not typically part of a urine analysis. They have been marketed as a legal method to achieve a cannabis high, and have also been called legal weed and herbal incense; despite confusion, they remain illegal for sale in Canada. The CBC on February 26, 2013 describes how people, especially youth, have the mistaken impression that these products are safe because they are sold in a store and often come with the label "herbal".

3.10 CHILD HEALTH PROTECTION AGAINST ACCIDENTAL EXPOSURE

Cannabis edibles (e.g. brownies and gummy candies) and discarded cannabis products are a risk for children. Most studies on this topic describe young children at the emergency room in a coma with unusual symptoms related to their brain, heart, and breathing that cannot be otherwise explained. Toxicity screens of the urine are a helpful medical tool but are not completely accurate in making a diagnosis of cannabis exposure. Many studies emphasize how challenging it is to confirm parental cannabis use and emphasize the importance of directly asking parents about it. Cases in the literature describe various lengths of coma and degree of illness, but all children recover enough to be discharged from the hospital within a few days. Long term impacts, if any, are unknown.

Case studies about cannabis exposure in children have been rare but they are becoming more common. Appelboam and Oades (2006) present a case study of an 11-month-old infant who received emergency medical support because the baby was in a coma after ingesting cannabis remains. The father confirmed that he regularly uses cannabis and believes that the baby picked some off the floor. Boros et al. (1996) urge physicians to consider cannabis ingestion when the cause of a pediatric coma cannot be otherwise determined. They report on two cases of coma after ingestion of a "cannabis cookie". In both cases, parents self-report that they were not regular users and only admitted to potential ingestion after toxicology screens tested positive for THC. This study took place in South Australia when possession of small amounts of cannabis was punishable by fine rather than criminal conviction and, yet, the parents still were not forthcoming with cannabis-related history. An effective clinical interview is very important when trying to determine these unusual cases of coma.

Wang et al. (2011) report the findings of a retrospective analysis of medical records for 5 children under age 6 who were exposed to cannabis during 2009-2010 in Colorado. This was before legalization of cannabis but the researchers indicate an increase of the use of medical cannabis during this period. In each case, a referral to a social worker took place and it was discovered that, in 4 out of 5 homes, a household member used medical cannabis. This study stresses that cannabis exposure can occur both through ingestion or passive inhalation and, as cannabis use increases, the chances of childhood exposure also increases. Most cases of this sort are accidental due to natural curiosity in young children, but Pélissier et al. (2014) link increasing incidence of these types of problems with higher rates of cannabis dependence and adult-usage across France, a finding which could be extrapolated to many western countries.

Cannabis toxicology screening in pediatric emergency care is not routine practice. For example, these tests are only used at two hospitals in Australia, thus increasing the chances of a missed diagnosis (Boros et al. 1996). Canadian statistics are unknown. Pélissier et al. (2014) provide an analysis of medical records for pediatric ingestion of cannabis over nearly a six year period in a French hospital. While poisoning in young children is relatively common, they indicate that poisoning due to cannabis remains rare. They present evidence from Spadari et al. (2009) who shows an increasing trend of this problem between 1993 and 2007. Of the 12 children who were included in this study because they were diagnosed as poisoned by cannabis, 10 had urine toxicology screens and only 7 tested positive. While the urine toxicology tests are a helpful tool, they do not confirm diagnosis in all cases.

Children exposed to second hand cannabis smoke are also at risk of negative health outcomes. Zarfin et al. (2012) stress the value of a health promotion and public education approach to increase awareness about the potential harmful effects when children passively inhale cannabis smoke. They believe that this case report is the first published article demonstrating the potential severity of toxicity related to passive cannabis smoke inhalation by an infant. After the infant's urine screen tested positive for THC, the parents admitted to a party the night before where 20 adults were smoking cannabis in the house, thereby exposing the infant to second hand smoke over several hours which ultimately put her into a coma. Parents need to be made aware of this risk.

In each of these studies from various parts of the world, the physicians recommend that a pediatric coma due to cannabis should include follow-up from child protective services for a full evaluation of the family circumstances. These studies suggest that, as cannabis becomes more commonplace, the health system can anticipate treating more cases of child poisoning, either from consuming products or exposure to second hand smoke. This may be followed by an increase in demand for child protective services.

3.11 OCCUPATIONAL HEALTH AND SAFETY

The Canadian Centre for Occupational Health and Safety (June 2017) reports that

> *As per Occupational Health and Safety legislation across Canada, employers have a duty to provide a safe work environment and take all reasonable precautions to protect the health and safety of employees and others in the workplace. This duty is known as due diligence. Due diligence is the level of judgement, care, prudence, determination and activity that a person would reasonably be expected to do under particular circumstances.*

Due diligence means that every employer has a responsibility to create a safe workplace and legalization of adult use cannabis will not change this obligation. As part of this, employers should have written policies to address issues of impairment including use and possession of substances that cause impairment (a general phrase can refer to all potential substances). They also have a responsibility to train employees about how to recognize the signs of cannabis impairment and enhance understanding about how that could affect the workplace. There must be preventative action taken in workplaces where cannabis impairment could lead to issues of workplace accidents or injuries.

However, an employer has a duty to accommodate any employee diagnosed with a condition that a physician has prescribed medicinal use of cannabis as an appropriate intervention. Like other medical conditions, it is most often an employee's personal choice whether to disclose health information to an employer. Furthermore, substance dependence is classified as a disability by the Canadian Human Rights Act and if an employee is actively undergoing treatment for the addiction, they should be permitted to remain in their role for the duration. Accommodations are required in either of these conditions unless the employer finds them unreasonably expensive, unsafe or causing some other undue hardship. Legal guidelines exist to help employers establish conditions of undue hardship but this is not a standardize definition and each case is subject to individual evaluation.

Challenges exist with testing individuals for acute cannabis impairment. A study completed by the United Kingdom National Health Services (2016) as reported by the Canadian Centre for Occupational Health and Safety (June 2017) shows that urine testing is positive for occasional users up to four days after use, for frequent users up to ten days after use and for heavy users up to two months after use. Current testing methods analyze blood, breath or saliva for THC and they are unable to discern how long ago cannabis was used. Therefore, in relation to workplace impairment, a positive result should not necessarily be deemed as concrete evidence of current impairment. The Canadian Centre for Occupational Health and Safety (June 2017) recommends that an assessment for cannabis impairment in the workplace must be accompanied by observations of an employee's change in ability, cognitive performance including judgement and whether there is an increased risk of safety concerns. A proper assessment should also give consideration to whether other conditions may be impairing the employee's performance. Despite some of these challenges, many employers will find that their current existing guidelines for substances in the workplace will continue to suffice after the legalization of adult-use cannabis. A proactive approach to reviewing and updating policies in all Saskatchewan workplaces, especially when occupational health and safety considerations are pertinent, will help keep Saskatchewan workers safe.

3.11 CONCLUSION

The lack of awareness and complacent public perception about the negative health outcomes of cannabis use is of great concern. There may be an opportunity to draw lessons from the anti-tobacco campaign that ultimately resulted in a reduction in cigarette smoking. If cannabis legalization results in higher rates of use, the healthcare system can anticipate many areas of higher demand. Extrapolating from this review, areas of the healthcare system that should prepare by increasing cannabis-related interventions include mental health and addictions, developmental pediatrics, pre-natal care and delivery, emergency services including paramedics, and internal medicine including cardiology, neurology, laboratory testing services, anesthesia, and perhaps others. Unfortunately, the poor health outcomes will not be mitigated by solutions in the health sector alone. Child protection services can anticipate more demand related to pre-natal exposures, follow-up from accidental exposures, and the complications that occur with cannabis use and low socio-economics. Long term negative health impacts of pre-natal exposure to cannabis and youth cannabis use will also need to be addressed in the education sector. There is an incredible amount of policy work required for promoting healthy living after cannabis legalization, but the most significant area to focus on is keeping developing brains healthy. This means that great efforts should be made to minimize fetal and adolescent exposure to cannabis. These are the two highest risk cannabis-related health concerns that result in long-term poor outcomes. A health promotion framework that provides support but focuses on prevention through public education will benefit everyone. Funding for a public health campaign can be realized through effective fiscal planning. The forthcoming chapter reviews the current and potential economic conditions related to the cannabis industry.

04

Economic Analysis

Photo credits: iStock by Getty images

04

Economic Analysis

In this chapter we explore the extent of the current illicit market for cannabis products, estimate the potential size of the legal market for cannabis, and make recommendations concerning the structure and regulation of the legal market for cannabis in Saskatchewan based on the objectives described in the *Cannabis Act*. We examine a variety of market structures and ownership models for both the distribution and retail segments of the market. As a result of our analysis we recommend that Saskatchewan license a single regulated private distributor of cannabis products and a limited number of private retail outlets within the province. The recommended market structure establishes a regulatory framework that aligns private market incentives to provide the maximum economic benefit to the people of Saskatchewan while ensuring public safety, restricting youth access, and establishing the best possible option to compete and displace the well-functioning illicit market for cannabis.

In April of 2017, the Federal Government tabled Bill C-45—the *Cannabis Act*—which legalizes the purchase and consumption of cannabis for adult-usage purposes. Under current federal law, the consumption of cannabis is prohibited except for individuals with a prescription granted by physicians in good standing with their province's College of Physicians and Surgeons. In addition, the production and sale of cannabis is prohibited except for firms licensed by Health Canada to produce cannabis for medicinal purposes and who sell directly to authorised patients. Currently, patients register with a licensed producer, purchase cannabis online, and receive it through the mail or by courier. In addition, under Canada's Access to Cannabis for Medical Purposes Regulations (ACMPR), patients with a prescription can choose to produce their own cannabis or can designate another individual to produce for them through a licence for cultivation (Government of Canada 2016a).

Although cannabis is legal for medicinal purposes, the illicit market for cannabis continues to thrive providing substantial income to organised crime and other illicit market participants involved in the production and distribution of cannabis. Despite the product's status as an illegal drug, more than 1 in 5 Canadians admitted in a telephone survey to regularly using cannabis as an adult-usage drug in 2016 (Deloitte Touche Tohmatsu Limited 2016). As a result, millions of Canadians and more than 150,000 people in Saskatchewan turn to the illicit market to meet their demand for cannabis products (Deloitte Touche Tohmatsu Limited 2016). However, based on current and forecasted production, legal producers will only be able to meet half of the Canadian demand for adult-usage cannabis. Therefore, without an effective regulatory framework, it is likely that the illicit market will continue to thrive after legalization. In addition to the continuation of the illicit market post legalization, it is likely that without an effective regulatory framework, illicit market distributors and producers will blend with the legal industry, making it even more difficult to displace the illicit market and ensure that only safe and legally-produced cannabis is available to the general public.

The blending of the illicit market with the formal economy has already begun with storefront retailers opening across Canada, including in Saskatchewan. Current enforcement practices seem to tolerate some level of their activity (Hager 2017). Although police raids and business closures do occur, in the rare cases that storefront operators are sent to court, the charges are often dropped. Some municipal police have even publicly declared that they have no intention of raiding illicit retailers (CBC News 2015). Given this environment, the number of cannabis retail outlets is growing across the country, making illegal retailers, in effect, de facto legal and demonstrating the potential for illicit markets to blend with the legal economy.

Although Bill C-45 legalizes cannabis for adult-usage, it does not provide a regulatory framework for the distribution and sale of cannabis nor does the *Act* address a variety of issues that will surface after legalization (*The Cannabis Act* 2017). The federal government's legislation leaves it entirely up to provincial governments to develop regulation regarding distribution and retail sale. Ontario has already announced their plan to operate an entirely government-run retail network for cannabis (Gray and Psadzki 2017). However, Bill C-45 does provide the following regulations and guidelines for provincial regulation:

- The cannabis must be produced by a federally licensed producer;
- It cannot be sold to persons under the age of 18 (provinces may opt for a higher minimum age);
- The seller must maintain records of commercial activities;
- Adequate measures must be taken to prevent diversion to an illicit market or activity;
- Individual sales transactions and public-place possession of dried and non-dried forms of cannabis are limited to 30 grams per person;
- Homegrown cannabis is limited to 4 plants per household; and
- Provincial regulation should be designed around protecting public safety (quality-controlled cannabis), displacing the illicit market, and restricting youth access to cannabis.

The specific design of the regulatory framework adopted by provincial jurisdictions will significantly impact public safety, the displacement of the illicit market, and youth access to cannabis. In addition, the choice of regulatory framework will significantly impact the economic benefits of this new industry that will accrue to the government and people of Saskatchewan. If provincial governments do not enact a regulatory framework by July, 2018, residents will be able to legally purchase cannabis online and have it delivered to their home through the mail or by courier. This option will make it difficult for provincial governments to minimize the risks to public safety, displace the illicit market, limit access by youth, or capture the economic benefits of this new industry as the province will not be involved in distribution or retail operations. Therefore, it is recommended that provincial governments design a regulatory framework that utilizes regulation to align private market forces to extract the maximum social and economic benefits from legalization of adult-usage cannabis.

4.1 POLICY IMPLICATIONS:

4.11 PRODUCT SAFETY

Maintaining public safety is a paramount concern in evaluating options for regulating the provincial distribution and sale of cannabis. The primary risks with respect to protecting the public lie in ensuring that cannabis is safe for consumption, which means free of contaminants and tested for potency. Public safety is jeopardized if **legally**-produced cannabis does not meet Health Canada regulations or if **illegally**-produced cannabis finds its way into the supply chain.

Minimizing the illicit market is an important factor in mitigating the risk of unsafe cannabis consumption by the public because illegal products are out of the reach of government to monitor or regulate. Illicit products have a higher probability of contamination by organic substances (such as tobacco) and by non-organic substances (such as insecticides, fungicides, and herbicides), or even other narcotics (such as opioids). Risks of contaminated cannabis making its way into the supply chain also exists in a legal cannabis market. However, unlike the illicit market, effective regulation can mitigate these risks. Health Canada regulates legal producers and requires testing of legally-produced cannabis for both contaminants and potency. However, recent independent testing has shown a failure of some legal cannabis to meet standards (Robertson and McArthur 2016).

To minimize the risk of consumers being exposed to contaminated cannabis, Saskatchewan could independently and randomly test cannabis entering the legal market in the province. Regardless of whether the government chooses a private or publicly-operated model, a quality control system could be implemented with government oversight. Products which do not meet the standards would be responsibly destroyed. This would ensure that legal cannabis sold in the province would be free of contaminants and would be accurately labelled for ingredients and potency.

Apart from testing all cannabis coming into the province, a seed-to-sale inventory tracking system can be used to mitigate the risk that untested or illegal cannabis enters the Saskatchewan supply chain. Tracking would be possible from the manufacturer, through the supply chain, to the point of sale to make monitoring and enforcement of regulation more-cost effective. All cannabis entering the province must pass through the tracking system and be independently tested for quality control. In addition, for both regulators and police, any legally sold cannabis can be easily traced to all points in the supply chain and origination making it easier to identify whether cannabis came into the supply chain legally or illegally. Although independent testing and inventory tracking from seed-to-sale will ensure the safety of legal cannabis being sold, cannabis produced and sold in the illicit market remains a risk to public safety. As such, ensuring public safety also requires regulation designed to displace the illicit market.

All cannabis entering the province must pass through the tracking system and be independently tested for quality control.

In addition to ensuring that legal cannabis is safe for consumption, there are additional negative externalities (social harms) that are linked to the production or consumption of cannabis. Some negative externalities linked to cannabis are driving under the influence of cannabis, overconsumption of cannabis, inhalation of second-hand smoke, and pollution from the production of cannabis. However, these issues are similar to what the government faces with alcohol and, to some extent, tobacco. In addition, these issues are not affected by the choice of a regulatory framework, and therefore should be addressed with specific policies.

4.12 DISPLACING THE ILLICIT MARKET

Inherent in the government's ability to reach the objectives of ensuring public safety, restricting youth access, and fostering economic growth is developing a regulatory framework that aligns regulation and market forces to displace the highly-functioning and well-developed illicit cannabis market with a legal one. Illicit market activity is outside the reach of any regulatory framework. As such, the continuation of illicit suppliers and sellers of cannabis in part, or in whole, alongside the legal market poses the most significant risks to the safety of the public, to our youth, and to capturing the economic benefits of this new industry. Despite its illegal status and the penalties associated with illicit market behaviour, cannabis remains easily accessible for both adults and youth.

Displacing the existing illicit market for cannabis is a principal objective of any provincial regulation for several reasons:

- Allows youth access to cannabis;
- Lacks testing for potency and contaminants jeopardizing consumer safety;
- Avoids all forms of taxation and public contributions reducing government revenue;
- Supports criminal organizations and aids in peripheral criminal activity; and
- Prevents the expansion of the formal economy and prevents the attainment of the economic benefits of this new industry.

4.13 DRIVERS OF THE ILLICIT MARKET

The main drivers of the survival of the illicit market post-legalization are that consumers will continue to seek out illicit dealers, purchase cannabis from illegal sources, and that illicit producers will infiltrate the legal supply chain with illegally-produced cannabis. Although these factors have the same consequences—increased youth access to cannabis, unsafe product sold to consumers, reduced government revenues and economic activity, and support for organized crime—the post-legalization regulatory action required to prevent each outcome is different.

The main factors that would drive consumers toward the illicit market post-legalization are lower prices, convenience, and greater variety and availability in the illicit market compared to the legal market. With respect to illicit producers infiltrating the legal supply chain, the main incentives for producers/retailers to source their products illegally are greater potential profit due to tax evasion and lower wholesale costs for products and the retention of relationships with illicit market participants. With respect to potential market structures, private and publicly-operated markets will have different effects on displacing the illicit market and the ability of illicit producers to infiltrate the legal supply chain.

Public ownership represents the lowest risk that illegal cannabis will enter the legal supply chain since government representatives will be buying the cannabis. However, public ownership and control of retail outlets represents the highest risk that the illicit market will continue due to reduced variety of cannabis, potentially higher prices, and highly restricted availability. There are two primary methods for displacing the illicit market: increased penalties and enforcement and ensuring the legal market is more competitive in terms of price, quality and variety. Despite the current environment of strict penalties and enforcement associated with the illegal cannabis activity, an illicit market continues to thrive. As such, it is unlikely that penalties and enforcement post-legalization for buying, selling, and producing cannabis will have any significant effects on displacing the illicit market. Therefore, the opportunity to end the illicit market for cannabis rests on the ability of the legal market to compete with the illicit market and capture the demand for cannabis within the province.

...the opportunity to end the illicit market for cannabis rests on the ability of the legal market to compete with the illicit market and capture the demand for cannabis within the province.

On the other hand, the private market represents the lowest risk of the illicit market continuing as private firms will compete directly with the illicit market through product variety, quality and pricing. However, private firms will have incentives to purchase illegal cannabis either to lower costs or to evade taxation. Although both the continuation of the illicit market and illegal cannabis entering the legal supply chain will lead to the social harms discussed above, with effective monitoring of private firms, the risk that illegal cannabis will enter the supply chain can be mitigated. As

such, a regulated private market option with monitoring will lead to competition between legal retailers and illicit market sellers, with minimal risk that illegal cannabis will enter the supply chain.

In addition to competing with the illicit market, another major issue facing all provinces within Canada with respect to displacing the illicit market is ensuring that the legal market can meet consumer demand for cannabis. Based on estimates of consumer demand and the supply capacity of licensed producers, it is expected that Canada will face a shortage of legal cannabis leaving the illicit market as the only option for consumers. Because Health Canada has sole discretion in issuing licenses to produce cannabis, and only legal suppliers have the **potential** to import cannabis, provincial governments have limited options to ensure that cannabis demand can be fully met by the legal market. The process to obtain a cultivation licence from Health Canada is lengthy. Of the 67 licensed producers in Canada, only 3 currently operate facilities in Saskatchewan.

Table 4.1: Saskatchewan Producers

Licensed Producer	Greenhouse	Current	Stated
CANNIMED LTD.	Saskatoon	1428 kg	12,000 kg
rTREES PRODUCERS LTD. (TWEED GRASSLANDS)	Yorkton	0 kg	12,857 kg
UNITED GREENERIES INC.	Lucky Lake	0 kg	11,700 kg
TOTAL		1428 kg	36,557 kg

Source: Adapted from Alberta. (2017). Alberta's approach to cannabis legalization. Retrieved from https://www.alberta.ca/cannabis-legalization.aspx.

Current licensing requirements enforced by Health Canada include employing a designated quality assurance person with significant experience in product testing to ensure the quality, safety, and potency of products (Government of Canada 2017f). In addition, producers must undergo background checks, obtain government security clearance, and have strong measures in place for ensuring safe and secure storage and transportation of cannabis products (Government of Canada 2017g). All of these requirements add significant costs to production and act as major **barriers to entry** into the cannabis market for new firms.

These barriers to entry created by Health Canada's licensing provisions and the economies of scale inherent in other parts of the cannabis production industry provide ideal conditions for the formation of an oligopoly. Firms in oligopolistic industries have sufficient market power to raise prices beyond the competitive level and thus earn supra-normal economic profits. In the nascent cannabis industry, this market power has the potential to capture most of the economic benefits of legalization, significantly reduce the benefits accruing to the people of Saskatchewan, and limit the displacement of the licit market. There are two key elements in any policy designed to limit oligopolistic firms' ability to extract supra-normal economic profits. The first is a reduction in the barriers to entry, which will increase competition and reduce any given firm's market power. The second is for purchasers (either retailers or distributors) to band together. A single legal distributor will be in the best position to negotiate a fair division of the economic benefits of the newly legal cannabis industry.

Reducing the barriers to entry for new production firms through government policies or initiatives that support shared resources, whether in terms of shared testing and storage facilities or expertise and knowledge transfer, will facilitate the development of a local cannabis industry. Facilitating local cannabis production will alleviate part of the expected shortage of cannabis while helping to displace the illicit market by increasing the competiveness of the legal market. In addition, the development of a local cannabis production industry will generate significant economic benefits to provinces as their economies expand.

It is possible that even after legalization of adult-usage cannabis that some consumers will simply prefer to continue purchasing cannabis from the illicit market, due to longstanding relationships with sellers or due to an ideological preference for smaller, non-commercial grow ops. Although the government has limited ability to influence these individuals, one option that may mitigate the size of this demand is the Federal government's provision that individuals are allowed to grow their own cannabis up to four plants in their home (*The Cannabis Act* 2017). The seeds and plants required to grow at home must be purchased through producers or licensed retailers. If individuals opt for home grown cannabis to acquire non-commercial or specialty cannabis not available through legal retailers, allowing home-grown cannabis will help to reduce the demand in the illicit market. However, it will be difficult to monitor the number of plants in private homes. In addition, concerns exist with respect to how individuals can safely and securely store cannabis plants and products to prevent unauthorised access, especially by youth. Other concerns are with respect to any dangers associated with using the equipment in a home. Quebec has recently announced that they are very reluctant to allow home-grown cultivation of cannabis, contrary to federal regulation (CTV Montreal 2017).

Regulators could, however, prohibit homegrown cannabis. The risk is that individuals will disregard this prohibition and will grow cannabis at home anyway. Home cultivation for adult use is currently happening, despite its status as an illegal activity. These growers will likely have more incentive to continue growing after legalization of cannabis for adult-use, as the product itself will no longer be illegal. Furthermore, consumers who have preferences towards non-commercially grown cannabis may decide, if homegrown cannabis is allowed, to leave the illicit market and grow their own. Another issue related to homegrown cannabis is an inability to test and ensure the safety of that cannabis.

The government has limited options with respect to minimizing the risks of homegrown cannabis, especially regarding access by youth: prohibition or strict penalties. Although enforcing strict penalties on individuals found in violation of the federal

regulation could potentially deter individuals from growing more than the allotted amount or allowing access by youth, detection would likely only happen by coincidence or in the detection of other criminal activities. Given the ineffectiveness of prohibition combined with the potential reduction in the illicit the market from allowing home cannabis, strict penalties is recommended over prohibition.

Although it is important to plan for any risks associated with the difficulties in monitoring home cultivation, experience suggests that these risks are low (Transform Drug Policy Foundation 2014). Not unlike the home brewing of beer and making wine, home production requires time, space, and perhaps most importantly, is inconvenient for the individual. The experience of the Netherlands suggests that these deterrents are strong enough to cause consumers to default to legal cannabis retailers after the legalization of adult-usage cannabis (Transform Drug Policy Foundation, 2014). As a result, it is possible that regulation of home cultivation in Canada will be of lesser concern for regulators and policy makers in the future.

Not unlike the home brewing of beer and making wine, home production requires time, space, and perhaps most importantly, is inconvenient for the individual.

4.14 ECONOMIC BENEFITS

Maximizing the potential benefits of the new cannabis industry to the people of the province entails capturing as much of the cannabis supply chain as possible and fostering expansion and innovation. The benefits of a new industry include the primary benefits associated with creating jobs, increased government revenue, and income to business owners and the direct benefits accruing to support firms (legal, maintenance, accounting etc.) In addition to the primary and direct benefits, there are also peripheral or indirect benefits, which refer to the development of new business opportunities and innovation of products and operational processes in the cannabis industry. These peripheral benefits arise due to firms' drive for profit leading to innovation and efficiency, new technologies, new products, and new services.

As long as the provincial government licenses retail and distribution the province will see primary and direct economic benefits from this part of the cannabis supply chain. However, a major opportunity in the development of a new industry is the peripheral or indirect benefits associated with innovation and new product and service development. Saskatchewan has competitive advantages in many industries including agriculture and hemp, and it is uncertain how these industries will integrate and evolve with the cannabis industry. However, there will be significant opportunities post-legalization to see substantial innovation in the supply chain, from production to consumption. As such, an environment that fosters innovation, the potential peripheral benefits are significant.

Although provinces will develop cannabis distribution and retail models, cannabis production is limited to Health Canada approved producers. However, if the regulatory framework implemented in the province can facilitate Saskatchewan entrepreneurs becoming licensed producers, Saskatchewan can benefit from the direct economic expansion and the indirect benefits associated with innovation in the production and farming of cannabis. Saskatchewan currently has a strong industry in Hemp production, which will facilitate the development of a thriving production industry for adult-usage cannabis.*

One potential option to support production activities is facilitating the development of infrastructure and enacting infant industry support policies that reduce the barriers to entry for Saskatchewan firms in getting Health Canada approval. Since quality assurance and security are two major barriers to becoming a licensed producer with Health Canada, supporting shared services and centralized quality assurance could help entrepreneurs getting licensed either in partnership with a single shared services firm or through utilizing shared facilities for multiple producers. Facilitating producer licensing and expansion through infrastructure development has the opportunity to develop a Saskatchewan cannabis production industry that is not only a leader within Canada, but also a competitive supplier to foreign markets.

With respect to fostering innovation and economic growth beyond production, the primary contributor is competition to meet the demands of consumers and offer cost effective technologies to firms within the supply chain. This is increased through more private sector engagement in the cannabis market as private firms have greater incentives for innovation and growth than publicly-owned organizations. In addition, the larger the cannabis industry is in Saskatchewan, the greater the government revenues generated through taxation will be. As such, an important principle to consider when choosing potential regulation is the effect on economic activity and government revenue.

Regardless of the regulatory framework chosen, legal distribution and retail of cannabis in Saskatchewan will generate direct economic activity and will spur growth in all firms involved in the supply chain. Greater economic activity means greater opportunity for generating taxation revenue. However, as with any industry, privately-run firms are more aggressive than government owned enterprises in their pursuit of innovation, technology, and product and service differentiation. We fully expect to see this in the cannabis market under private operated model, either within current firms or in the development of new firms, as legal market participants compete against the illicit market and with each other to satisfy the desires of consumers.

*Report amendment: While hemp is different from marijuana in THC content and market uses, the knowledge gained from growing hemp in a well-controlled and closely regulated system can be useful and applied to the growing and supply chain management of cannabis.

4.15 LIMITING YOUTH ACCESS

Preventing youth access to cannabis is a major goal of policy makers, the general public, and physicians. The Canadian Medical Association has argued that the health dangers of youth smoking cannabis can be curtailed by implementing a minimum age of well over 18 (Canadian Medical Association 2016). The main risks of youth access to cannabis are retailers illegally selling to underage individuals and a continuation of the illicit market.

Continuation of the illicit market represents the easiest access for youth and provides another strong rationale for the importance of aligning private market forces and regulation to displace the illicit market. With respect to restricting youth access in the legal market, the primary risks are retailers selling to minors and access through home cultivation. To ensure that legal cannabis is not being sold to minors, the government can monitor retailers as it does currently for tobacco and alcohol. With respect to youth access within homes, regulation can hold parents responsible for keeping any cannabis in the home away from children and youth, whether homegrown or purchased. Finally, setting an appropriate legal age to purchase cannabis will assist the legal market in displacing the unregulated (with no effective minimum legal age) illicit market access to cannabis by youth.

Although private retailers will have incentives to sell to youth, current regulation over tobacco and alcohol has proven effective in preventing such retailers from selling to minors. However, it is important to note that publically-owned retailers have a better track record in preventing sales to minors than private retailers. One way to minimize sales to youth through a private model is to impose strict penalties for selling to minors, including revoking licences.

4.16 FINANCIAL AND POLITICAL RISK

An important consequence of the type of regulatory framework chosen is the degree of financial and political risk to government. Financial risk refers to the investments and other financial outlays required by government to develop infrastructure and other start-up costs if public ownership of either retail or distribution is chosen. Naturally, this risk is mitigated by opting for a privately-run cannabis market and this risk increases substantially with the degree of public sector involvement.

Although infrastructure is already in place for selling alcohol, the Federal Task Force on Cannabis Legalization and Regulation recommends that cannabis and alcohol not be sold in the same location (McLellan et al. 2016). This recommendation assumes that cannabis and alcohol are complements—that is, the two products are typically consumed together, leading to higher levels of intoxication than consumption of either product in isolation. Current evidence, though lacking academic rigour, suggests that cannabis and alcohol are substitutes rather than complements (PRWEB 2017). If the products are substitutes, there is little risk associated with co-sales, and thus co-sales should be permitted. This could potentially reduce the amount of government resources needed to establish a publically-owned cannabis retail sector. At this time, the evidence is not strong enough to be certain cannabis and alcohol are substitutes. Given the risks associated with joint consumption caution dictates stand-alone retail outlets where feasible.

In addition to the financial resources for infrastructure and start-up costs, enacting any regulation will see increased demands on monitoring and enforcement resources. These demands include testing of cannabis, inspection of facilities, and other compliance work. Monitoring and enforcement costs for the government will be greater in a private model than in a publicly-owned model.

Political risk refers to the public perception concerning government involvement in the cannabis market, which increases with public ownership. There may be substantial public backlash if the government decides to sell a product known to cause social harms and negative externalities. Though this has not been a significant issue since the re-introduction of the sale of alcohol by government for off-site consumption, the political risk is still present and could jeopardize the smooth functioning of a government-controlled cannabis market (retail or wholesale). In addition, sustained shortages in a publicly-run model, for example, would likely generate substantive political costs, as consumers would blame the government for the shortage of cannabis.

4.17 CANNABIS DISTRIBUTION

An important consideration in designing a cannabis regulatory framework is addressing the distribution of cannabis to retailers. The choice of distribution has important implications on public safety, displacing the illicit market, and the ability to drive economic growth and innovation. Left unregulated, it is likely that private firms will arise to specialise in sourcing cannabis for retailers or in linking producers with retailers. These companies would also likely offer packaging, branding, and transportation services. Several companies have begun to develop in Canada to provide these services and are generally referred to as "streaming" companies (Willis 2017).

There are a number of drawbacks to this multi-distribution channel approach. Allowing for multiple private distribution channels increases the risk that illegally-produced cannabis or cannabis that does not satisfy provincial safety and packaging guidelines will enter the Saskatchewan retail market. A diverse and diffuse set of distribution networks will make monitoring and enforcement more difficult for the regulator. Numerous supply channels will also have to be monitored simultaneously. This increases the likelihood of unsafe or illicit products being provided to retailers in the province. In addition, a multiple distributor model fails to capture some of the economies scale that would accrue with a single distributor and will lead to higher costs, higher retail prices, and lower competition with the illicit market.

4.18 CENTRAL DISTRIBUTOR

Establishing a single central distributor in the cannabis industry will significantly increase the effectiveness of any regulatory framework and provide an opportunity to mitigate many of the risks outlined above regardless of whether a private or public retail option is chosen.

As discussed, keeping illegal cannabis out of the supply chain is an important objective of regulation. A key element in keeping illegal cannabis out of the supply chain is being able to differentiate between legal and illegal cannabis. Currently-available seed-to-sale tracking and inventory management systems provide an ability to trace cannabis to the originating producer. Having a central distributor receive and track cannabis to the final retail location allows regulators to cross-check cannabis sold in retail outlets with purchases from the distributor, and to immediately identify the source of any illicit cannabis. Having a single distribution centre manage the inventory and tracking system will reduce the likelihood that illegal cannabis will enter the Saskatchewan market.

In addition to providing a single choke point for cannabis coming into the Saskatchewan market for tracking and inventory management, a single distributor will decrease the risk to public safety in the cannabis industry. A single distributor responsible for testing and quality assurance of all cannabis sold in the province will lower the operation costs as compared to having testing done at multiple facilities with multiple agents responsible. A single distributor with a mandate to test samples of all products entering the retail market can ensure that cannabis products sold in Saskatchewan meet the requirements for product quality and product safety much more reliably than can be expected of private producers with, at times, interests that conflict with full product testing.

Enforcing the use of undifferentiated packaging eliminates the possibility of producers using the letter of the *Cannabis Act* to circumvent its intent. The *Act* prohibits most traditional forms of marketing by cannabis producers, including all but minimal branding. In this environment, a producer who finds a way to meaningfully differentiate their product in the eyes of consumers has a major advantage. Unchecked, this would lead to differentiated packaging in terms of size, shape, or colour. All of these differentiations can stand in for more traditional marketing. Rather than developing and enforcing guidelines on every element of packaging, a sole distributor can ensure that all packaging is undifferentiated by using the same packaging and labels for all products. Labelling would disclose mass, plant variety and strain, THC content, CBD content, and name of producer.

A single distributor, whether publicly or privately owned, reduces the costs associated with retailing cannabis by taking advantage of economies of scale and specialization in distribution costs such as shipping and receiving, inventory tracking and management, and storage and security. In addition, a single legal distributor will have the ability to counter the market power currently granted to producers by Health Canada, further reducing the cost of cannabis to retailers. Reduced costs for retail will help keep prices competitive with the illicit market, thereby increasing the probability of displacing the illicit market. A central distribution centre offering quality assurance, testing, packaging, and labelling would also allow for the bulk import of cannabis in the face of shortages, which could lower costs to Saskatchewan consumers, providing competition with the illicit market on price.

Retail outlets found to be in violation of provincial rules could be denied access to the distributor and thus shut out of the legal adult-usage cannabis market. Conversely, under a multi-distributor model, closing a retail outlet would be much more difficult. Retailers who are found to be committing infractions—be it is selling to youth or other infractions—can have their supply cut off by regulators immediately through the single distribution centre, rather than having to monitor whether the retailer is still receiving product or selling it illegally. Any and all products not traceable to the single provincial distributor are easily identifiable as illegal. A central distribution point also serves as a system to check the performance of producers. If producers are consistently supplying products that fail the distributor's quality and safety checks, as mandated by provincial requirements, regulators can take direct and immediate action more easily than would be possible with a diffuse distribution network.

A central distribution centre can work with regulators through a control and advisory board to facilitate enforcement and monitoring of all agents and firms in the cannabis industry. Developing an advisory board for monitoring and enforcement also has other important benefits to provincial governments. This board could have representatives from various stakeholder groups (First Nations, Government, Police, Industry etc.) affected by cannabis legalization. For example, representatives from government ministries can work through the advisory board and central distributor to coordinate and implement their programs and policies. Representatives from First Nations can work with the central distributor and Board to help develop small business opportunities within the cannabis sector, and representatives from justice and police services can utilize the Board and central distributor to implement policies and new regulations. Finally, representation by producers and retailers on the advisory board would facilitate the dissemination of relevant expertise and knowledge to firms wishing to produce or sell cannabis in Saskatchewan. The advisory board would operate as a central location of expert knowledge within the cannabis industry and provide an excellent point to collect data on the cannabis industry and develop strategies for further economic growth, innovation and research.

A central distribution centre will have significant impacts on economic activity within the province and will facilitate the displacement of the illicit market. Choosing a private or semi-private option for a single distribution centre aligns market forces with not only expanding economic activity in the province, but also in competing with the illicit market. Market forces will ensure that the distributor maximizes the amount of legal cannabis sold

within the province, which includes meeting consumers' demand for quality, variety, and price. If the legal market cannot offer consumers a wide variety of high-quality cannabis at a competitive price, the illicit market will continue to thrive. Aligning market forces to compete with the illicit market will dramatically reduce the continued existence of the illicit market beyond a transition period.

> A central distribution centre offering quality assurance, testing, packaging, and labelling would also allow for the bulk import of cannabis in the face of shortages, which could lower costs to Saskatchewan consumers, providing competition with the illicit market on price.

An important consideration in mandating a single distributor is that a distributor with testing and packaging operations could significantly reduce a major barrier to entry for local firms gaining licence from Health Canada in cannabis production. Currently, licensed producers must adhere to Health Canada's stringent requirements regarding quality assurance, processing, and packaging and shipping procedures. These requirements are a burden on producers who wish to be granted a cultivation licence from Health Canada and represent a barrier to entry to the cannabis industry in Canada.

To alleviate this burden, a central distributor can work with Health Canada and domestic firms wishing to enter the cannabis industry to manage all aspects of quality assurance, processing and packaging, and security and storage of domestically-produced cannabis, thereby mitigating barriers to obtaining a Health Canada cultivation licence. This will facilitate a significant increase in cannabis production in Saskatchewan, addressing the expected shortage of cannabis and further reducing the likelihood of a continuation of the illicit market. In addition, this would significantly increase economic activity and innovation in the province.

In addition, this central distribution centre will help smooth interjurisdictional/international trade in cannabis and cannabis products, adding to Saskatchewan's reputation as an open trading province. The distributor will be in an excellent position to export safe cannabis should a surplus of locally produced cannabis arise, helping Saskatchewan producers compete globally. If the central distributor is able to obtain a licence from Health Canada for importation, the predicted shortage of cannabis in Saskatchewan would be mitigated and the distributor would be able to offer imported cannabis at lower prices than individual producers importing and reselling it to the distributor.

Finally, having a central distributor with quality assurance infrastructure prepares the province to deal with changing regulations and shifting consumer preferences. As consumers search out new products and varieties, such as seeds and clones, the central distributor will be best placed to source and assure the quality and safety of these new products. They will also be best situated to address the growing demand for the types of edible cannabis based products being developed in other jurisdictions.

4.2 POLICY OPTIONS:

4.21 OWNERSHIP OF A SINGLE DISTRIBUTOR

As discussed, a central distribution centre combined with a separate retail system, either private or public, would create significant benefits for the province and further reduce many of the harms currently associated with the cannabis industry. As such, we recommend that the provincial government establish and regulate a single distributor for recreational adult-usage cannabis in Saskatchewan. The single distributor will reduce operation costs of retailers, whether public or private, through economies of scale in sourcing legal supply, in shipping and receiving, and in inventory storage. In addition, a single choke point of cannabis coming into the province will increase the effectiveness and reduce costs associated with compliance, including testing, labelling, packaging, data collection, knowledge sharing and innovation, and imposing penalties on retailers.

Under a central distribution centre, retailers would be required to source any and all products through the single distributor. This distributor would be responsible for assuring the quality and safety of all products distributed to Saskatchewan retailers. This will require a dedicated testing facility staffed with qualified professionals. Generic labelling would be the responsibility of the distributor; this would be achieved by simply repackaging product into appropriate containers at the distribution centre. Product would arrive freeze-dried or vacuum-packed and ready for repackaging into generic but appropriately-labelled (with information on strain, strength, and producer) bar coded packages of standard sizes, such as 1 gram, 5 grams, and 15 grams. During the packaging process, a random sample from each shipment would be diverted for testing.

Different ownership models for this single distributor offer different combinations of costs and benefits to the province. In this section we consider the implications of three different ownership models and recommend a private distributor with significant direct provincial oversight.

4.211 Publicly-Owned Distribution

One option available to the government under either a private or public retail model is establishing a government-owned and -operated distribution centre.

Benefits

- Greater public safety through public management of testing and a seed-to-sale tracking and inventory management system.
- Greater public perception of public safety.

- Absence of profit motive, which reduces the likelihood of sourcing less expensive cannabis from the illicit market and reduces costs associated with monitoring and enforcement.
- Profits are directed to the government to fund prevention, treatment, public education, and enforcement programs.

Costs
- Lower market forces driving distributor behaviour, which may reduce the distributor's motivation with respect to the following:
  - product variety, availability, and customer service; and
  - competitive spirit which fosters economic activity and the advancement of the Saskatchewan cannabis market.
- Significant financial and political risk:
  - Large capital investment from the province to set up the central distribution centre;
  - Large capital outlays could potentially be seen negatively by the public; and
- All risks associated by supply failure or interruption become the responsibility of the provincial government.

4.212 Privately-Owned Distribution

As discussed, both the private and public models of a central distribution system will provide benefits in terms of reduced costs of selling cannabis in Saskatchewan through economies of scale and increased cost effectiveness in monitoring and enforcing compliance. However, a regulated, private distributor will generate additional benefits compared to a public distributor through the following:

Benefits
- Locating high-quality, legal, cost-effective cannabis to compete with the illicit market in terms of quality, price, and variety (including a local production industry);
- Increasing the supply of cannabis in Saskatchewan by providing shared services (testing, packaging, and labelling) to producers to reduce barriers to entry of firms getting Health Canada licences to produce;
- Utilising these operations to import additional supply when needed and help develop an export industry for cannabis produced in Saskatchewan, over time;

Costs
- Incentives to cut costs, thereby requiring more stringent monitoring and enforcement of regulations compared with a publicly-owned distributor; and
- A reluctance to work with public stakeholders (from the health care system, justice system, or other government agencies) to minimise the social harms caused by cannabis use, including facilitating information and awareness campaigns.

4.213 Regulated Private Distributor

A modification of the government-owned and -operated distribution model is to have the distributor run by a private firm under licence from the provincial government. A variety of models could be used to achieve this depending on the degree of regulation and government involvement. In this way, the provincial government will avoid significant financial outlay and any political risks associated with market interruptions, such as negative public perception in the event of supply shortages. The distributor will not be paid directly by the provincial government, but will instead extract its profit through a regulated mark-up assessed at distribution. The regulated private distributor has the potential to blend the benefits of both the publically-owned model and the strictly private owned model.

Benefits
- Government oversight and regulation reduces the likelihood that the distributor will minimize costs of production through non-compliance in sourcing, testing, packaging, and labelling products.
- Reduced burden on government monitoring and enforcement costs as compared to a completely private model.
- Will ensure that the distributors work through the Advisory Board to advance the needs of stakeholder groups and support innovation in Saskatchewan.

Costs
- Potential strain on government resources to develop infrastructure, if required by the partnership.
- Negative public perception of the government in dealing with a product surrounded by stigma.

4.214 Summary

Regardless of the model chosen for retail, licensing distribution allows for economies of scale in retailing costs through inventory management, storage, sourcing supply, and shipping and receiving. However, the government can choose a single publicly-owned distributor, privately-owned distributor, regulated private partnership distributor, or can choose to license multiple distributors.

In addition to economies of scale in retailing costs, distribution points between retailers and producers provide a point of concentration of cannabis coming into the province allowing more cost-effective monitoring and enforcement of testing, packaging, labelling, and seed-to-sale tracking. Given the importance of points of concentration in the supply chain on the ability to protect the public, restrict youth access and displace the illicit market, a single distributor would provide for the most cost-effective monitoring and enforcement. As such, the options for distribution are public versus private ownership, or a regulated private distributor.

Because protecting public safety and preventing access to cannabis by youth hinges on displacing the illicit market, aligning market forces through private distribution against illicit market participants and organised crime represents significant benefits to the people of Saskatchewan. In addition, because a private distributor would be best positioned and incentivised to help develop a local cannabis production industry and facilitate the

import and export of cannabis from and to other provinces and countries, the central, privately-owned distributor offers the greatest advantage in terms of economic growth to the people of the province.

> Because protecting public safety and preventing access to cannabis by youth hinges on displacing the illicit market, aligning market forces through private distribution against illicit market participants and organised crime represents significant benefits to the people of Saskatchewan.

The main benefit to public ownership is the lack of a profit motive to minimize costs through evading regulation around legal sourcing, testing, packaging, and labelling. This reduces the burden on the government of monitoring and enforcement costs. The costs associated with public ownership are the strain on government resources to develop the infrastructure needed for distribution, political risk in public perception of distributing cannabis, and the lack of incentives to compete with the illicit market and drive innovation and economic growth throughout the cannabis supply chain.

On the other hand, private ownership comes with higher monitoring and enforcement costs to the government to ensure the distributor is not evading regulation to lower costs and is working in conjunction with stakeholder groups. Although both public and private ownership will facilitate seed-to-sale tracking inventory management, private ownership brings market forces and incentives directly against the illicit market to ensure retailers are selling only cannabis that has come through the distributor. In addition, private ownership incentivizes the distributor to build infrastructure to facilitate health Canada approval of local producers and develop a world leading cannabis industry in Saskatchewan.

4.23 RECOMMENDATIONS FOR DISTRIBUTION

4.231 Regulated Private Distributor

Although both private and public ownership models and have their costs and benefits, regulating a single private distributor (with possible partial public ownership) will provide lower costs and higher benefits than either choice in isolation. A public ownership model has lower monitoring and enforcement costs than private ownership, while private ownership has the benefit of aligning market forces against the illicit market and towards innovation and economic growth. Therefore, it is recommended that the government try to form a public/private partnership for regulated private distribution by issuing an RFP (request for proposals). The RFP should be written in such a way as to generate private market solutions for minimizing the harms associated with the cannabis industry. Proposals should also demonstrate how the distributor plans to generate economic growth and stimulate the cannabis production industry within Saskatchewan.

It is imperative that the distributor work with regulators and other government representatives to monitor and enforce compliance with regulations and work to reduce the social harms caused by cannabis use. This allows the government to avoid the majority of the financial and political risk of a strictly publicly-owned distribution company, while retaining the benefits of higher compliance rates seen from public ownership. As long as the government can find a strong private sector partner, the safety of the public will be maximised, while being best positioned to displace the illicit market and to transfer the economic benefits of this new industry to the people of Saskatchewan.

> It is imperative that the distributor work with regulators and other government representatives to monitor and enforce compliance with regulations and work to reduce the social harms caused by cannabis use.

Contract

This approach would require an exceptionally well-written and well-enforced contract for the firm providing the testing and distribution services. If this option is chosen, the provincial government would be wise to place strong provisions within the contract for revoking the licence with cause – such as failure to maintain quality control. Under a private/public partnership, breach of contract would cause the physical assets of the distributor to revert to the provincial government immediately. The firm should be chosen based on their ability to protect the public, compete with the illicit market, and develop benefits to the province through distribution. In addition, the firm should demonstrate an ability to facilitate an advisory board for compliance, develop and transfer knowledge and expertise in cannabis and innovation, and adapt to, and enforce regulation through the supply chain. Finally, the chosen firm should demonstrate an ability to be a leader in fostering innovation and economic growth in the cannabis industry.

Retail Options

A major decision the government faces in developing regulation ahead of the July 1, 2018 legalization date is whether to operate a government-run or a privately-owned retail model. The government of Saskatchewan has the authority under the

Cannabis Act to act as a monopolist in the retail market. This approach would create a system very similar to the market for alcohol prior to 2009 . This is the approach that the government of Ontario has decided to take (Gray and Psadzki 2017). Similar to the cost-benefit analysis performed above for distribution we examine the costs and benefits of different retail market structures and ownership models.

4.232 Publicly-owned and -operated retail outlets

A public owned and operated system of retail outlets would provide a number of important benefits, not the least of which is the greatest degree of control over the behaviour and location of retail operators. Publically owned retailers would have no incentive to purchase product from anyone other than the central distributor, as there is no profit motive at play.

The lack of a profit motive also reduces the incentive to illegally sell cannabis to youth. In B.C., government-run liquor stores were much less likely to sell alcohol to persons below the legal age than their privately-run counterparts (BC Gov News 2012) . Though it should be noted that BC's publically owned retailers sold to minors approximately one-quarter of the time.

The public ownership model also provides the greatest control over outlet density. Outlet density is a contributing factor in overall alcohol consumption in jurisdictions (Borland 2003). Private retailers have an incentive to pursue density as a method of capturing additional sales and profits.

The costs of a public owned and operated system are also substantial. The lack of a profit motive leaves publically owned retail outlets with little incentive to compete with the illicit market in variety and price. Consumers may also reject government retailed cannabis products as inferior leading them back to the illicit market. In addition, a publically owned retail system will have less capacity to transmit appropriate price signals from consumers to producers than private firms, as publically owned retailers have to be more responsive to charges of fairness and reprisals at the ballot box. Moreover, the public system will be much less dynamic than a system of multiple privately owned retailers being flexible and adaptive to changing economic and regulatory conditions. Finally, without a profit motive, publically owned and operated retailers will have little incentive (or ability) to attract those with the greatest knowledge of the product into the industry. This knowledge (generally developed in the illicit market) will be essential to helping consumers use recreational cannabis as safely as possible. It is these failings that make the system employed in Ontario likely to foster the continuation of the illicit market well after recreational cannabis use is legal.

Some of the costs to public ownership will fall upon the government itself. Establishing a system of standalone public retail outlets will require large capital investments with initially uncertain returns. There is also the risk of political backlash as the government directly provides a product with more social stigma than either alcohol or tobacco. Public ownership puts the government in the position of providing an addictive substance with serious mental health risks to at risk populations.

The likelihood of early roll-out problems compounds this risk to government. Based on estimates of the demand and legal domestic supply of recreational cannabis (presented in the final section of this chapter) we expect a shortage of legal supply upon legalization. Retailers and their owners will bear the brunt of consumer frustrations with the resulting shortages. These shortages will be addressed as new legal supply is added, but it is uncertain how quickly and reliable that will take place.

Thus, public ownership of the retail segment of the cannabis market generates the following benefits and costs.

Benefits:

- Lower risk that retailers will purchase product from illegal producers for resale;
- Lowest risk of youth access, as government-run retailers do not have profit incentives to sell to youth;
- Lowest risk of tax evasion or other cost-cutting schemes, including non-compliance;
- Greatest control over the density of retail outlets; and
- Additional opportunity for quality control as product testing could be performed at the retail level.

Costs:

- High risk of continuation of the illicit cannabis market as public retailers' lack incentives to compete with illicit market sellers in terms of variety and price;
- Consumers who prefer private retailers may opt for illicit options over purchasing from government-run retailers;
- Significant capital outlays;
- Moral and political backlash associated with selling cannabis;
- Risk of early roll-out problems;
- Lower ability to send appropriate price signals to distributors and suppliers than private firms;
- High political and financial risk, including substantial fixed costs, putting pressure on government resources;
- Difficulty in attracting industry and knowledge experts in cannabis products; and
- Lower incentives for retailers to pursue innovation, product and service differentiation, making it less likely that legal product will successfully compete with and displace the illicit market.

4.233 Unlimited number of regulated, government-licensed, private retailers

Another option that meets the requirements of the *Cannabis Act* is to simply license any and all retailers that meet a small set of basic requirements. This is essentially how tobacco retailers have been licensed in the province, with most convenience stores having licenses to sell tobacco products. As with tobacco, these licenses would be revocable by the province for a wide variety of infractions.

The benefits an unlimited number of regulated, licensed private retailers stem from the forces of competition and regulator distance for the provincial government. In pursuit of profits, private retailers will ensure they provide the types of products consumers want at prices they are willing to pay. Competition among these retailers will provide consumers with lower prices as lower operating costs and overheads are passed on through retail prices. Essentially extra-normal profits will be eliminated. Retailers will send quick and clear signals to the distributor, and thus to producers, in the form of price movements. These price movements will induce producers to increase production of popular varieties quickly and scale back less popular ones at the same time, promoting efficiency and reducing costs. Private retailers allow provincial governments to focus on a regulatory role without fear of recrimination from supply interruptions. It also allows the provincial government to avoid the moral and political risk discussed previously.

The costs of the private system come in the form of lower control over the behaviour, number, and location of retailers. As discussed above, private retailers are more likely to sell to minors than publically owned retailers. In order to limit the incentive of private retailers to sell to youth, a system of stringent penalties and enforcement (including youth as agents) will be required, adding to enforcement costs. Similarly, private retailers have incentives to seek out product from the illicit market; however, a seed to sale tracking system will aid in the enforcement of sourcing requirements. It is important to note that although the private retail model will be more likely to sell to youth, they are more likely to displace the illicit market, which will eliminate a major source of youth access. Finally, the higher outlet density of an unlimited number of private retailers is likely to contribute to excessive use of cannabis. High outlet density encourages consumption through ease of access and allows consumers to evade the 30 gram possession (and implicitly purchase) limit by visiting multiple retail outlets.

The following are the benefits and costs of unlimited private retailers.

Benefits:
- Higher incentives for retailers to remain competitive by reducing costs and margins;
- Lower costs for consumers due to lower operating costs and competition due to high outlet density;
- Lower political risk for Saskatchewan government associated with direct participation in the retail market for cannabis; these potential negative public perceptions are transferred to the private sector; and
- Greater ability to send accurate price signals.
  - Private retailers will respond quickly to changes in demand for cannabis by either raising or lowering the price they are willing to pay the distributor.
  - Changes in retail and wholesale prices provide information on demand to suppliers, indicating the need to either expand or contract operations. Government-operated systems distort prices and thus deprive the system of the information and incentives needed to achieve the most beneficial outcomes for the people of Saskatchewan.

Costs:
- Costly for government to ensure compliance vis-à-vis selling to minors and selling illegal cannabis;
- Greater difficulty managing and ensuring compliance;
- Regular inspections; and
- More difficult to enforce daily possession limits.
  - If cannabis is as available as tobacco, purchasing from multiple retailers in a short period of time will be as simple and easy as walking to multiple convenience stores.

4.234 Limited number of regulated, government-licensed private retailers

A system of a limited number of private retailers licensed by the provincial government offers a combination of benefits of government-owned/operated retail and a large number private retail operators. This system would be modelled on the system currently used to license private alcohol retailers in the province, and would include provisions through which the licenses may be revoked. Any area able to support a cannabis retailer would be identified and an RFP for a retailer in that zone would be issued. The provincial government would select the most appropriate proposal and grant a retail license for a fixed period of time – for example, 5 or 10 years. This approach offers yet another combination of benefits and costs.

The benefits of a limited number of regulated, government-licensed private retailers accrue from the combination of the ability of retailers to respond to incentives and for the government to effectively regulate the retail segment of the market. These profit motivated firms will still be highly responsive to consumer demand, ensuring that the variety of products they sell and prices are highly competitive with the illicit market.

In issuing a limited number of geographically specific licenses, the provincial government can directly control the density of retail outlets, reducing the impact of availability on consumption. This approach also allows the provincial government to control the concentration of ownership in the retail market. A single large retailer is likely to have a high degree of bargaining power with the centralized distributor as well as significant power and resources to lobby the provincial government for changes to the regulatory structure. By ensuring diffuse ownership of the retail sector, the provincial government reduces the risk of regulatory capture.

A single large retailer is likely to have a high degree of bargaining power with the centralized distributor as well as significant power and resources to lobby the provincial government for changes to the regulatory structure.

The smaller number of retail outlets provides the opportunity for more cost-effective enforcement of regulation, particularly around sales to minors and selling product not sourced through the central distributor. The profits accruing to retailers due to reduced (but still present) competition provide greater incentives for compliance with regulation, as the loss of a license would mean the loss of an entire business, not simply the loss of a product line.

Finally, the separation of retail owners/operators from the regulator allows the provincial government to better fulfil its mandate as a regulator. Regulatory capture occurs when those responsible for regulating an industry enact laws and policies designed to benefit the firms being regulated at the expense of consumers or society at large. This is highly likely to occur when the any level of government is serving both as a regulator and as firm in the industry. Maintaining a separation between retailer and regulator makes the appropriate evolution of regulation much more likely.

The limitations of this market structure are due to reduced competition and the incentives faced by private retailers. The reduction in the competition caused by limiting the number of retail outlets is likely to lead to higher prices than would be observed in a market without regulated barriers to entry. However, the existence of the illicit market will initially provide the competition required to keep prices (and profits) in check. As was discussed above, private retailers have a greater incentive to sell to minors than do government owned and operated retailers. The fact will require active enforcement of minimum purchasing age with minors as agents.

Therefore the following are the benefits and costs of a limited number of regulated, government licensed private retailers.

Benefits:
- Direct government control over outlet density, thereby exercising control over consumption levels;
- Greater incentives for retailer compliance;
- Greater retailer compliance due to lower complexity and cost of monitoring and enforcement for regulators;
- Lower risk of illicit cannabis products entering the retail supply chain due to smaller number of outlets;
- Lower political risk because the provincial government is not trying to act as both a retailer and a regulator;
- Greater control over concentration of ownership in the retail market; and
- Privately-owned firms still have incentives to compete with the illicit market.

Costs:
- Higher prices due to a lower level of competition; and
- Risk of sales to minors as firms respond to profit motives or as employees are less generously compensated.

4.24 SUMMARY

A major benefit of publically-owned versus privately-owned retail outlets is the reduced cost of monitoring and enforcement of regulations that comes with a publically owned model. However, a majority of those increased costs under a private model will be mitigated by a single distributor, especially through a public/private partnership. With that being said, public ownership of retailers is shown to better minimize the risk of youth access in alcohol sales, as private retailers have an incentive to sell to youth in order to generate more sales, despite strict enforcement and hefty penalties if caught selling to youth. Therefore, the public retail option will be more effective at restricting youth access at the point of sale. However, the government would face significant resource constraints in building retail infrastructure, especially if co-sale alongside alcohol is not allowed. In addition, the government could face political risk from selling cannabis.

A major benefit of publically-owned versus privately-owned retail outlets is the reduced cost of monitoring and enforcement of regulations that comes with a publically owned model.

In addition to being more likely to sell to youth, a private retail option will align market forces to open as many outlets as possible. However, as long as the government is limiting the number of retailers and their location, this cost can be mitigated. The major benefit of a private retail option is that market forces will align retailers to compete with the illicit market on quality, variety, and price. Although both models can compete on price, public owned retailers have been shown to have reduced variety and may not search the highest quality supply. If consumers are not satisfied with the current variety, quality and price in public retailers, they will likely continue to utilize the illicit market to meet their demand. However, a private option will incentivize retailers to compete with the illicit market and will likely to bring an end to the illicit market over time.

Given the importance of displacing the illicit market (public safety,

restricting youth access, and fostering economic growth), the higher probability of private retailers displacing the private market outweighs the increased risk of private retailers selling to youth. This is reinforced by the fact that the illicit market provides the greatest ease of access to youth.

4.25 RECOMMENDATIONS FOR RETAIL

We recommend that the provincial government offer a limited number of geographically specific licenses for private cannabis retailers. This system allows for close monitoring of retail outlets at a limited cost. It also limits outlet density, which is likely to reduce over consumption. The limited number of outlets provides the provincial government more leverage over individual retailers. We also recommend that the provincial government limit the total number of retail outlets that may be owned or operated by a single firm or individual. This will limit the lobbying power of cannabis retail owners (Borland 2003).

4.26 RECOMMENDATIONS FOR HOME-GROWN CANNABIS

The *Act* allows individuals to grow up to four plants in their homes. This will be near impossible to enforce without consistent violation of citizens' right to privacy. Similarly, completely banning home growing is simply unenforceable (Borland 2003). Allowing individuals to grow cannabis in their home does pose a risk with respect to access by youth and issues related to landlords preventing home-grown operations in their rental properties. Those willing to violate the laws will do so regardless of whether or not the federal regulation holds in the province.

The government has limited options with respect to minimizing the risks of homegrown cannabis, especially regarding access by youth: prohibition or strict penalties. Although enforcing strict penalties on individuals found in violation of the federal regulation could potentially deter individuals from growing more than the allotted amount or allowing access by youth, detection would likely only happen by coincidence or in the detection of other criminal activities. However, given the ineffectiveness of prohibition combined with the potential reduction in the illicit market from allowing home cannabis cultivation, strict penalties are recommended over prohibition.

4.3 TAX POLICY

Taxation has been identified as an important tool in reducing demand for both alcohol and tobacco. Increasing the price of these products with a Pigouvian tax plays a role in reducing demand and thus the negative externalities associated with the use and abuse of alcohol and tobacco. The provincial government should preserve the means to use pricing to limit demand in the future. Initially, the existence of a sophisticated illegal distribution/retail network limits the ability of the government to reduce demand with price. Once illegal sellers have been removed from the market, pricing and taxation options for controlling demand should be explored.

Immediately following legalization, the illicit market ensures that there is an upper limit to the retail price in the legal market. The legal retail price must not be significantly higher than the price in the illicit market if the illicit market is to be eliminated (Transform Drug Policy Foundation 2014). The impact of different tax policies will depend on the structure of the retail market and the system of distribution chosen by the provincial government. We make two key recommendations concerning tax policy for legalized adult-usage cannabis: that it is marked up at distribution and that an ad valorem tax is applied at the point of sale.

Marking up product at the distribution point offers a method of increasing the price, as part of a host of methods to reduce demand, without having to constantly update legislation concerning tax rates. It will also generate revenue to cover the costs associated with infrastructure and quality assurance. Mark-ups tend to have the political advantage of being less visible to consumers than taxes applied at the register. The exact mark-ups on distribution and retail should be decided through the RFP process and the most cost-effective solutions for Saskatchewan chosen.

An ad valorem tax of 10 per cent of the retail price applied at the register is also recommended. This tax is recommended with the sole purpose of generating revenue for the provincial government to offset the negative externalities associated with cannabis use, including but not limited to the mental health effects associated with consumption by youth. An ad valorem tax of 10 per cent is expected to generate $20,750,000 annually.

The resulting pricing system would have the form shown in the table below.

Stage	Case 1 $ per Gram	Case 2 $ per Gram	Case 3 $ per Gram
Production	$3.00	$5.00	$6.00
Distribution Mark-up	$3.00	$2.50	$2.00
Retail Profit	$2.33	$2.00	$2.00
Subtotal	$8.33	$9.50	$10.00
Provincial Tax	$0.83	$0.95	$1.00
Federal Tax	$1.00	$1.00	$1.00
Total Retail Price	$10.16	$11.45	$12.00

Table 4.2: Tax Schedule
Source: Adapted from Alberta. (2017). Alberta's approach to cannabis legalization. Retrieved from https://www.alberta.ca/cannabis-legalization.aspx.

Based on the estimates of demand (explored below), a well-functioning market for cannabis in Saskatchewan can be expected to generate $250,000,000 (at $10 per gram) in economic activity per year (assuming no out-of-province exports or imports).

4.31 DEMAND FOR CANNABIS

The quantity of cannabis that Saskatchewan consumers will demand upon legalization is not a known quantity and therefore must be estimated. As with any product or service, the ideal demand estimation method would be to observe purchasing decisions made by consumers or production decisions made by suppliers. In a well-functioning legal market, this data is easy to acquire. However, it is virtually impossible to acquire when the product in question is prohibited.

4.4 METHODOLOGY

In other jurisdictions—Colorado, for example—it would be possible to estimate final consumer demand from the reported output of producers. However, the only legal producers in Canada are restricted to providing cannabis only to those with medical prescriptions. This means the current legal supply excludes non-medical users. Thus, current legal production figures do not provide an accurate assessment of post-legalization demand, as it will include cannabis demanded for adult-usage once it is legal.

Purchases by non-medical consumers are also unobserved as purchasing adult-usage cannabis for consumption is currently illegal. There are surveys of Canadians that attempt to estimate the number of individuals who use cannabis and their frequency of use, but they do not estimate how much cannabis is consumed per usage. However, data from other jurisdictions provide estimates of the quantity individuals consume based on their frequency of use.

The first step in this process is estimating the number of users of various types, ranging from occasional to daily users. We then use estimates of quantity consumed by each user type from a jurisdiction in which cannabis is legal to arrive at estimates of total consumption by each category of user. Colorado is chosen as the reference point as it offers the best combination of time since legalization and cultural comparability to Saskatchewan (as opposed to, say, California or Uruguay). As shown in the following table, quantity of cannabis consumed per day is based on the number of days per month an individual uses cannabis. For example, individuals who consume cannabis on average 25 or more days a month tend to consume between 1.30 and 1.90 grams per day that they consume cannabis. To find the quantity consumed per year, we can multiply the quantity per day by the use-days per month, and then multiply this number by 12 to get annual consumption. This is the same approach taken by Deloitte (Deloitte Touche Tohmatsu Limited 2016), the PBO (Parliamentary Budget Office 2016), and the Marijuana Policy Group on behalf of the Colorado Department of Revenue (Marijuana Policy Group 2016).

Use-days per month	Lower Bound	Mean	Upper Bound
< 1	0.20	0.30	0.60
1 to 20	0.43	0.67	0.95
25 +	1.30	1.60	1.90

Table 4.3: Grams Per Use-Day
Source: Adapted from Alberta. (2017). Alberta's approach to cannabis legalization. Retrieved from https://www.alberta.ca/cannabis-legalization.aspx.

With an estimate of the quantity consumed per year for members of each group, we simply need the number of individuals in each frequency group to get total demand. The only way to do this is through surveys. Three important surveys have been reported in the last five years. Each uses a slightly different survey methodology and sample frame. Estimates of total demand for cannabis in Saskatchewan are based on each survey. Unlike the PBO or other agencies, we do not adjust estimates of users for underreporting by arbitrarily inflating user numbers. Instead, we report a range of total consumption based on differing estimates of quantities consumed by each category of consumer.

4.41 DEMAND ESTIMATE #1: LOW (Canadian Community Health Survey)

The Statistics Canada Canadian Community Health Survey – Mental Health data shows the lowest number of Canadian users. This survey sampled 25,113 Canadians, with just 12.2 per cent of Canadians admitting to having used cannabis in the past year (Statistics Canada 2012). There are two likely reasons this survey generates the lowest number of admitted users: respondents are unwilling to admit an illegal activity to an agency of the federal government, or the survey is out of date (performed in 2012) and cannabis use has increased dramatically over the past five years. Estimates of annual demand for Saskatchewan based on the Canadian Community health survey range from a low of 7 tonnes up to 17.7 tonnes (Table 4.4). Based on the date of and agency conducting the survey, this range should be treated as an absolute minimum.

Table 4.4: Demand Estimate #1

Frequency Days per Month	Users (SK)	% of Users	Lower Bound Days per Year	Lower Bound Grams per Day	Lower Bound Total Kg per Year	Upper Bound Days per Year	Upper Bound Grams per Day	Upper Bound Total Kg per Year
<1	29,738	32	6	0.20	35.7	11	0.60	196
1	6,505	7	12	0.43	33.6	12	0.95	74
2 to 3	10,223	11	24	0.43	105.5	36	0.95	350
Once a Week	8,364	9	52	0.43	187.0	52	0.95	413
More than Once a Week	19,516	21	8	0.43	872.7	240	0.95	4,450

Source: Canadian Community Health Survey (Mental Health, Statistics Canada). 2012

4.42 DEMAND ESTIMATE #2: LOW- TO MID-RANGE (Cannabis Consumer Update)

A more recent survey conducted by Lighthouse Consulting on behalf of Cannabis Consumer Update (an advocacy group) was conducted in 2016, and includes just 360 respondents aged 18 and up (Freeman 2016). The small sample means the results should be treated with caution. The survey finds that 61 per cent of Canadians between 18-34 years old and 42 per cent of those over 35 have tried cannabis at some point (Freeman 2016). The survey also found that about one-third of cannabis users have used cannabis in the past 12 months (Freeman 2016). Based on these numbers, 142,107 people in Saskatchewan have used cannabis in the past year. Based on this survey, demand will be no lower than 10.7 tonnes and could easily reach as much as 27 tonnes per year (Table 4.5).

Table 4.5: Demand Estimate #2

Frequency Days per Month	Users (SK)	% of Users	Lower Bound Days per Year	Lower Bound Grams per Day	Lower Bound Total Kg per Year	Upper Bound Days per Year	Upper Bound Grams per Day	Upper Bound Total Kg per Year
<1	45,474	32	6	0.20	54.6	11	0.60	300
1	9,947	7	12	0.43	51.3	12	0.95	113
2 to 3	15,632	11	24	0.43	161.3	36	0.95	535
Once a Week	12,790	9	52	0.43	286.0	52	0.95	632
More than Once a Week	29,842	21	104	0.43	1,334.6	240	0.95	6,804
Almost Every Day	27,000	19	252	1.30	8,845.3	365	1.90	18,725
Total SK Demand					10,733			27,109

Source: Lighthouse Consulting for Cannabis Consumer Update. 2016

4.43 DEMAND ESTIMATE #3: HIGH (Deloitte)

In 2016, consulting group Deloitte conducted a national survey of 5000 people, and reported that 22 per cent of the population aged 19 and over were current cannabis users (Deloitte Touche Tohmatsu Limited 2016). This differs from previous studies in that it identifies adult-usage users as distinct from medical users. 22 per cent of the population aged 19 and over corresponds to 192,122 Saskatchewan residents being users of cannabis. The survey likely provides the best estimate of demand for adult-usage cannabis due to it being recent, being conducted by a non-government agency, and having a large sample size.

Estimates based on the Deloitte survey yield a lower bound of 21 tonnes and an upper bound of 66 tonnes per year (Table 4.6). The divergence between the upper and lower bound is driven primarily by daily users, who have the widest range of grams consumed per use day.

Table 4.6: Demand Estimate #3

			Lower Bound			Upper Bound		
Frequency Days per Month	Users (SK)	% of Users	Days per Year	Grams per Day	Total Kg per Year	Days per Year	Grams per Day	Total Kg per Year
Occasional	69,863	36	6	0.20	84	11	0.60	461
Monthly	26,198	14	12	0.43	135	36	0.95	896
Weekly	34,931	18	52	0.43	781	336	1.90	22,300
Daily	61,130	32	252	1.30	20,026	365	1.90	42,393
Total SK Demand					21,026			66,051

Source: Deloitte (RIWI Corp.) 2016

4.44 DEMAND ESTIMATE #4: MID- TO HIGH-RANGE (Colorado)

Finally, rather than using a survey of Canadians to establish the number of cannabis users in Saskatchewan, we assume usage rates in Saskatchewan after legalization will be the same as those in Colorado, where adult-usage cannabis consumption is legal. The resulting estimate of total demand (from 21 to 42.5 tonnes per year) is consistent with the estimated range based on the survey by Deloitte.

Table 4.7: Demand Estimate #4

			Lower Bound			Upper Bound		
Frequency Days per Month	Users (SK)	% of Users	Days per Year	Grams per Day	Total Kg per Year	Days per Year	Grams per Day	Total Kg per Year
<1	66,629	33	6	0.20	80	12	0.60	480
1 to 5	49,130	24	12	0.43	254	60	0.95	2,800
6 to 10	12,134	6	72	0.43	376	120	0.95	1,383
11 to 15	12,035	6	132	0.43	683	180	0.95	2,058
16 to 20	12,543	6	192	0.43	1,036	240	0.95	2,860
21 to 25	5,602	3	252	0.43	607	300	0.95	1,597
26 to 31	45,174	22	312	1.30	18,322	365	1.90	31,328
Total SK Demand					21,357			42,506

Source: Usage Identical to Colorado 2016

Given that three of the four estimated demand ranges include the range of 21 tonnes to 27 tonnes, we use this as our estimated minimum demand for Saskatchewan. In calculations of the tax revenue and economic impact, we used 25 tonnes. This is likely a conservative estimate of post legalization demand for cannabis in the province.

4.5 LEGAL SUPPLY OF CANNABIS:

4.51 SASKATCHEWAN

We estimate the supply of cannabis only from producers currently licensed by Health Canada, as this represents the producers who will continue to supply cannabis immediately upon legalization. Experience in other jurisdictions, including Colorado and California, suggest that after legalization, supply will change only as rapidly as regulation allows.

At the time of writing, there are 67 licensed producers in Canada, three of which operate facilities in Saskatchewan (Table 4.8). These licenses technically only allow for the production of medicinal cannabis, but it is expected that this restriction will be relaxed by Health Canada after adult-usage is legalized.

The Government of Saskatchewan will be able to exercise the most control over producers within its jurisdiction, followed by those in other parts of the country. The government will have little influence over the quality and safety of products produced outside the country. Thus, in the interest of assessing the supply mostly likely to meet the needs of public safety, we assess only the Saskatchewan-produced supply.

The current Saskatchewan annual supply (see next page) is just 1.4 tonnes of cannabis, compared to an absolute minimum provincial demand of 7 tonnes and a likely demand of at least 25 tonnes. It is highly likely that there will be a shortage of legal cannabis immediately following legalization of adult-usage.

The currently licensed producers have plans in place to expand their operations, but it is not immediately obvious how quickly those plans can be implemented and the potential supply realized. If and when phases of expansion are realized, currently licensed producers in Saskatchewan will have a maximum capacity of 36.6 tonnes, which may be sufficient to meet post-legalization demand. This capacity will not be available immediately upon legalization. Thus there will be a shortage of cannabis legally produced in Saskatchewan at the time of legalization.

Licensed Producer	Greenhouse	Current	Stated
CanniMed Ltd.	Saskatoon	1428 kg	12,000 kg
rTrees Producers LTD. (Tweed Grasslands)	Yorkton	0 kg	12,857 kg
United Greeneries Inc.	Lucky Lake	0 kg	11,700 kg
Total		1428 kg	36,557 kg

Table 4.8: Saskatchewan Producers
Source: Adapted from Alberta. (2017). Alberta's approach to cannabis legalization. Retrieved from https://www.alberta.ca/cannabis-legalization.aspx.

4.52 CANADA

Nationally, the picture looks very similar. Deloitte estimates national demand between 600 tonnes and 1,000 tonnes per year, immediately following legalization (Deloitte Touche Tohmatsu Limited 2016). Current production is 69 tonnes, with a planned capacity of 1,371 tonnes per year if all projected expansions are approved by Health Canada. A shortage of cannabis will occur upon legalization. Keeping in mind that all current production (70 tonnes nationally) is ear marked for medicinal consumption, a sustained shortage in the adult-usage market is likely.

The implication is clear: If Saskatchewan is to eliminate the illicit market for cannabis, legalization alone will not be sufficient, as there will be a shortage of cannabis produced legally in Canada. To meet adult-usage demand with legally produced cannabis, products will have to be imported from outside Canada. Importation of cannabis provides a specific challenge to public safety and the exclusion of illicit producers. This will have to be addressed in the policies developed by the Government of Saskatchewan regarding the cannabis market.

4.6 CONCLUSIONS

4.61 OPPORTUNITY FOR SASKATCHEWAN

The legalization of adult-usage cannabis represents an excellent opportunity for Saskatchewan to become a world leader in the production and export of cannabis and to become an innovator in the implementation of a market-based approach to the responsible regulation of adult-usage cannabis. Capitalizing on this opportunity will require the right mix of government involvement and private ownership to align market forces with regulation so as to minimize the social harms and maximize the economic benefit of the soon-to-be-legal cannabis industry. The optimal regulatory framework will align market forces to compete with illicit market sellers, distributors, and producers, ensure only safe legal cannabis is sold in Saskatchewan to adults, and

to ensure innovation and economic growth is maximized. The elimination or minimization of the illicit market is imperative to ensuring that a legal market for cannabis improves public safety and that all of Saskatchewan benefits from the economic activity associated with the cannabis industry which currently benefits only those prepared to break the law.

4.62 DISPLACEMENT OF THE ILLICIT MARKET

Despite the profusion of resources currently devoted to policing and enforcement, the illicit cannabis market currently supplies tonnes of cannabis to both youth and adult consumers. Legalization or other legislation will not suddenly increase effectiveness of policing and enforcement of illicit activity in the market for cannabis. Therefore, regulation alone will not enhance public safety by displacing the illicit market. As such, the optimal policy choice will need to facilitate the legal market's ability to shift current demand for illicit cannabis to the legal market. Capturing cannabis demand rests on the legal industry's ability to provide a wide variety of high-quality, safe and tested cannabis at a lower price than what can be found in the illicit market. Although price and safety are similar under publicly- and privately-owned retailers (assuming a single distributor tasked with testing and inventory tracking), privately-run retailers are better-positioned to provide greater variety and likely higher-quality cannabis than publicly-owned retailers. The adjustment of firms' product range to the preferences of their consumers is a natural outcome of any profit-seeking firm operating in a competitive market. As long as the market price is reasonably competitive, regulating limited private retailers will leverage market forces to eliminate the illicit market as legal market participants pursue profit.

Capturing cannabis demand rests on the legal industry's ability to provide a wide variety of high-quality, safe and tested cannabis at a lower price than what can be found in the illicit market.

4.63 REGULATED CENTRAL DISTRIBUTOR

A crucial part of the optimal regulatory framework is a single distributor generating economies of scale through testing, inventory management and tracking, sourcing supply, and shipping and receiving operations. In addition, a central distributor provides a single point of concentration for all cannabis sold in the province. This increases the effectiveness and reduces the costs of testing and regulatory enforcement throughout the supply chain and ensures only safe, legally-produced cannabis is sold in Saskatchewan. Public ownership of the distributor removes the profit motive and will lead to lower costs of monitoring and enforcing as fewer resources will need to be devoted to ensuring that the distributor is not evading regulations or best practices to reduce costs. Either public or private distributors can provide the benefits of educational and awareness programs.

The real benefits of choosing a private option over public for distribution is aligning the pursuit of profit to facilitate a robust and innovative cannabis industry in Saskatchewan including production, retail, support services, and supplier products and services. A profit-seeking distributor will work towards reducing shortages of cannabis through sourcing strategies and supplying retailers with the highest quality and lowest price cannabis. Mandating the distributor to provide independent testing, packaging and labelling will allow the distributor to work with local firms to develop a leading cannabis production industry in Saskatchewan with an ability to import cannabis during shortages and to export cannabis during surpluses.

Although a private distributor promises to generate substantially more economic benefit and be more effective at displacing the illicit market, the benefits of public ownership with respect to monitoring and enforcing regulations around testing, labelling, and ensuring the effective regulation of the supply chain from seed to sale are also substantial. As such, it is recommended that the single distributor be regulated with enough public involvement to ensure cost-effective monitoring and enforcement of regulations. A strong regulatory relationship between a private firm and the government in distribution provides the government with enough control of operations to enforce regulations and safety, while aligning the pursuit of profit with Saskatchewan's position as an innovative, competitive leader in the production of cannabis and the responsible regulation of the cannabis industry. It is recommended that the government issue an RFP to private firms interested in developing a public/private partnership with the requirement that proposals contain solutions for the displacement of the illicit market, protection of the public, restriction of access by youth, and accelerated development of the cannabis industry in Saskatchewan. In addition, the government, in conjunction with the private distributor, may want to investigate options related to partnerships with other provinces. The western Canadian provinces serve as excellent candidates for partnership in distribution to maximize economies of scale and build a stronger import and export presence.

4.64 PRIVATE RETAIL

A privately-owned retail model versus a publicly-owned retail model has a few risks: slightly higher youth access to cannabis and increased monitoring and enforcement costs. However, given private retailers' ability to displace the illicit market and thereby reduce youth access, improve public safety, and foster economic growth, the benefits of private ownership outweigh the costs of slightly higher youth access and compliance costs. Therefore, regardless of the choice of public versus private distribution, it is recommended that the government pursue limited licensing of private retailers to minimize the illicit market and improve the wellbeing and economic prosperity of the people

of Saskatchewan. A system of limited private retailers granted zoned licenses, much like those currently granted for the sale of beverage alcohol, will limit outlet density, simplify monitoring and enforcement, and ensure that retail outlets have an incentive to compete effectively with the illicit market.

4.65 HOME CULTIVATION

In addition to a regulatory framework consisting of private retailers with a public/private distributor, it is recommended that the government maintain the Federal government's regulation allowing home grown cultivation within the defined limits. With respect to youth access within homes, regulation and strict penalties can hold parents responsible for securing cannabis in the home and for securing any homegrown production. The other option for homegrown cannabis is to continue with prohibition. However, individuals who currently grow cannabis within their homes have chosen to do this despite the current prohibition and will likely have more incentive to continue after legalization, as it will no longer be the production of an illicit good. Furthermore, consumers who have preferences towards non-commercially grown cannabis may decide, if homegrown cannabis is allowed, to leave the illicit market and grow their own, leading to the benefits of reducing the size of the illicit market including reduced to access for youth.

The recommended regulatory framework for retail and distribution, combined with the other recommendations, provides the provincial government with an approach to the regulation of cannabis that utilizes the optimal mix of private and public involvement which will best position Saskatchewan as an innovative leader in the responsible regulation of legal cannabis. The approach aligns market forces and regulation to compete with and eliminate the illicit market for cannabis, limit youth access, ensure public safety, and allow Saskatchewan to be regarded as an innovator in the production, distribution, and retail of cannabis while extracting the maximum economic benefit from this new industry for the people of the province.

05

Comparative Analysis

Photo credits: iStock by Getty images

Comparative Analysis

There are a number of lessons that can be drawn from other jurisdictional experiences with the legalization of cannabis and its impacts on the retail sector. In the U.S., a number of states have adopted regulatory regimes that mirror controls on alcohol and seek *profit maximization*. In Uruguay, regulatory instruments were designed based on the WHO Framework Convention on Tobacco Control (FCTC) and on the country's existing alcohol regulations. As a result of the *demand reduction* approach, cannabis is only sold through government pharmacies with public health the priority. Comparing these various jurisdictional approaches will provide insight into existing best practices, undesirable policy design outcomes, and a failure to protect public well-being. This chapter explores the current and proposed Canadian context and compares it to Colorado, Washington, Oregon and Uruguay. Through these comparisons, the chapter provides a synopsis of evaluative research regarding health and social outcomes, impaired driving and economic impacts from jurisdictions that have previously legalized adult usage cannabis.

5.1 THE CANADIAN CONTEXT

Already-occurring cannabis markets exist in all provinces of Canada. With the medical cannabis sector in existence since the beginning of the 2000s, a market has popped up, both legally and illegally, to sell cannabis and cannabis paraphernalia. The illicit market has existed in Canada for over a century. Legally, there are 16 and 39 authorized licensed producers within British Columbia and Ontario, respectively, whereas the rest of Canada has 14 producers total (Government of Canada 2017j). Illegally, British Columbia has the largest industry out of all provinces, with sales estimated to be at least $443 million annually (Werb 2012). Most provinces have some form of legal market, whereas all Canadian jurisdictions have an illicit market for cannabis.

The Province of Saskatchewan completed a survey that will assist in the preparation of provincial regulatory framework for Saskatchewan residents over 18 years of age that ended on October 6, 2017. Legislation is expected to be unveiled in the Spring 2018 session, ahead of the expected July 1, 2018 legalization date set by the federal government. Areas of focus for the provincial government are around the sale and distribution of cannabis. In addition to these issues, the provincial government has questions around taxation, workplace health and safety, and impaired driving. When asked if the provincial government would sell cannabis through a retail government model, Minister of Justice and Attorney General, Don Morgan, replied, "We haven't made any decision as to whether that would be something that would be a strong contender for consideration here. I suspect we would probably be looking at other options" (CBC News 2017). This suggests the Government of Saskatchewan is not interested in pursuing a retail government model similar to the recently announced direction from the Ontario provincial government.

On June 2, 2017, Manitoba was the first province to enact tougher laws on cannabis, through passing *The Cannabis Harm Prevention Act* (2017), regulating where cannabis can be consumed and stored, as well as amending other legislation to encompass cannabis. This past summer, Manitoba sought out a company to complete a public consultation survey on cannabis consumption and possible rules. The Liquor and Gaming Authority believe the survey results can shape the Manitoba regulatory framework for cannabis (Lambert 2017). They then issued an expression of interest in late July to figure out who is interested in producing cannabis, to understand market interest. The intent is to learn about responsible use and how to minimize harm.

In British Columbia, the issue of illegal licensed retail outlets occurred before there was an issue in Ontario. It was not a priority for police to enforce the drug laws—British Columbians are less likely to be ticketed or investigated for criminal charges than the rest of the country (Cotter, Greenland, and Karam 2015)—so bylaws were created to attempt to curb the illegal retail stores (Miller 2016). While Ontario does not have any bylaws, the bylaws in British Columbia prohibit licensed retail outlets from operating within 300 metres of schools, community centres, or other licensed retail outlets (City of Vancouver 2017). In the beginning of 2017, the Supreme Court of British Columbia agreed that municipalities have the right to control retail stores with licensing and zoning bylaws (Abbotsford (City) v. Mary Jane's Glass and Gifts Ltd. 2017).

In Ontario, with the current legal market being so large, it will be an easy transition into the adult-usage market. However, Ontario has a lot of illegal stores that have recently opened up around the province in anticipation of legalization. The province responded by declaring them illegal and stating that the new provincial plan will establish government-run physical stores only, in order to control the cannabis market (Miller 2017). In studying Canada's experience with medicinal cannabis, it was found that fewer than 10 per cent of authorized individuals bought from government-contracted or licensed producers, due to a lack of product choice and price (Task Force 2016). This is a problem not only in Ontario, as illegal retail operations are emerging in many locations across Canada.

The Alberta provincial government completed a public consultation survey between June 2 and July 31, 2017. Currently, input from the survey is under review, with a draft of the Alberta Cannabis Framework released in October 2017 (Alberta 2017). In the draft framework Minister of Justice and Solicitor General Kathleen Ganley, indicates that work public engagement will be on-going to ascertain what Albertans think about health concerns, workplace safety, drug-impaired driving, legal age, distribution, and sale of cannabis. The Alberta Cannabis Framework will seek further public and stakeholder opinion prior to implementation in July 2018.

As already discussed, the proposed federal legislation downloads some responsibility to the provinces and territories and municipalities. Table 5.1 outlines the different jurisdictional responsibilities:

Table 5.1: Jurisdictional Responsibilities

Activity	Responsibility		
	Federal	Provincial	Municipal
Possession limits *	▯		
Trafficking	▯		
Advertisement and packaging *	▯		
Impaired driving	▯	▯	
Medical cannabis	▯		
Seed-to-sale tracking system	▯		
Production (cultivation and processing)	▯		
Age limit (federal minimum) *	▯		
Public health	▯	▯	
Education	▯	▯	▯
Taxation	▯	▯	▯
Home cultivation (growing plants at home) *	▯		
Workplace safety		▯	
Distribution and wholesaling		▯	
Retail model		▯	
Retail location and rules		▯	▯
Regulatory compliance	▯	▯	
Public consumption		▯	▯
Land use/zoning			▯

** Provinces will have the ability to strengthen legislation for these areas under federal jurisdiction.*
Source: Adapted from the Alberta Government (2017) on the roles of provinces.

In the last couple of months since the proposed legislation by the federal government, all jurisdictions have held public consultations, whether through surveys or through hearings, to find out public opinion before creating any sort of framework or legislation for the fall (National Post 2017). Only the jurisdictions of Alberta, New Brunswick and Ontario, however, have publicized how the cannabis sector may be regulated within their province (Table 5.2). With the exception of making some minor changes to land use bylaws, once the provinces have published their regulations, municipalities plan on providing further public engagement.

A strong market, like the craft beer industry, includes both small- and large-scale of production firms. With adult-usage cannabis still being illegal, there is a definitive difference between the two

Table 5.2: Proposed Regulation of Cannabis by Jurisdiction

Regulation	Jurisdiction		
	Alberta	New Brunswick	Ontario
Minimum age	18	19	19
Possession limit	Same as Federal, 30g	Same as Federal, 30g	Same as Federal, 30g
Additional driving legislation	Maybe	Align with Federal	Yes
Similar to alcohol penalties	Yes	Yes	No
Prohibited in public spaces	Same as alcohol, vaping, and smoking	Same as alcohol, vaping, and smoking	Same as alcohol, vaping, and smoking
Workplace safety	Recognizes harm	Recognizes harm	Education initiatives
Distribution Model	Government-regulated	Government-regulated	Government-regulated
Retail model	Unknown1	Crown Corporation under liquor board	Crown Corporation under liquor board
Sold with liquor	No	No	No
Online sales	No	Unknown	Yes, similar to online alcohol sales
Minimum age of labourers	18	19	Unknown
Training to sell cannabis	Yes	Yes	Yes
Advertising restrictions	Align with Federal, similar to tobacco	Align with Federal, similar to tobacco	Align with Federal, similar to tobacco
Taxation	Wait for federal and other provinces	Wait for federal and other provinces	Wait for federal and other provinces
Discount pricing and bulk purchases	Unknown	No	Unknown
Price based on concentration	Unknown	Hierarchical	Unknown
How to use revenue	Unknown	Fund health-related programs and develop education and prevention campaigns	Unknown
Home cultivation	Yes	Yes	Unknown
In a private, secure location	Yes	Yes	Unknown
Limited by landlord	Yes	Yes	Unknown

Note: These regulations are all preliminary and have not been passed through legislation, so additional regulations will be enforced. Alberta makes reference to a possibility of implementing programs and services in the future.
1 Options provided for further consultation.
Source: Alberta Government (2017); Province of New Brunswick (2017); Ministry of the Attorney General (2017); Ministry of Finance (2017).

in the cannabis market. The legal medicinal cannabis market will easily transition into the adult-usage market, despite there being different legislation for each. These are considered the large-scale production firms, whereas the small-scale production firms would be considered the local craft market or, to politicians and law enforcement, the illicit market.

There are current fears from the craft market that the coming of legalization would eliminate the craft market and harm local economies that rely on the employment in the illicit market (England 2017). On the other hand, the illicit market shows a lot of unknowns, such as a lack of controls in growing and distributing cannabis, and the government has vowed to eliminate it for public health and safety purposes (Solomon, Chamberlain Al-Azem 2017). The illicit market is not one cohesive group, with varying perceptions arising from various members. There is the organized crime element that seeks maximum profits, and there is the individual craft side that also seeks profit but with a somewhat altruistic purpose (Hough et al. 2003).

As some cannabis from the legal medicinal market moves towards illegal dispensaries (Hutchinson 2017), it must be recognized that legalization does not totally eliminate the illicit market. Because there are economic benefits to be derived from including the small-scale production firms in the cannabis market (Hajizadeh 2016), greater toleration of these firms should be considered with legalization as the "least worst cannabis markets," to satisfy the consumer and reduce organized crime (Decorte 2010, 271).

5.2 THE AMERICAN CONTEXT

In the U.S., federal law does not recognize the lawful use of cannabis for medical or adult-usage purposes. While some states, such a Colorado, legalized cannabis in 2000, the Bush Administration's federal drug enforcement priority was focused on raiding medical dispensaries, which slowed the implementation and administration of legal cannabis. Under the Obama Administration, federal direction minimized dedicated resources for individuals using medical cannabis in states that decided to legalize adult usage. As of January 2018, eight states will have legalized both medical and adult-usage cannabis, while 20 have only legalized medical cannabis (Table 5.3). States' legislative activities vary significantly across the country. For example in Alabama, possession of cannabis is a misdemeanor while cultivation is illegal and sale a felony; in Illinois, medical cannabis possession, sales, and cultivation are all treated as misdemeanors. There are also several Native-American reservations that have legalized the possession and sale of cannabis, including the Flandreau Santee Sioux Tribe (South Dakota), the Suquamish Tribe (Washington State), and the Squaxin Island Tribe (Washington State). In addition, the District of Columbia fully legalized cannabis in 2014.

Table 5.3: State Cannabis Legalization

Activity	Medical Legal	Adult-usage Legal	De-criminalized	Illegal
Alabama	☐			
Alaska	☐	☐		
Arizona	☐			
Arkansas	☐			
California	☐ *(Jan 2018)*	☐ *(Jan 2018)*		
Colorado	☐	☐		
Connecticut			☐ *(medical)*	
Delaware			☐ *(medical)*	
District of Columbia	☐	☐		
Florida	☐			
Georgia	☐			
Hawaii	☐			
Idaho				☐
Illinois			☐ *(medical)*	
Indiana	☐			
Iowa	☐			
Kansas				☐
Kentucky				☐
Louisiana	☐			
Maine	☐	☐		
Maryland			☐ *(medical)*	
Massachusetts	☐	☐		
Michigan	☐			
Minnesota			☐ *(medical)*	
Mississippi			☐ *(medical)*	
Missouri				☐
Montana	☐			
Nebraska			☐ *(medical)*	
Nevada	☐	☐		
New Hampshire			☐ *(medical)*	
New Jersey	☐			
New Mexico	☐			
New York			☐	☐
North Carolina			☐	☐
North Dakota	☐			
Ohio			☐ *(medical)*	
Oklahoma	☐			
Oregon	☐	☐		
Pennsylvania	☐			
Rhode Island			☐ *(medical)*	
South Carolina				☐
South Dakota				☐
Tennessee	☐			
Texas	☐			
Utah				☐
Vermont			☐ *(medical)*	
Virginia				☐
Washington	☐	☐		
West Virginia	☐			
Wisconsin	☐			
Wyoming				☐

Source: Wikipedia 2017

There are been a number of problems for states that have fully legalized cannabis; however, the economic benefits have been significant. According to Forbes, the 2016 profits from the cannabis sector totaled $6.7 billion (Borchardt 2017b). Still, there are many challenges arising from sector. For example, banking has proven to be a major issue, as federal laws precludes banks from providing services to illegal businesses, leading many licensed retail outlets to have an excess of cash on hand in order to address their banking needs. Indeed, in Colorado, the highest industry-related crime is burglary of licensed retail outlets. Issues arising from diversion to states where cannabis has not been legalized has placed pressure on a number of bordering state's law enforcement resources. In Colorado, a lack of warehousing space has led to higher real-estate costs, which has impacted other sectors such as transportation and the devaluation of properties in areas where homelessness and pan-handling have become problematic (Leeds School of Business 2017).

There are been a number of problems for states that have fully legalized cannabis; however, the economic benefits have been significant.

5.21 COLORADO

On November 6, 2012, voters passed the Colorado Amendment 64, which led to the 2014 legalization of cannabis use and possession. The Colorado Amendment 64 was a popular initiative ballot (a petition signed by a certain minimal number of voters) that sought to amend the Colorado constitution's drug policy, making Colorado the first American jurisdiction to legalize cannabis. In Colorado, a person has to be 21 years of age to use, possess, and cultivate cannabis. Policy impacts have been both positive and negative, with the sector adding significantly to the state economy —but not without problems.

Government revenue from the sector has been considerable, with a 15 per cent excise tax, cannabis application and license fees, and a retail tax (see figure 5.1). When it was introduced, the retail tax was set at a rate of 10 per cent plus a 2.9 per cent state tax, with the state keeping 85 per cent of the revenues and local government receiving 15 per cent. In July 2017 the retail cannabis/cannabis products sales tax rate was raised to 15 per cent; however, the products are now exempt from the state sales tax (2.9 per cent). Under the new regime, the state will keep 90 per cent of revenue while local authorities will receive 10 per cent. At the state level, all revenue is reinvested in education and the construction of schools, with approximately 14 per cent redirected to prevention and treatment and 12 per cent to regulations and enforcement (Borchardt 2017a). More than $5.5 million was set aside for a public education campaign, while $1.16 million was invested in police training (Colorado 2016).

Figure 5.1: Total U.S. Government Revenue

Revenue Source (Market)	2014	2015	2016	2017	2014-2017
15% Exise Tax (Adult)	$13,341,000	$35,060,590	$61,989,401	$30,676,572	$141,064,563
10% Special Sales Tax (Adult)	$30,364,797	$57,582,832	$86,058,176	$42,555,121	$216,560,926
2% Sales Tax (Adult)	$8,822,120	$16,484,635	$24,545,403	$12,228,934	$62,081,092
2.9% Sales Tax (Medical)	$10,886,966	$11,451,375	$12,279,446	$5,147,097	$39,764,884
License/Application Fees (Both)	$12,737,585	$14,521,031	$13,652,738	$5,760,816	$46,672,170
Total Taxes and Fees	**$76,152,458**	**$135,100,463**	**$198,522,164**	**$96,368,540**	**$506,143,635**

Source: VS Strategies (2017). Colorado Exceeds $500 Million in Cannabis Revenue Since Legalization.

The economic benefits for cities and counties are significant. For example, in 2015, Denver licensed over 1,000 businesses and collected $29.5 million in revenues (City of Denver 2016). Cities and counties across Colorado are reinvesting revenues in a variety of local priorities ranging from scholarships to supports for homelessness to infrastructure needs such as schools and adult-usage centers (Illescas 2016). However, not all municipalities are on board with the legalization of cannabis. The City of Golden, Colorado, for example, banned all adult-usage cannabis shops and usage within city limits (Klemaier 2014). In Colorado Springs, the second most populous city in the state, there is complete prohibition of adult-usage cannabis with only medical dispensaries permitted.

In an attempt to mitigate negative outcomes, the state has adopted a multi-sectoral approach, anchored by the Governor's Office of Marijuana Coordination, which is responsible for leading collaboration and the oversight of implementation. The main five departmental partners of the collaboration and their specific mandates are listed below.

- Department of Education
  - –Dropout prevention
  - –Substance abuse prevention

- Department of Human Services
  - –Child protection
  - –Substance abuse prevention
  - –Substance abuse treatment

- Department of Public Health and Environment
  - –The Medical Marijuana Registry
  - –Funding medical Cannabis research
  - –Monitoring health effects
  - –Monitoring retail marijuana trends
  - –Public education

- Department of Revenue
  - –Regulatory oversight of both medical and retail marijuana
  - –Licensing for businesses
  - –Taxes

- Department of Transportation
  - –Implementing prevention strategies for drug-impaired driving

Public consumption, whether through smoking or edibles, is prohibited due to existing smoke-free policies. Access is controlled through restricted hours of operation (8am to 12pm) and by prohibiting anyone under the age of 21 from entering retail outlets. Any advertising aimed at youth is banned, as is any outdoor advertising. Still, billboards asking "Need Weed?" and "Best Kush in Denver" proliferate.

Colorado borrowed extensively from the medical cannabis regulatory system, which was expanded to guide adult-usage. The medical system has been plagued with a range of implementation problems leading to some serious performance issues (Office of the State Auditor of Colorado. 2013). Medical cannabis has been legal in Colorado since 2000; however, there was no regulatory framework in place for a decade. Policy makers decided to build on the existing legislative frameworks in the development of a commercial cannabis system. Similar to medical cannabis, reaction cannabis must comply with a seed-to-sale registry system called the Marijuana Enforcement Tracking Reporting Compliance (METRC). METRC is a closed loop regulatory regime that tracks cannabis production, distribution, and retailing from the seed to the commercial sale. The system was designed and implemented by the Colorado Department of Revenue's Marijuana Enforcement Division. Current challenges with this system include poor integration of the retail and bureaucratic systems, privacy concerns around data sharing, and a lack of funding.

The impacts of commercial cannabis in Colorado have been considerable. In 2014, the first year adult-usage was legalized, visits to hospital emergency rooms for cannabis-related health problems rose 29 per cent (Wong and Clarke 2015). Assessing the health impact of adult-usage cannabis has been very challenging due to deficient baseline data, a lack of a shared definition for prevalence, frequency and type of usage, and inconsistent administrative codes in hospital data sets (Ghosh et al. 2016). In 2014 in Denver, the first year of retailing, cannabis-related traffic deaths jumped 32 per cent in one year, while driving under the influence of drugs charges rose 100 per cent (from 33 to 66) (Wong and Clarke 2015). These issues were expected by policy-makers, as evidenced in decisions to reinvest taxes in health and impaired driving initiatives.

The Colorado cannabis sector has also been responsible for a number of unexpected consequences, including a rise in homelessness, a decrease in the effectiveness of drug-sniffing dogs, grey market emergence due to issues with taxation, negative impacts on bordering states, and trouble measuring crime. In Denver in particular, legalization has led to an influx of homeless adults between 18 to 26 years of age, which in turn is placing pressure on existing social supports (McGhee 2014). Drug-sniffing dogs have been trained to detect a cadre of illicit substances including cannabis, leaving canine supports in drug detection ineffectual. States bordering Colorado have also experienced an impact, with greater demand placed on law enforcement due to diversion of cannabis to other states (Wong and Clarke 2015). Early implementation of a data collection system, prior to legalization, will help Saskatchewan better understand the impact this shift will have on crime. Failure to do this in Colorado has led to difficulties in measuring impacts and undertaking planning (Police Foundation 2016).

5.22 WASHINGTON

Washington legalized cannabis in November 2012 through Amendment 64 and Initiative I-502. While the Washington case shares a number of similarities with Colorado, there are also some notable differences. Washington has a higher rate of taxation and stricter policies for production and sales (Hawken et al. 2013). Similarities include a minimum purchase age of 21, and that it may not be used in public spaces. Some differences are that Washington does not permit growth of plants for personal use

and that there was not a pre-existing infrastructure supporting medical use of cannabis. Cannabis sales began in Washington on July 8, 2014 (Canadian Centre on Substance Abuse 2015).

In terms of retail sales, the Washington State Liquor and Cannabis Board supervises regulation and licensing for distribution. Hours of operation, the number of distributors, and whether to offer any product sales are determined by municipal governments. Both dried cannabis and infused products are available for purchase but can only be sold by licensed individuals who have lived in the state for a minimum of three months. It is well understood from the alcohol industry that increased availability results in higher use. Therefore, Washington chose to restrict the number of available licenses to sell cannabis and to institute geographical requirements (e.g. minimum distance from schools). This has resulted in retail locations being predominantly in industrial areas and other inconvenient locations for customers. The I-502 benefit-cost analysis (September 2017) shows that retail sales have grown between June 2014 and June 2017, with the first half of 2017 resulting in $437.9 million in sales as compared to the last half of 2014 with $40.7 million in sales. This demonstrates a significant increase in sales over only a few years.

Cannabis remains a scheduled substance for the U.S. federal government and therefore, state governments must take responsibility for regulation, inspection, and enforcement in the cannabis sector. This has created some challenges with enforcement on waterways, which are under federal Coast Guard regulation. Outside of the jurisdictional confusion on the waterways, Washington has established other regulatory legislation to minimize public harm. In Washington, cannabis use is not allowed in public areas and there are strict regulations for promotion and advertising. Edibles in the form of "candy" are not permitted for retail sale, in an attempt to minimize youth interest. Misdemeanor possession offenses dropped from 5000 cases in 2012 to 120 cases in 2013 (Roffman 2016). Drivers are considered impaired when blood concentration reaches 5 nanograms/ml. The Washington medical cannabis regulatory framework was not well established initially, and many changes have taken place to align with the retail system. Washington had the advantage of learning from challenges that emerged in Colorado after legalization of adult usage cannabis.

One main goal for legalizing cannabis in Washington has been to move from a corrections and enforcement perspective to one of health promotion. Taxation revenue was allotted for public awareness campaigns and supports for the health system, but there was a delay between when revenue was obtained compared to when public education was most needed. Furthermore, Washington chose to reallocate tax revenue that was initially planned for cannabis-related prevention into a general fund. This budget process detracted from the potential public health benefits that may have taken place. Taxation on cannabis changed in July 2015 to a 37 per cent tax at the purchase point, in addition to state and local sales taxes. This change was made so that retailers could claim the taxes as a business expense for their own corporate taxes.

One main goal for legalizing cannabis in Washington has been to move from a corrections and enforcement perspective to one of health promotion.

Stakeholders identified a gap in coordinated leadership within the state, which many feel would have improved implementation and understanding across sectors. Washington has experienced difficulties with having a double set of regulatory standards between the retail sales and the medical cannabis industry, which has contributed to an illicit market that is unauthorized though not necessarily illegal. It took about two years for Washington to better align the medical and retail cannabis sectors, which occurred in July 2016.

Concerns about the high levels of THC in plants and oil extracts became a problem in Washington shortly after legalization, leading to discussions about limiting THC levels, differential taxation according to THC content, and restricting edibles that appear to be candy, in the best interest of youth.

Law enforcement in Washington has adapted to cannabis legalization both positively and negatively. Initially, officers did not consider it important to respond to minor transgressions (i.e. smoking cannabis in public), which created a problem. However, a great deal of capacity planning occurred prior to legalization to prepare medical labs and methods of detecting impaired driving, which has been helpful.

Research into the wide gaps on cannabis-related information has been identified as a priority. Stakeholders in Washington retrospectively identified a lack of baseline data to conduct future research that could better understand the impact of cannabis legalization. This hindsight recognition that Washington lacked baseline data prior to legalization is a lesson for Saskatchewan.

A benefit-cost analysis of I-502 released in September 2017 shows that cannabis addiction treatment rates have been unaffected by Washington's legalization (Darnell and Bitney 2017). However, it also found that counties with higher levels of retail outlets have higher numbers of cannabis users and users who identify as using it heavily. Therefore, minimizing the number of retail outlets would likely result in lower numbers of users and decreased frequency of use.

The report also indicates youth shows no increase in use of cannabis over the last 30 days since legalization in Washington (Darnell and Bitney 2017). Public understanding of the harmful effects of cannabis has remained stable and there continues to be an impression amongst youth that cannabis is difficult to obtain. It should be noted that poison control centers have received an increased volume of work from an average of 155 calls during 2011-2013 to 246 calls in 2014 (Roffman 2016).

Trends in impaired driving have become a more significant concern in Washington. For individuals ages 18-25 who self-report as cannabis users in the last 30 days, 49 per cent of them admit to driving after having used cannabis within the previous three hours (Roffman 2016). Testing for THC in fatal crashes shows a 111 per cent increase between 2014 and the average of the previous four year period (Roffman 2016).

5.23 OREGON

The state of Oregon modelled their cannabis industry based on lessons from Washington and Colorado. Therefore, many similarities exist within these regulatory frameworks. The initial vote for adult-usage use of cannabis in Oregon failed, with 53 per cent voting against the proposition in 2012 (National Academies of Sciences, Engineering and Medicine 2017). However, two years after Colorado and Washington voted to legalize cannabis, Oregon made this change in November 2014.

The Oregon Liquor Control Commission is a state-run agency charged with regulating the cannabis industry and administering licenses for retail stores. Individuals in public places may possess 1 ounce of dried plant or non-homemade cannabis concentrates, 16 ounces of solid cannabis edibles, or 72 ounces of cannabis-infused liquid, but use of these products in public places is banned. In a private residence, there is one difference, in that an individual may possess up to 8 ounces of dried cannabis. Individuals may grow up to four cannabis plants, but they must be hidden from the public, and can possess up to ten seeds at one time.

Municipal and county authorities retain the right to refuse providing local approval for cannabis licensed retail outlets. Currently, more than half the geographical space in Oregon has counties that ban cannabis sales. However, a city or town within a banned county retains the right to sell cannabis. Learning from challenges banning cannabis smoking in public places in Colorado, Oregon chose to explicitly define "public places" and the parameters of smoke-free laws, thus prohibiting private cannabis clubs (Pepin et al. 2017).

Cannabis sales in Oregon slowly grew since it was first legally sold on July 1, 2015, with revenue significantly increasing in the first part of 2017. This is at least partly related to increased availability of the product as licenses were approved and retail outlets established. Weekly sales in January 2017 ranged from $4.5 to $5.5 million (Hibpshman January/February 2017). As is the case with Colorado, cannabis producers may sell product to commercial retailers or directly to consumers (Spithoff, Emerson, and Spithoff 2015).

5.3 URUGUAY

Uruguay is the first nation to fully legalize and monopolize control of cannabis production and distribution from seed to sale. Some believe that this heavy control of the industry will minimize the development of Big Cannabis (profit by multi-national corporations) unlike the conditions in the U.S.. Uruguay's legalization of cannabis was government-led, with a desire to minimize harmful health effects within the public, resulting in a different framework than decisions focused on economics, corrections and justice, or policy changes initiated by the public (as is the case in the U.S.). Advertising is required by the national health and education systems about available treatments and preventative measures (Pardo 2014). Tax revenue from cannabis directly funds a public health campaign. Uruguay established a specific cannabis control authority associated with central government that oversees production, quality, and pricing, and sells to distributers because it did not have a pre-existing authority related to other industries, such as alcohol (Pardo 2014; Spithoff, Emerson, and Spithoff 2015). This authority has the power to sell cannabis cheaply to undercut the illegal market; it initially sold cannabis tax free to diminish the existing illicit market. Promotion of cannabis products is strictly prohibited, and the country is also attempting to minimize drug tourism, unlike American states that have legalized the product (Pardo 2014).

Cannabis users in Uruguay must declare and register which method of supply they will use to obtain the product. Licensed pharmacies sell bulk cannabis that is packaged in plain bags with labels warning about the THC levels. Individuals may purchase a total of 10 g per week, which is less than typical heavy use. Other options include growing cannabis or joining a cannabis co-operative "club". Self-growing is heavily regulated and these individuals require registration and fingerprinting. There are concerns that this level of regulation may encourage illicit market involvement (Spithoff, Emerson, and Spithoff 2015). One household is allowed up to six flowering plants to a maximum harvest of 480 g per annum, regardless of the number of residents in the home (Pardo 2014). Members of private cannabis clubs are permitted to grow a cumulative maximum of 99 plants per year to be used by a group of 15 to 45 members (Pardo 2014; Queirolo, Boidi, and Cruz 2015). These clubs are designated for private use, are non-profit, and are the least preferred option for regular cannabis users. They did not exist prior to legalization and were not considered in the first draft of policies developed to regulate this industry (Queirolo, Boidi, and Cruz 2015).

Administration processes for establishing a legal cannabis club are complex, lengthy and sometimes confusing for residents. People seek membership in these clubs as a means to access high quality cannabis and develop a mechanism for activism (Queirolo, Boidi, and Cruz 2015). While many countries have cannabis clubs, Uruguay was the first nation to establish a legal framework to regulate this practice. However, the cannabis club regulation process has been fraught with institutional challenges such as delays, discoordination, and miscommunication.

Cannabis impaired driving is illegal when blood cannabis levels exceed 10 ng/ml (Spithoff, Emerson, and Spithoff 2015). This contributes to strict impaired driving laws in combination with a zero tolerance for alcohol impaired driving. Uruguay's legislation of adult usage cannabis has been shaped by laws and regulations with the explicit intent to minimize the illicit market and maximize citizen well-being. Uruguay's framework offers a comparison that differs from the similar approaches found in Colorado, Washington and Oregon and demonstrates the necessity of considering local context.

5.4 COMPARATIVE ANALYSIS

There are many jurisdictions that have decriminalized possession and cultivation of certain amounts of cannabis, but there are few jurisdictions that have made private possession and cultivation legal, besides medicinal cannabis legislation, along with regulated sale and transport (read OAS (2014) or Health Technology Assessment Unit (HTAU (2017) for a detailed legislative comparison). There are several jurisdictions that are comparable to the proposed legislation Canada will bring in in July 2018, including Uruguay, Colorado, Oregon, and Washington (see Table 5.4). For these jurisdictions, legalization does not include regulations surrounding medical cannabis or decriminalization, nor does it include infractions that are not investigated nor prosecuted (i.e. not investigating possession for under a certain amount, like the Netherlands). While Canada is proposing the use of a harm reduction approach in regards to justice, regardless of whether a jurisdiction chooses to ignore a minor infraction, decriminalization is not the same as legalization. Legalization means that adults are able to purchase, possess, and use cannabis without any sort of criminal prosecution, while decriminalization means that penalties and charges for simple possession are removed.

Table 5.4: Governance Structures and Comparison Factors by Jurisdiction

Governance Structures	Jurisdiction			
	Uruguay	Colorado	Oregon	Washington
Date of Legalization	December 2012	January 2014	July 2015	December 2012
Intent[1]	Public Safety	Ballot Initiative	Ballot Initiative	Ballot Initiative
Regulatory Board	Yes	Yes	Yes	Yes
Different governing body than alcohol/ tobacco	Yes	No	No	No
Separate governing body for medicinal	Yes	No	No	No
Comparison Factors				
Personal Cultivation	Yes	Yes	Yes	Yes
Retail Sale	Yes	Yes	Yes	Yes
Transport	Yes	Yes	Yes	Yes

Note: Other than Uruguay, both public health and safety arguments were used to justify legalizing cannabis in the U. S. To a lesser extent, the revenue motive was used as well. However, in these jurisdictions, legalization was voted in by citizens who had their own arguments for supporting legalization.
Source: Health Technology Assessment Unit (2017); Instituto de Regulación y Control del Cannabis Association (2014).

5.5 COMPARATIVE OUTCOMES OF SOCIAL INDICATORS

There are many possible social issues that could result from the legalization of cannabis. Comparison with other jurisdictions can mitigate the negative externalities from those social issues, so a direct comparison of jurisdictions before and after legalization on certain social indicators provide Saskatchewan with pertinent examples (for a detailed look, read the Colorado Department of Public Safety (2016) paper). Table 5.5 illustrates the social indicators for each of the comparable jurisdictions. Comparisons are available in prevalence of use, arrests, impaired driving, youth consumption, hospital visits, tax revenue and economic impact.

As will be established, legalization is not straight forward, and outcomes differ on a variety of factors that cannot be presented here. There are some jurisdictions that have setbacks and can move forward in a positive way, while others, due to many factors, fail to progress forward (Campbell 2017). For this reason, if one social indicator is bothersome, it should be accompanied by research to distinguish the exact reason.

5.51 PREVALENCE OF USE

As the name suggests, the prevalence of use looks at how often individuals of any age use in the past month. In the majority of comparable jurisdictions, use of cannabis has not increased after legalization of cannabis, with the exception of Colorado. Colorado experienced an increase in use since legalization; however, after public sales, the rate of use stabilized (RMPHAC 2017).

5.52 ARRESTS

Arrests include the entire cannabis sector and illicit market. As legalization is intended to significantly decrease the illicit cannabis market, it can be postulated arrests would decrease; we can see that in the majority of comparable jurisdictions, the amounts of arrests have decreased other than in Uruguay. This may be because individuals do not want to grow it or be in a national registry; it is said that cannabis is heavily regulated and pervades privacy and restricts when it can be bought (Campbell 2017). This served to maintain the demand for illicit market cannabis.

5.53 IMPAIRED DRIVING

Impaired driving under the influence of cannabis can be evaluated through observing the number of incidents where cannabis charges were laid as well as fatal accidents. Looking at the former, impaired driving while under the influence has increased for all comparable jurisdictions where data is available. This follows the positive trend of cannabis in the system since 2009; however, it is also correlated with a decrease in other drugs being responsible for motor vehicle crashes, both fatal and nonfatal (Colorado Department of Public Safety 2016).

Impaired driving under the influence of cannabis causing fatal injuries includes incidents where at least one of the drivers was under the influence. In the majority of jurisdictions, fatalities have increased, but they have remained stable in Oregon. This may be due to the fact that Oregon has a higher prevalence of use than the national average and is known to export illegal cannabis out of the state, so individuals are already well versed on the dangers of driving and have become more physiologically tolerant (Oregon State Police 2017).

5.54 YOUTH CONSUMPTION

The consumption of youth is defined by those between the ages of 12 and 18. Youth consumption has either remained stable or decreased, other than in Uruguay. As in all polls, certain papers state that use has moderately increased in some jurisdictions, such as in Washington (Cerda et al. 2017), yet, overall, there have not been significant increases in youth consumption. This corresponds to a decrease in the perceived risk of cannabis consumption after legalization (HTAU 2017; Colorado Department of Public Safety 2016; Cerda et al. 2017).

5.55 HOSPITAL VISITS

When looking at hospital visits, any cannabis-related emergency department visit was counted in the analysis. Colorado and Washington, for instance, saw an increase in burn cases after legalization due an attempt to create hash oil (HTAU 2017). However, even despite the burn cases with hash oil, there was only a slight increase in hospital visits for Colorado, whereas other jurisdictions with data show a significant increase in hospital visits.

Possibly a direct, unconscious consequence of legalization, "across all age groups and all states, there was a substantial increase in accidental cannabis ingestion" (HTAU 2017, 157). Because there is no need to hide cannabis anymore, individuals may leave their legal cannabis out where children can reach it and so it can be ingested without awareness of the consequences. Other situations may be individuals putting too much cannabis oil into home-made edibles without a strong tolerance for cannabis, or simply ingesting too much of the edible because after the first portion, the user felt no effect, so they took another and another and another.

5.56 TAX REVENUE

Tax revenue from the sale of cannabis is driven by sales taxes, excise taxes, licenses, and fees. All jurisdictions other than Uruguay have decided to tax the sale of cannabis. Because this is a new tax stream, all jurisdictions have increased revenue from taxing cannabis. While wanting to decrease illicit market sales of cannabis through lower or comparable pricing, jurisdictions are treading on the razors edge between public safety and public health by charging a tax (Caputo and Ostrom 1994).

5.57 ECONOMIC IMPACT

The economic impact of cannabis is huge, as it touches a variety of sectors and has resulted in an increase of revenue and jobs. Strictly looking at the legal market in the U.S., sales are expected to increase by 2021, regardless of whether the federal government continues restrictions. With a new market, the demand for legal cannabis will rise and proportionately take market share from the illicit market, thus increasing the need for production and retail facilities, enhancing the amount of jobs and ancillary businesses created (Krishna 2017).

For Uruguay, because the retail systems were already in place, legalization only had a moderate economic impact. Jobs were created with the increased production of cannabis, but minimal

Table 5.5: Social Indicators Before and After Legalization by Jurisdiction

Social Indicator	Jurisdiction			
	Uruguay	Colorado	Oregon	Washington
Date of Full Legalization	December 2013	January 2014	Oct 2015	December 2012
Prevalence of Use	Decreased	Stable	Stable	Decreased
Arrests	Increased	Decreased	Decreased	Decreased
Impaired Driving	NP	Increased	Increased	Increased
Fatal Impaired Driving	NP	Increased	Stable	Increased
Youth Consumption	Increased	Decreased	Stable	Stable
Hospital Visits	NP	Stable	Increased	Increased
Accidental Ingestion	NP	Increased	Increased	Increased
Proposed Tax Revenue	Not taxed	Increased	Increased	Increased
Economic Impact	Moderate	Large	Large	Large
Ancillary Sector Growth	Moderate	Large	Large	Large

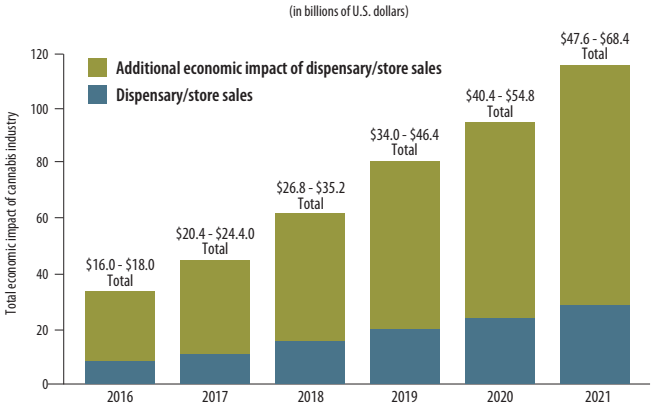
Note. Jurisdictions without published data are labelled as NP.
Sources: Campbell (2017); Colorado Department of Public Safety (2016); Health Technology Assessment Unit (2017); Washington Department of Health (2016); Light, Orens, Rowberry, and Saloga (2016); Johnson (2015); National Drug Board (2014); Oregon Department of Revenue Research Section (2016); Oregon State Police (2017); Retail Marijuana Public Health Advisory Committee (2017); Whitmore et al. (2017).

numbers of jobs were created relatively speaking. The sales of cannabis created new revenue for the government to use.

Legalization is not straight forward and outcomes differ on a variety of factors that cannot be presented here. There are some jurisdictions that have setbacks and can move forward in a positive way, while others, due to many factors, fail to progress forward (Campbell 2017). For this reason, if one social indicator is bothersome, it should be accompanied by research to distinguish the exact reason.

As the American comparison demonstrates, recent sales trends and economic growth projections in the cannabis sector have been significant and might even be considered 'gold rush'. Indeed, the economic impact of the sector has been extensive, spurring the real estate industry, taxation bases, tourism, and a wide range of ancillary markets in everything from security to packaging to technology. Conservative estimates suggest that in the U.S. for "every $1 consumers/patients spend at dispensaries or rec stores, another $3 in economic benefits are created in cities, states and nationwide" (Marijuana Business Daily 2017, 12).

Figure 5.2: U.S. Cannabis Industry Total Economic Impact: 2016-2021



Source: Marijuana Business Daily (2017), 11.

In Canada, the adult-use markets will presumably be even stronger, as the American industry is truncated by conflict between legalization in certain states and the federal laws in which cannabis remains illegal.

5.6 CONCLUSION

There are many jurisdictions around the world that Canada and Saskatchewan can learn from, and each have different aspects of regulation that can enhance Saskatchewan's own regulation of the cannabis sector. Successes can be taken from each jurisdiction and adjusted it to fit the Province's needs. The next steps are to take these lessons and apply them to Saskatchewan's public consultation results to see what fits with an evidence-based model for the distribution and sale of cannabis in Saskatchewan.

All jurisdictions in Canada have performed their own public consultations ahead of presenting their regulations. In a few jurisdictions, regulations have been made on where cannabis can be consumed and where stores can be located, in order to anticipate the legalization process. Alberta, New Brunswick, and Ontario, for instance, have presented partial provincial regulation on cannabis use. These proposed regulations allow for further regulations to be placed at the local authority level to control for the location and density of retail stores.

Coordination, communication, and lack of information-sharing have been identified as major challenges in the early evaluation of Uruguay's cannabis initiative and can be avoided through careful strategic planning. While U.S. federal law does not recognize the lawful use of cannabis for medical or adult-usage purposes, many states have legalized both, which adds to the complexity of the system. Such issues as where retailers can bank and commerce among the States have arisen. That being said, the economic benefits have been significant.

States such as Colorado, Washington, Nevada, California, Oregon, Maine, and Alaska have legalized adult-usage cannabis. The Colorado, Washington, and Oregon experiences have demonstrated both positive and negative impacts of the new sector. The positives are an increase in revenue and a decrease in the illicit market, with the negatives being an increase in public health issues. The challenges that have presented in some jurisdictions have been learning lessons for other states and have been reported on extensively (see Canadian Centre on Substance Abuse (2015) and Health Technology Assessment Unit (2017) for lessons learned).

A comparison can be made with other jurisdictions to see the impact that legalization can have on certain social indicators before and after. A proper comparison can be made only with certain jurisdictions that have similar regulations to those proposed by Canada. Different social indicators were used to distinguish the effects on the economy and public health and safety. While consumption was generally not affected, public health and safety were negatively affected by legalization. The negative effects were largely seen in Uruguay, as there were issues with setting up the cannabis market. As could be expected, the economic impacts for most comparable jurisdictions were large.

Saskatchewan, like all provinces and territories in Canada, is challenged with creating laws, regulations and means to enforce these changes for the adult use cannabis industry. As established in this chapter, other jurisdictions have encountered both successes and challenges and this information can be utilized to benefit this province. Much of the comparative research indicates that Oregon avoided some of the drawbacks experienced in Colorado and Washington because it was able to make initial regulatory decisions using a greater knowledge base, predominantly from examining previous experiences with legalization in these other States. A provincial comparison will not be possible; therefore, Saskatchewan must also glean insight from non-Canadian jurisdictions that have forged ahead into the cannabis industry. Merging these lessons with Saskatchewan's unique context will result in more success with this initiative.

06

Growing the Saskatchewan Cannabis Ecosystem

Photo credits: iStock by Getty images

Growing the Saskatchewan Cannabis Ecosystem

Economic forecast of the cannabis industry suggests that it will grow exponentially over the next decade as adult users switch from illicit to legal sales and new customers are introduced to the market. Saskatchewan has long been known as an innovator and stands to benefit from the cannabis sector. The rapid pace at which the markets will unfold in Canada will challenge the province to identify the Saskatchewan Advantage and how to support local producers and investors. Saskatchewan is well situated to fulfill many of the sectoral needs in new products, services, and processes. A socially responsible entrepreneurial ecosystem that supports innovation and economic development will situate Saskatchewan as a leader in the sector.

This chapter explores the sectoral innovations for medical and adult-usage cannabis legalization to identify potential advantages in Saskatchewan. The provincial ecology of actors including governments, First Nations, regulators, producers, retailers and investors will play a key role in maximizing the economic opportunities of the sector. A client-centered approach will be needed in the provincial cannabis ecosystem to address the needs and motivations of citizens in efforts to advance provincial economic prosperity. This will include careful decisions around sources of information, public safety, regulatory decisions, product choices, and licensed retail outlet options.

There are a number of options for innovation in the cannabis sector; however, without the appropriate regulatory framework in place the province will lose investment opportunities. To create a true Saskatchewan advantage the necessary infrastructure must be in place in the next year. The ancillary markets of the cannabis sector may include technologies and know-how related to any of the following: inventory management systems, identify preserved production systems, analytical tools, packaging and quality assurance systems. The regulatory framework for controlled substances will present unique challenges for the supply chain. Saskatchewan producers are technology savvy and have implemented similar types of systems and protocols for organic production, GM crops as well as safety requirements for food and food supplements. Once the regulatory framework is established, innovative approaches to assist in product differentiation, traceability, safety and compliance will be highly sought after. The province is in a position because of the sophistication of its supply chain to position itself as a supplier of choice for high quality, safe and traceable products. In order to seize this opportunity, a rapid and coordinated effort between regulators, producers, processors, distributors and retailers will enable the province to capitalize on this impending legislation.

The development of supply chain and identity preserved management systems are aligned with Innovation Saskatchewan's efforts to support technology companies. The program, entitled Co-Labs, could provide incubation support and connect with other development programs. An important component of an innovation strategy would be the branding of an industry wide system that would position itself as a differentiated approach that would ensure customers and the public of product safety, security and quality/efficacy.

If regulations permit export of Saskatchewan produced product to other provinces, this approach would be highly advantageous. The natural health products industry successfully employed this approach when it was fraught with false product claims and product quality. Bioriginal Food and Science, a Saskatchewan organization, also utilized this approach and it resulted in substantial growth and sustained product value. The innovative and economic impact for the cannabis industry in Saskatchewan will be greater with a sector-wide approach.

Innovative opportunities also exist in product format and delivery. Currently, fresh and dried cannabis, oil and seeds and live plants are being contemplated for legalization and there may be methods to innovate packaging or processing of these products. However, edible products offer the biggest opportunity to innovate sectoral contributions because product differentiation, traceability, safety and compliance will be in demand. With the appropriate sophistication in the Saskatchewan supply chain, the province could be in the position to become a supplier of choice for high quality, safe and traceable products. In addition, Saskatchewan also has expertise as a food producer, which may be an advantage in the edible market.

An important component of an innovation strategy would be the branding of an industry wide system that would position itself as a differentiated approach that would ensure customers and the public of product safety, security and quality/efficacy. This approach was successfully employed by the Natural Health Products industry which was fraught with false product claims and product quality. This approach would be particularly advantageous if regulations permit export of Saskatchewan produced product to other provinces. If the cannabis industry and the province employed a sector-wide approach, the impact could be more significant.

Another future opportunity would be in product format or delivery. Currently, fresh and dried cannabis, oil and seeds or plants are being contemplated. There may be methods to innovate packaging or processing of these products. However, the biggest opportunity would be to get out in front of future product formats that may be accepted such as edibles.

6.1 INNOVATION IN THE ADULT-USAGE CANNABIS INDUSTRY

Innovation is going to be needed to fully harness the economic potential associated with the adult-usage cannabis industry and the many ancillary business the sector will create. The regulatory structure needed to protect public safety and confidence will be extensive; however, these need not impede innovation. In addition to some key ancillary markets discussed below there are also opportunities for Saskatchewan to design new technologies for market optimization. Consumer concerns about product quality and reliability should be addressed by establishing licensing systems for all stages of the supply chain and encouraging an industry that advances best practices and reinvests in the local economy.

An innovation strategy premised on a vertically integrated supply chain would provide a greater measure of public safety and public confidence. Vertical integration refers to organizations that work on different stages of production within the supply chain entering into strategic cooperative relationships. For example, in the upstream stage of production licensed producers cultivate raw cannabis products; while the downstream stage consists of the processing of the plants into oils, edibles and other forms and then selling these products to consumers. Digitally tracking cannabis from seed-to-sale will be necessary to identify contraband products and ensure products are traceable in the event of a recall. This integration would not only provide operational improvements for better control of quality but it will also assist in cost containment by preventing price inflation during the predicted supply gap.

Saskatchewan must be complaint with the federal inspection system and thus must ensure all products are sampled, tested and labelled prior to human consumption. Ensuring that cannabis and cannabis-induced product are certified as safe for consumers will be a critical to ensuring public confidence. Ideally, third-party licensed laboratory facilities should sample the product to ensure it is legal and then test it for containments (Microbiological, heavy metals, pesticides and such) and the potency of the active ingredients (THC or CBD). The products should then be labelled with the quality, potency levels, and warnings concerning exposure to children (Freeman et al. 2015).

Innovation is going to be needed to fully harness the economic potential associated with the adult-usage cannabis industry and the many ancillary business the sector will create.

The products required for the adult-based usage and medical markets will differ in terms of the cannabinoid profiles. Cannabis with higher levels of THC (tetrahydrocannabinol) produce the psychoactive effect many adult consumers will typically associate with getting high, while strains high in CBD (cannabidiol) are more typically used for medical purposes. While researchers continue to identify new cannabinoids there are currently 111 of these chemical compounds found in cannabis. The potential strains that will become available will be very diverse with consumer preferences ultimately driving what will become the more popular cannabinoid profiles. Just as there are hundreds of types of wine there will be hundreds of strains that enter the legal market.

There are also a number of potential information technologies innovations in which new advancements in software will be vital in propelling the industry forward, and which will be needed to track cannabis from seed to sale overseeing product, processing, and manufacturing. Consider a few examples. Farmers will require a software solution to track the growth cycle of their plants. Retailers will require software for inventory tracking that maintains compliance with federal and provincial rules and regulations but that is also intuitive enough for employees working in licensed retail outlets to effectively and efficiently use the technology. Applications that use artificial intelligence to search through various strains of medical cannabis at the molecule level such as the Potbiotics (www.potbotics.com) will also be applicable in the adult-usage markets. Retailers will also have to limit the amount sold to consumers which will require systems in place to calculate the weight of cannabis and cannabis induced products being sold whether these are flowers, edibles, or concentrates.

Cannabis cultivation is a high-tech, high skill industry. There are numerous opportunities associated with the development of new strains with the traits required by the new market and the acquisition of plant breeders' rights. Research and development of applications for cannabis to target diseases such as obesity and osteoporosis could transform how people cope with chronic illness and pain. Experimenting with improvements in weed-control processes is also an opportunity as cannabis is a finicky crop, so the ability to fine-tune growing processes could generate products far superior to what exists today. Meanwhile, data-capture technologies enable growers to identify optimal conditions for their plants, leading to larger and better-quality yields. Market data from the U.S. suggests Canadian consumers will expect to have access to a variety of high quality strains. Whether it be cannabis sativa or cannabis indica or various hybrids in-between genetically engineering cannabinoid profiles to create new cannabis strains presents a significant opportunity for Saskatchewan's agricultural sector and its sophisticated biotechnology research infrastructure.

Branding will be critical and ensuring consumers trust in Saskatchewan product should be a priority. Over time the illicit cannabis market has produced dozens of euphemisms and hundreds of street names to market products. First there are various cultural terms such as L'Herbe (France), Ganja (Jamaican), Churro (Mexico), Kif (North African), Mota (Spanish) and Pakalolo (Hawaiian). Often cannabis strains have been named after the regional regions in which they were produced such as Acapulco Gold, BC Bud, Black Russian and Maui Wowie. Many legitimate cannabis strains are gaining popularity in the U.S.. For example, Sour Diesel is a popular sativia strain that produces feelings of euphoria, creativity and happiness, while Bubba Kush is an indicia strain that helps with relaxation. There are also the hybrid strains such as Girl Scott Cookie and OG Kush, which were bred to accentuate certain generic properties.

Innovation in operational improvements is also a key area of exploration and with Saskatchewan's experience as a global leader in agricultural innovation the potential in this area is considerable. Producers will require equipment and technology to improve drying and curing, microbial and moisture control, processing improvements (technology and equipment improvements), and packaging. The creation of smart, energy-efficient systems that automatically adjust growing environments according to changes in moisture, temperature, and sunlight are needed—something that Saskatchewan researchers have proven with agricultural crops. Technological advancements in nutraceuticals, farming equipment, extraction technology, manufacturing, distribution, and more means that technology will play an increasing role in ensuring quality, consistency, and eefficiency on the production side. The cannabis paraphernalia industry is also booming with high tech with new delivery mechanisms and then there is tourism, packaging, and security that provided further innovation potential.

6.2 THE OPPORTUNITIES

Ancillary businesses are considered part of the supply chain and represent a large and broad segment of the cannabis industry with significant market growth from material sales, security systems, growth systems and commercial real estate (Marijuana Business Daily 2017). When it comes to producing and selling cannabis there are a lot of other sectors that have a material involvement and are impacted. The ancillary sector consists of companies that provide products and services related to the broader cannabis economy that are not a direct component of the cannabis sector. Examples include companies that develop cannabis related technology and/or services such as breathalyzers and testing kits, agricultural technology, cannabis paraphernalia, security, transportation, hospitality and tourism, real estate, and investment and finance companies. For example, in Colorado, the ancillary cannabis market is estimated to be over $20 billion, much of which arose after legalization (Whitmore et al. 2017). Washington has benefitted from an additional 100 million dollars in tax revenues that are not directly from cannabis taxes (Borchardt 2017). Ancillary business profits have been overlooked with the focus on eliminating the illicit market. Legalization of an illicitmarket results in innate sectoral investments that will be directly related to cannabis, but there will also be opportunities for growth, especially in the ancillary sectors (Schelling 1967).

There is ample opportunity for ancillary sector businesses to innovate in order to enhance their product delivery. Many companies may perform multiple services and will be most effective within a supportive regulatory framework. For example, the security industry does not directly deal with the cannabis sector. However, because all levels of the cannabis sector require enhanced security, businesses that produce and supply these services will benefit (e.g., cameras, fencing, guards, access cards, monitoring, etc.). Security of cannabis, much like the security for medical cannabis and hemp cultivation and production, will grow with the increasing area of cultivation and production, requiring innovative solutions to capture this growth.

6.3 HEMP SECTOR

Industrial hemp is one of the most versatile plants in the world, and is used to make thousands of products, including paper, textiles, clothing, biofuel, food, beverages, and CBD products for medical purposes. Hemp was a banned product between 1937 and 1998, but was then legalized for production of product with a maximum THC level of 0.3 per cent. Hemp production is licensed by Health Canada, with the applicant required to have no criminal record, a map of the official cultivation site, and the name of hemp variety to be grown. Licenses are provided for one calendar year for crops of 4 hectares or more and less than 1 hectare for cultivating for seed (Laate 2015). Currently, possession of a hemp plant is a criminal offense outside of production licensure.

Saskatchewan is leading this production, as they have been issued the majority of the licenses for growing (see Table 6.1). In the 2017 growing season, Saskatchewan only had 10 exemptions. Alberta and Manitoba, who have the next most abundant approved licences, both had more exemptions, which create an additional step for farmers in growing hemp. Saskatchewan specializes in growing eleven different varieties of hemp, and is a leader for two varieties (Risula 2017).

Table 6.1: Industrial Hemp Commercial Licenses - Issued by Province, 2015

Province	Total Licenses Issued	% Total Licenses Issued for Cultivation
Alberta	297	64
British Columbia	20	35
Manitoba	278	62
New Brunswick	2	50
Nova Scotia	2	50
Ontario	53	72
Prince Edward Island	2	100
Quebec	81	65
Saskatchewan	400	64
Total/Average	1135	62

Source: Risula 2017

Hemp is tested by a certified hemp sampler. This sampler follows Health Canada guidelines to collect samples and submit them to an approved laboratory. The grower pays for both the sampling and laboratory analysis (Risula 2017).

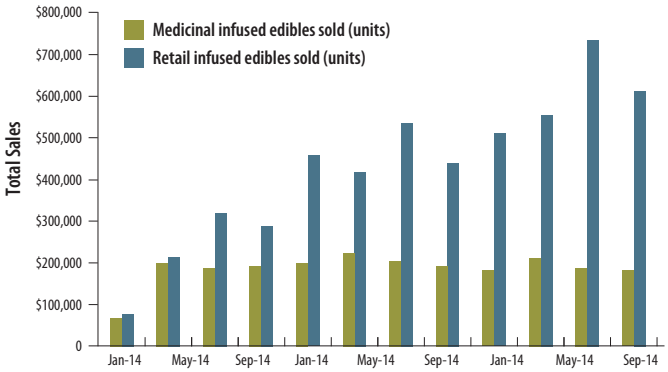
There have been innovations in seeds in other countries, but current legal regulations in Canada do not allow farmers to plant their own seeds unless they are certified (Government of Canada 2017h). The price of hemp grain has remained fairly constant, with a price ranging from $0.75 to $0.90 per pound for conventional hemp grain and $1.75 to $1.90 per pound for certified organic hemp grain (Risula 2017). After legalization, the markets for hemp will improve.

Hemp is also recognized for its strong fibrous qualities, which requires the stalks of the hemp plant to be retted (the separation of the bast fibres), and soaked in tanks of water or chemicals (Risula 2017). This is a costly venture compared to other processes in wetter climates, but also provides an area where innovation can take place. Opportunities also exist for development of other industries that use hemp fibre for different products such as paper, textiles, and clothing.

6.4 EDIBLE SECTOR

Even though the Supreme Court of Canada ruled that medical cannabis users can consume cannabis products in many forms (*R. v. Smith*), the federal government plans to delay legalizing edibles and concentrates for non-medical use until a year after cannabis itself is legalized (Government of Canada 2017a). This may serve as an issue because, for public safety reasons, new products not yet eligible will result in market appeal and growth. Consumers can already purchase edibles online and make their own at home, and they have been rising in popularity (Hoppe 2016; see Figure 6.1 for sales in Colorado). In a study of U.S. adults, almost a third of respondents consumed cannabis in edible or beverage form (Schauer et al. 2016).

Figure 6.1 Total Sales Volume of Medical and Retail Edible Cannabis in Colorado, 2014, 2015, and 2016



Source: Brohl, Kammerzell, and Koski 2015; Brohl, Kammerzell, Koski, and Burack 2016; Brohl, Humphreys, Kammerzell, and Burack 2017.

Edibles are infused with cannabis extract and allow for people who don't want to smoke cannabis to still feel the effects of cannabis. Edibles can be taken either be through ingesting it or sublingually, and the THC in edibles take around 30 minutes or more to feel the effect on the body, depending on the way it is ingested (Barrus

et al. 2017). Research has shown that this route of administration may prolong the duration of the cannabis effects (Huestis 2007; Cooper, Comer, and Haney 2013).

While these effects make edibles seem more cost-effective, there are various issues with edibles when regulating its use for public health reasons:

- Potency of Edibles – There are issues of regulation to make sure the edible is safe for those that may not have a high tolerance of cannabis. Cooking with cannabis is difficult to make sure the potency is the same throughout the edibles.
- Edibles can be made at home - People can infuse cannabis products into their food, whether through using dry cannabis or oils and butter.
- Edibles can be purchased online – currently consumers can purchase edibles online and have it shipped to them. While these have a bit more control, they are not regulated for safety and are currently illegal.
- Edibles can be made to look appealing to children – Edibles can be made to look like gummies, salty snacks, cereal, etc. and that can be appealing to children who find them.
- Edibles can be made to not taste like cannabis – Because the edible tastes like a sugary or salty snack, it can be easy to over-consume.
- Because it takes some time for the edible to have its desired effect, consumers may take a second portion or more and run the risk of over-dosing.

Additionally, if an individual took too much cannabis when ingesting cannabis, because the effects last longer, the individual may suffer negative consequences, such as severe anxiety, nausea, vomiting, and psychotic episodes (Barrus et al. 2017). Some edible makers are currently experimenting with fast acting edibles to combat this problem (Weed 2017).

However, if done in a safe manner, this provides a safer alternative to smoking it. Further, regulating it can make sure it is labelled properly, the potency is universal, and its appearance does not look appealing to children. Educational campaigns can be used to inform the public of the risks of eating and making their own edibles. With the possible issues, there is very little wonder why Colorado recently banned edible candies shaped like animals, fruits, or people (Matthews 2017). Regulating edibles to solve for some of these issues requires learning from other jurisdictions and understanding the illicit market will not go away overnight.

6.5 CRAFT CANNABIS MARKET

A strong market, like the craft beer industry, includes both small and large scale of production firms. With recreational cannabis still being illegal, there is a definitive difference between the two in the cannabis market. The legal medicinal cannabis market is already established and built for large scale production, and will easily transition into the adult-usage market, despite there being different legislation for each. The small scale of production firms would be considered the local craft market, or to politicians and law enforcement, the illicit market.

In order to cultivate a superior product that will entice Canadians to move towards the legal market, producers must provide product choice to satisfy the consumer. Certainly, this can be seen with beer sales in Canada. Beer sales in Canada have only grown slightly, and while beer consumption has dropped per capita, the craft market has seen an upsurge in sales and consumption (Agriculture and Agri-Food Canada 2016). Due to distribution issues depressing the creation of alcohol breweries, it is suspected that cannabis distribution for craft markets, if allowed, will not experience these issues and will grow, providing product choice for consumers.

In order to cultivate a superior product that will entice Canadians to move towards the legal market, producers must provide product choice to satisfy the consumer.

In order to attract customers and compete with larger firms, the craft market has to develop effective marketing strategies and offering distinctive products (Paige and Littrell 2002; Government of Canada 2013m). The craft market is well known for its product differentiation (Clemons, Gao, and Hitt 2006), mainly because the craft market can easily maneuver around their variable costs, not worrying about the large output of a few varieties of cannabis strains, and be innovative with the type of product they sell.

Further, with a skilled workforce already present in the craft market, there is no learning curve and sales can enhance the economic impact of the geographical area. As already seen with cannabis dispensaries, cannabis tourism is already occurring in Canada (Kepple and Freisthler 2012). This can be expected to grow with Canadians and other visitors going to popular retail stores that offer more than just buying a pack of cannabis cigarettes. This competition, while increasing other public issues, will both help to normalize using cannabis products, thus decreasing use, and create a robust market, generating revenue for the government and retailer.

There are current fears from the craft market, though, that the coming of legalization would eliminate the craft market and harm local economies that rely on the employment in the illicit market (England 2017). On the other hand, the illicit market includes a lot of unknowns, such as a lack of controls in growing and distributing cannabis, and the government has vowed to eliminate it for public health and safety purposes (Solomon, Chamberlain, and Al-Azem 2017). There is a difference within the illicit market though. There is the organized crime element that sets out to make profits

and there is the individual craft side that also seeks profit but is somewhat altruistic in its purpose (Hough et al. 2003).

As some cannabis from the legal medicinal market moves towards illegal retail stores (Hutchinson 2017), it must be recognized that legalization does not totally eliminate the illicit market (Light et al. 2016). Because there are economic benefits of including the small scale production firms in the cannabis market (Hajizadeh 2016), greater toleration for these firms should be considered with legalization as the "least worst cannabis markets" to satisfy the consumer and reduce organized crime (Decorte 2010, 271).

6.6 CHALLENGES AND BARRIERS

There are a number of challenges that might impede innovation in the sector:

6.61 INCOMPLETE REGULATORY FRAMEWORK—INCLUDING DECISIONS REGARDING LICENSING, CONTROLS, AND DISTRIBUTION OF PRODUCTS.

The Government of Canada is seeking to strike a balance between implementing appropriate restrictions, in order to minimize the harms associated with cannabis use, and providing adult access to a regulated supply of cannabis while reducing the scope and scale of the illicit market and its social harms. As it currently stands, the legislative framework reflects a public health approach to reduce harm and promote health that takes a precautionary approach to minimize unintended consequences, given that the relevant evidence is often incomplete or inconclusive. This approach also recognizes the need to establish a safe and responsible supply chain including production (including cultivation and manufacturing), distribution and retail sales. It is proposed that the Government of Canada regulate the production of cannabis and its derivatives (e.g., edibles, concentrates) at the federal level, drawing on the good production practices of the current cannabis for medical purposes system, using licensing and production controls to encourage a diverse, competitive market that also includes small producers, implementing a seed-to-sale tracking system to prevent diversion and enable product recalls, promoting environmental stewardship by implementing measures such as permitting outdoor production, with appropriate security measures, and implementing a fee structure to recover administrative costs (e.g., licensing). The successful implementation of a regulatory framework for cannabis will take time and require that governments meet a number of challenges with respect to capacity and infrastructure, oversight, co-ordination and communications as examples. The federal government will imminently advance the legalization of non-medical cannabis through legislation and the publication of regulations.

6.62 COMPETITION FROM ILLICIT SUPPLIERS

Cannabis is cultivated more than any other illicit drug plant in the world. The legal medical market for cannabis pales in comparison to illicit sale of cannabis. For example, the worldwide sale of illicit cannabis is 25 times higher than the sale of legal pain medication, which itself is classified as an epidemic in Canada, according to a 2015 Market Research Report (Amadee and Company Inc. 2015). As seen with the illegal retail shops emerging in places like Ontario and British Columbia, there is an immense sense of haste to beat the competition by getting their product in place faster. Additionally, with the ability for household cultivation, there are other forms of competition on the smaller scale.

This competition can force legitimate companies to lower costs or cut corners in order to meet the goals of the legislative framework. This will happen on the illicit side as well. In order to compete, the illicit market will cut costs in any way to maintain their profits. The challenge is to make sure consumers are confident in the production and sale of legal cannabis. Regardless of a higher price, the legal market can boast its record for safety and compliance as well as providing a quality product, while recognizing that the illicit market will not slow down in the first couple of years.

6.63 COMPETITION FROM EXTERNAL LEGITIMATE PRODUCERS

While competition is usually seen as beneficial to innovation and lowering costs for consumers, thus reducing the need for an illicit market, it also has its pitfalls in a regulated market. If the intention is to reduce the harms of cannabis, having cannabis coming in from other jurisdictions, whether legal or not, there is a chance to break consumer confidence in the quality product that a single distributor provides. However, consumers will also want more variety, as witnessed in the increased craft beer market (Agriculture and Agri-Food Canada 2013), and so will begin to demand a wider variety of cannabis strains that increased outside competition can provide. The challenge to meet this demand is the ability to regulate incoming product while manoeuvring between trade agreements and public health and safety.

Medical cannabis producers have a step up on their competitors. Companies that have established themselves as medical-cannabis producers under the regulations are poised to dominate the non-medical cannabis market when it comes to be as they have already met the regulations and requirements to become a licensed cannabis producer. It would only take a disproportionately lower investment to increase production in order to sell for non-medical purposes when compared to someone just starting out. What this does, though, is reduce the capacity in which a larger increase in production could develop, further limiting the possibility for innovation. In order to meet demand, both quantity and quality need to be provided, and that includes having a variety of cannabis strains. Having too low a number of licenses will only exacerbate this issue.

6.64 RESOURCES TO ADVANCE RESEARCH AND MARKET DEVELOPMENT —EXAMPLE OF GROWERS GROUPS

Another barrier cannabis innovation has is producing the resources used to advance research and market development. Again, because the goal is to mitigate the harms associated with

the illicit market, there may not be as much profit garnered from the sale of non-medical cannabis. One such success has been the creation of growers groups (i.e., Cannabis Growers of Canada and the Canada Cannabis Association). With these groups, funding can be earmarked for research and market development, setting of standards and testing capabilities, negotiating and securing preferred pricing for members, developing industry best practices, better growing education and awareness and it can benefit the majority of members. Balancing the goal of mitigating harm with a lower profit margin, research will ultimately be stifled.

Another issue is by choosing to have a lower tax rate on cannabis products; the government has to choose where to best spend the money. Educational, health care, and law enforcement costs will rise due to battling cannabis, so harmonizing those legitimate goals with research and market development will have to come from somewhere if they want to win the battle against the illicit market.

If an industry association based on a grassroots model is created these barriers can be overcome. Research and market development and branding could result in a supply chain that achieves regulatory compliance, that is also linked with consumer and public confidence that supports an IP protected supply chain that sustains value and differentiates products.

6.7 PRODUCTION AND PROCESSING INNOVATION

A more detailed look at the many stages of production, processing and packaging will provide a better picture of the numerous and rich opportunities for innovation. A great deal of expertise has been developed in the growing and processing of cannabis by illegal producers and suppliers. However, once cannabis is legalized, the required scale of production will significantly increase, thus requiring automation and rigorous quality and safety standards which offers vast opportunities for innovation. In addition, formal plant breeding programs could evolve that will improve existing products and develop new varieties.

A cursory overview of the steps and phases of the production and manufacturing process includes the following:

1) Variety selection and development with certified seeds.
2) Agronomic practices and associated equipment and technology.
3) Harvesting with increased mechanization as scale of production increases
4) Storage
    a. Secure and scalable storage facilities with a controlled environment to maintain quality and minimize spoilage are significant factors.
    b. Sensor and digital technologies to enhance control and quality.
    c. Customized inventory management software to enable more control in a multi-phased production and manufacturing process.
    d. Software with features of an enterprise resource planning (ERP) system that embeds standard operating procedures (SOPs) and includes order-taking, material handling and production planning.
5) Inbound and outbound quality assurance analytical techniques to verify quality, potency standards, detect contamination and ensure regulatory compliance.
6) Drying and curing of harvested product must be controlled and monitored. Technology will improve this process and reduce labour costs.
7) Preparation and manufacturing of the products with automated and scalable systems are necessary for cost effective production.
8) Packaging that offers convenience, quality and differentiation.
9) New products not yet eligible such as edibles will result in market appeal and growth.

It has been speculated that there are currently thousands of different options of seed varieties available in the illicit market. The three main types of cannabis plants include Indica, Sativa and Ruderalis and they have been cross-bred to produce hybrid strains. The chemical components of seeds sold in the illicit market may not be clear about the level of THC or other cannabinoids and there is an increasing demand for well labeled product that can respond to consumer demand in a regulated environment.

Cannabis crops have moved indoors in recent years because yield is significantly more successful than through outdoor production. This crop has become increasingly scientific as the industry moves into an economy of scale. Opportunities for mechanization exist and have been established in previously legalized jurisdictions and there will be an opportunity for Canadian manufacturers and companies to support this side of the industry. Demand for mechanical equipment will include items such as automatic drip irrigation systems, wet and dry trimming machines, large-scale extractors and equipment for drying product such as drum rotators. Production operations will require environmental control units to regulate temperature, lighting and humidity. As crops become regulated, pest and disease management is increasingly more important and requires balancing nutrients and pH through appropriate use of nutrients and fertilizers. It is not only the hardware that will be sought after as every step of the process from production to retail will also require software support.

Large scale cannabis farming requires a significant space infrastructure which may be possible in Saskatchewan. Like Colorado, Saskatchewan producers could take advantage of high levels of sunlight in production systems. Large industrial type facilities must be sub-divided to maximize crop rotation, continual production and specialization of product and minimize exposure to contaminants, pests and disease. As production scales up, interior equipment also becomes more specialized. For example, rolling tables and vertical growing structures allow for increased use of space. With increased scale, there may be greater opportunity for applying a relatively innovative method called

aeroponics. There is also an increased concern for employee safety and workplace regulations that prevent back strain which will become significantly more valued after legalization takes place. If Saskatchewan intends to offer competition in the market of scale for production, infrastructure should be an initial consideration.

> Large scale cannabis farming requires a significant space infrastructure which may be possible in Saskatchewan.

As cannabis shifts from an illicit activity to a legitimate crop, it invites an increased interest from those who are environmentally and socially conscious. There is likely to be a demand for organically certified cannabis from a regulated source. Additionally, standard cannabis production requires a significant amount of energy and light. Large scale producers may have interest in enhancing environmentally conscious energy sources such as using wind turbines and utilizing cost and energy efficient lighting. This crop tends to produce a significant amount of grey water which some producers may be very interested in either reducing or maximizing re-usability. It also requires a significant amount of carbon dioxide input, which through very innovative processes could potentially link to other energy production in the province (e.g., carbon capture processes). Legalization of cannabis offers incredible opportunities to enhance to social consciousness associated with this crop.

6.8 CONCLUSION

Cannabis legalization in Canada provides an opportunity to increase investment and develop intellectual property that would give us a leading position globally. According to Dumouchel (2017), a patent lawyer, the adult-use cannabis industry could boost Canada's innovation performance. The market potential will attract extensive investment in the sector with projections suggesting "Canada could have nearly four million legal recreational users of marijuana by 2021, with a potential for $6-billion in sales." Since the federal announcement of full legalization and the creation of federal regulatory rules publicly traded Canadian cannabis stocks rose several per centage points and continue to climb.

On the upstream of the cannabis value chain there is cultivation, raw material extraction and processing, production and warehousing and packaging and labeling, on the downstream there is transportation and distribution and retailing. Trade-marking Saskatchewan innovations should be an industry priority as other entrepreneurs both nationally and globally will be exploring various product adult-usage cannabis related markets. Canadian medical cannabis firms are aggressively filing trademark application stating claims in the market.

07

Conclusions and Recommendations

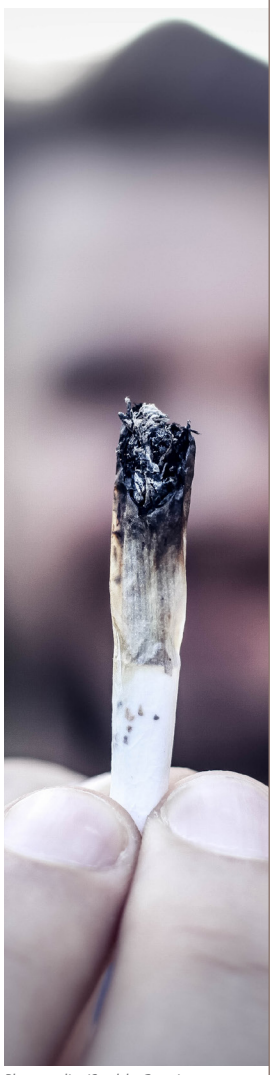


Photo credits: iStock by Getty images

07

Conclusions and Recommendations

This report has worked through the historical and current context of cannabis in Canada, protecting public safety, enhancing public health, considering economic impact, establishing smart practices through a comparative framework and innovating for the emerging adult-usage cannabis sector. It has examined existing research and comparative cases to begin addressing key provincial-level questions associated with the legalization and regulation of cannabis from a Saskatchewan context. The goal of this project is to support the design and implementation of the various policies and frameworks required to prepare Saskatchewan for the legalization and regulation of the cannabis sector.

The legalization and regulation of cannabis in Canada presents numerous opportunities for Saskatchewan investors and the provincial economy. The pace at which the illicit market will be eradicated, the impact of public education campaigns, the minimization of harm, and the success of the retails markets will all depend on the governing instruments selected. The province will have to use multiple policy instruments that must be carefully integrated to achieve the many desirable policy outcomes.

The design and implementation of Saskatchewan's framework for adult-use cannabis will require collaborative process and an understanding of the collective impact of our new normal. As each chapter in the report demonstrates, there are a number of competing objectives; thus, options must be weighed carefully. The worst possible outcome would be a siloed approach, with each Ministry working autonomously and limiting discussions to individual mandates. Additionally, while consultations will be necessary, citizen and stakeholder input should be gathered in the implementation stages as opposed to during policy design.

Designing good public policy for the cannabis sector will have to balance a number of often competing objectives. Policy lessons from other jurisdictions, combined with the available research, smart practices, and the federal government framework allow us to identify some of the most commonly desired outcomes from public safety, public health, economic, and innovation lenses from a Saskatchewan perspective (Macdonald et al. 2016; Maslov, Lawrence and Ferguson 2016; Pacula et al. 2014). These objectives include:

- Restrict youth access, availability, and usage.
- Promote responsible adult-based use.
- Minimize harms of use.
- Minimize drug-impaired driving.
- Mitigate organized crime.
- Protect community safety.
- Create a safe supply chain.
- Maximize targeted economic development opportunities.
- Maximize Saskatchewan innovation.

To achieve these objectives and support positive long-term outcomes for the Province of Saskatchewan, we make the following forty recommendations across ten dimensions of the sector.

7.1 PUBLIC EDUCATION

- **Recommendation 1:** Design a large-scale, multi-pronged public information campaign to educate citizens about health impacts, changes to the law, and impairing driving.
- **Recommendation 2:** Design a large-scale preventative public information campaign for youth and parents.
- **Recommendation 3:** Develop an educational campaign about the dangers of cannabis use during pregnancy and breastfeeding.
- **Recommendation 4:** Design a public information campaign on misuse and treatment.

Of all the available policy instruments, public education campaigns will be among the most important in the shift towards legalized cannabis. How government produces, collects, uses and disseminates information will be critical for minimizing harms to users. Public education campaigns and public awareness campaign will, at the end of the day, be the most effective tool for protecting public safety, promoting health, minimizing misuse, and ensuring a safe supply chain. The use of education will be a reoccurring theme through the recommendations.

Of all the available policy instruments, public education campaigns will be among the most important in the shift towards legalized cannabis.

In the 2017 budget, the Government of Canada announced that "Health Canada will support cannabis public education programming and surveillance activities in advance of the Government's plan to legalize cannabis by directing existing funding of $9.6 million over five years, with $1.0 million per year ongoing" (Government of Canada 2017b). On October 31st the federal government announced an additional $36.4 million for public education on cannabis over the next 5 years. Public Safety Canada is also rolling out a $1.9 million social media, print, radio, and television impaired-driving campaign targeted at youth. Drug Free Kids Canada, a charitable organization focused on preventing drug abuse, has released a campaign called "The Call That Comes After", which is an innovative tool designed to help parents deter young people from drug-impaired driving. MADD has also produced several videos addressing drug-impaired driving.

Robertson et al. (2016) suggest that challenging public misperceptions around false information will need to be included in the cannabis-related awareness and education campaigns. The first misperception is that cannabis is not harmful, but rather is a natural herb that is safe. Second is the myth that cannabis does not impact one's ability to drive. Third is the myth that police can't tell if someone is high and driving.

A series of information campaigns focused on prevention, awareness, health promotion, and treatment will be required. In addition, targeted campaigns for youth, parents, and vulnerable populations will also need to be designed. Educating the public on the new laws will require an awareness campaign designed to inform citizens of the various aspects of the legalization of adult-use cannabis, including outlining legal possession limits, household cultivation, consumption levels, and changes to the Criminal Code. Enhancing health literacy and health promotion related to cannabis will require a number of targeted initiatives for youth and parents, expecting mothers, and vulnerable populations. Information campaigns on prevention of misuse and of impaired driving will also be required.

7.2 RESTRICT YOUTH ACCESS

- **Recommendation 5:** The minimum legal age to purchase and consume cannabis in Saskatchewan is set at the same level as the minimum legal age to purchase and consume alcohol.
- **Recommendation 6:** Put in place strong disincentive (penalties, fine) for licensed retail outlets selling to minors.

- **Recommendation 7:** Saskatchewan Government Insurance (SGI) creates an information campaign on impaired driving designed specifically for young persons under the age of 24.

- **Recommendation 8:** Justice Canada funds a national information campaign of the new laws prohibiting selling/ providing cannabis to minors.

Of all the decisions the Government of Saskatchewan faces, determining the age of lawful purchase and possession is one of the most difficult. The science clearly shows that cannabis negatively impacts childhood/youth development until the age of 24. In a poll conducted by the Canadian Medical Association, 46 per cent of the 800 respondents felt that the minimum age for purchases of adult-usage cannabis should be 21 or older (Fayerman 2016). While we recommend against adopting a minimum age of 18, as this would permit high school students to legally purchase and possess cannabis, we do suggest that harmonizing cannabis with alcohol is the best way to restrict youth access by addressing the two main risks - the illicit market and adult-usage retailers selling to youth.

Young adults under 24 years of age are the heaviest users in Canada, while youth from 12 to 17 are the second highest group of cannabis users (Task Force 2016). In addition, Canada has the highest rate of cannabis use among youths of any developed country (UNICEF 2013). The Federal Task Force recommended a national minimum age of 18 for purchasing cannabis, which was approved by the federal government. If the minimum age is set too high, then youth will continue to access the illicit market. As young adults currently constitute the largest market segment, this would undermine policing attempts to mitigate organized crime.

The *Cannabis Act* identifies 18 as the absolute minimum age for legal purchase and consumption, while allowing provinces to deviate upwards (The *Cannabis Act* 2017). Not unlike the status quo regarding alcohol sales, retailers would be encouraged to ask for identification from any person attempting to purchase cannabis that appears under the age of 30. We recommend that posters be displayed that warn customers that they may be asked to show proof of identification to minimize the risk of a negative reaction by the customer when asked for ID (Borland 2003).

Although some private retailers may be incentivized to sell to youth, current regulatory frameworks that forbid the selling of tobacco and alcohol to minors can be similarity implemented in the adult-usage cannabis market. The availability of illegal cannabis for youth provides another strong rationale for the importance of aligning market forces and regulations to displace the illicit market. To ensure all Canadians understand the implications and laws surrounding youth access, there will need to be national information campaign educating all citizens on the government's recent legislative changes.

The availability of illegal cannabis for youth provides another strong rationale for the importance of aligning market forces and regulations to displace the illicit market.

Despite a government's best efforts to control harmful or addictive substances with an age restriction, underage consumption is inevitable (Transform Drug Policy Foundation, 2014). To reduce social harms associated with irresponsible cannabis use, we recommend that the age restriction be complemented by evidence-based drug education programs (Transform Drug Policy Foundation, 2014). These programs will encourage responsible use and healthy lifestyles (Transform Drug Policy Foundation, 2014). Through the advisory board and central distributor, educational media can be disseminated to cannabis retailers.

Finally, as Saskatchewan's current legal age to purchase and consume alcohol is 19-years-old, if the legal age for cannabis purchase and consumption is set at 18, those aged 18 will be pushed toward the consumption of cannabis rather than alcohol. If the age for cannabis is set higher than 19, those 19 but not yet of age for cannabis will be pushed toward consumption of alcohol rather than cannabis. By synchronising the legal age for consumption of both alcohol and tobacco, we prevent this implicit push.

7.3 POLICING RESOURCES AND CAPACITY DEVELOPMENT

- Recommendation 9: Seek adequate funding from the Government of Canada to provide money for police training and education.

- **Recommendation 10:** The main goals/expectations for policing should be to mitigate the illicit market and to combat drug impaired driving

- **Recommendation 11:** Reinvest a per centage of all taxation in policing resources

The technologies adopted by municipal police forces will not necessarily be the same as those changes initiated by the federal police forces, leaving questions around which jurisdiction will bear the costs. While the Saskatchewan government has requested that the federal government covers procurement costs, there are currently no final commitments that would address policing needs. Either way, law enforcement officials will need to be provided with the resources and technologies necessary to present credible evidence to secure convictions before the courts.

The costs associated with impaired driving alone will be very high. Equipping police with devices, providing training and on-going recertification to use the devices, training officers to become qualified standard field sobriety testers or drug recognition

evaluators, or to obtain and analyze blood tests will create significant financial burdens on Canadian policing resources at all levels. There is also a capacity issue, as officers will require a costly amount of training to conduct drug evaluations (Government of Canada 2017c). Even if the federal government does agree to cost-share, part of the tax revenue should be directed to this aspect of public safety.

Great effort will need to be directed into identifying and prosecuting incidences of drug-impaired driving. While police are able to demand an oral fluid sample if there are reasonable grounds for suspicion that the driver is drug-impaired, it is unclear what constitutes reasonable grounds and what burden of proof will be required for a driver to comply? To qualify for a Drug Recognition Evaluator designation, an officer must be accredited and certified by the International Association of Chiefs of Police, with initial training costs per evaluating officer being approximately $5,600, plus cost of maintaining certification. This cost does not included backfill for officers in training. Alberta, Saskatchewan, and Manitoba have all publicly stated that the financial burden imposed by the challenges in the sector needs to be covered by the federal government (Kirkup 2017).

Eliminating the illicit market and displacing organized crime will take years. Spokespersons for both the RCMP and the Canadian Association of Chiefs of Police have recently told the federal government Health Committee that it will take a long time following legalization to displace organized crime's involvement in the growing, distribution, and importing and exporting of cannabis (MacDonald 2017). To suggest that police would be able to dismantle this illicit market in only a few years is completely unreasonable.

Eliminating the illicit market and displacing organized crime will take years.

7.4 PROTECTING PUBLIC HEALTH

- **Recommendation 12:** Design and implement a health promotion framework for cannabis use.
- **Recommendation 13:** Use revenues from cannabis to fund programs for prevention, education and treatment.
- **Recommendation 14:** Design and implement treatment programming to address misuse.
- **Recommendation 15:** Limit public consumption by disallowing smoking and vaping in locations where smoking bans are in effect and restricting social consumption to licensed premises.
- **Recommendation 16:** Regulate packaging to ensure potency and quality is clearly labelled for consumers.

Policies built into the regulatory framework that support a health promotion approach will have a long-term benefit for the public. Designating a certain percentage of the revenue stream towards cannabis health information campaigns, cannabis-related support services (e.g. addictions and mental health), and research will diminish the potentially negative impact of this sector. It is prudent to recognize that some length of time will be needed to generate revenue, but funding for health information campaigns will be the most powerful tool for mitigating negative health outcomes.

Decision makers must also assume that misuse will occur. A number of commentators suggest that cannabis-related regulations, policies, and programs should draw lessons from the tobacco and alcohol regimes; however, there are some risks to this approach. For example, knowing that restricted youth access is important, cannabis labeling could mimic the strict labeling practices currently used for tobacco packaging that limits appeal for children. Alternatively, the artificially inflated price of alcohol and tobacco used to deter usage may not be appropriate for cannabis pricing, assuming the dismantling of the illicit market is an objective.

Mental health and addiction is a major policy issue for Saskatchewan. To prepare for the inevitable misuse, the Government of Saskatchewan should return to lessons drawn from the introduction of widespread gambling in the province. The gaming model provides a more effective comparison as policy makers knew misuse would occur and prepared for this eventuality early in the planning stages. Problem gambling in Saskatchewan was treated as a public health issue from the onset and, as a result, treatment programs to address problem gambling behaviours were introduced very early on. We would recommend the development of programs for problem cannabis users be a major priority. Indeed,

Public consumption associated with smoking and vaping cannabis should follow the same rules guiding cigarette smoking, so as decrease exposure to second-hand smoke and limit youth exposure. Cannabis should be treated similarly to tobacco in this regard and follow similar protocols outlined in Saskatchewan's *Tobacco Control Act* and occupational health and safety guidelines. Furthermore, the retail sale of edible cannabis products should be limited to licensed retail outlets. If the province were to permit social consumption in restaurants, bars, or music festivals, for example, then youth would be exposed to the product; additionally, these settings might promote combining alcohol and cannabis usage, which may result in higher possibilities of impaired-driving and misuse.

While branding will be important in mitigating the illicit markets, consumer packaging should fully inform buyers of the potency of what they are consuming. The federal government will be responsible for the rules around advertisement and packaging,

but the provinces are able to strengthen these regulations. To limit problems with unwanted containments and uncertain potency, products should be stamped with approval by a licensed testing mechanism. While consumer choice will prevail in what cannabis products people purchase, all adult-usage products should bear an official stamp verifying their legality, effect, and ingredient list.

7.5 MARKET STRUCTURE

- **Recommendation 17:** Align market forces and regulation through a limited number of licensed private retailers to ensure the retail market for cannabis is responsive to market conditions and consumer preferences, effectively competing with the illicit market.
- **Recommendation 18:** Establish a single point of entry for bulk cannabis, seeds, and clones coming into the province through a private single distributor that tests, packages, and tracks all products sold in the province, ensuring only safe, cost-effective, and legal cannabis reaches consumers and that there is a level playing field for both small and large producers.
- **Recommendation 19:** License and regulate the distributor through a central cannabis advisory board that coordinates the implementation of policies and programs, centralizes expertise, facilitates medical and policy related research, disseminates information and transfers knowledge, and supports innovation and economic growth in the cannabis industry.
- **Recommendation 20:** Work with the distributor through the advisory board to utilize the single distributor's infrastructure to reduce the barriers to entry of Saskatchewan firms in becoming licensed cannabis producers, and facilitate innovation in new product development in the Saskatchewan economy.
- **Recommendation 21:** Work with the distributor through the advisory board to facilitate opportunities to import cannabis to relieve shortages and develop a channel for Saskatchewan producers to export cannabis.
- **Recommendation 22:** Support the Federal regulation allowing home cultivation of cannabis within certain limits.
- **Recommendation 23:** Taxation levels on legalized adult-usage cannabis must ensure that the legal market is competitive with the illicit market.
- **Recommendation 24:** Allow the market to set the pricing to ensure the supply of cannabis starts to balance with demand.
- **Recommendation 25:** Establish a distributor model that includes a mandate to source and test all cannabis entering the Saskatchewan market to reduce barriers to Saskatchewan producers entering the market.
- **Recommendation 26:** License a limited number of private cannabis retailers to enhance the links between consumer demand and production while limiting outlet density.

As shown in the following table, licensing a single private distributor and a limited number of private retailers provides the best option to align market forces and regulation to compete with and eliminate the illicit market for cannabis, limit youth access, ensure public safety, and allow Saskatchewan to be regarded as an innovator in the production, distribution, and retail of cannabis while extracting the maximum economic benefit from this new industry for the people of the province.

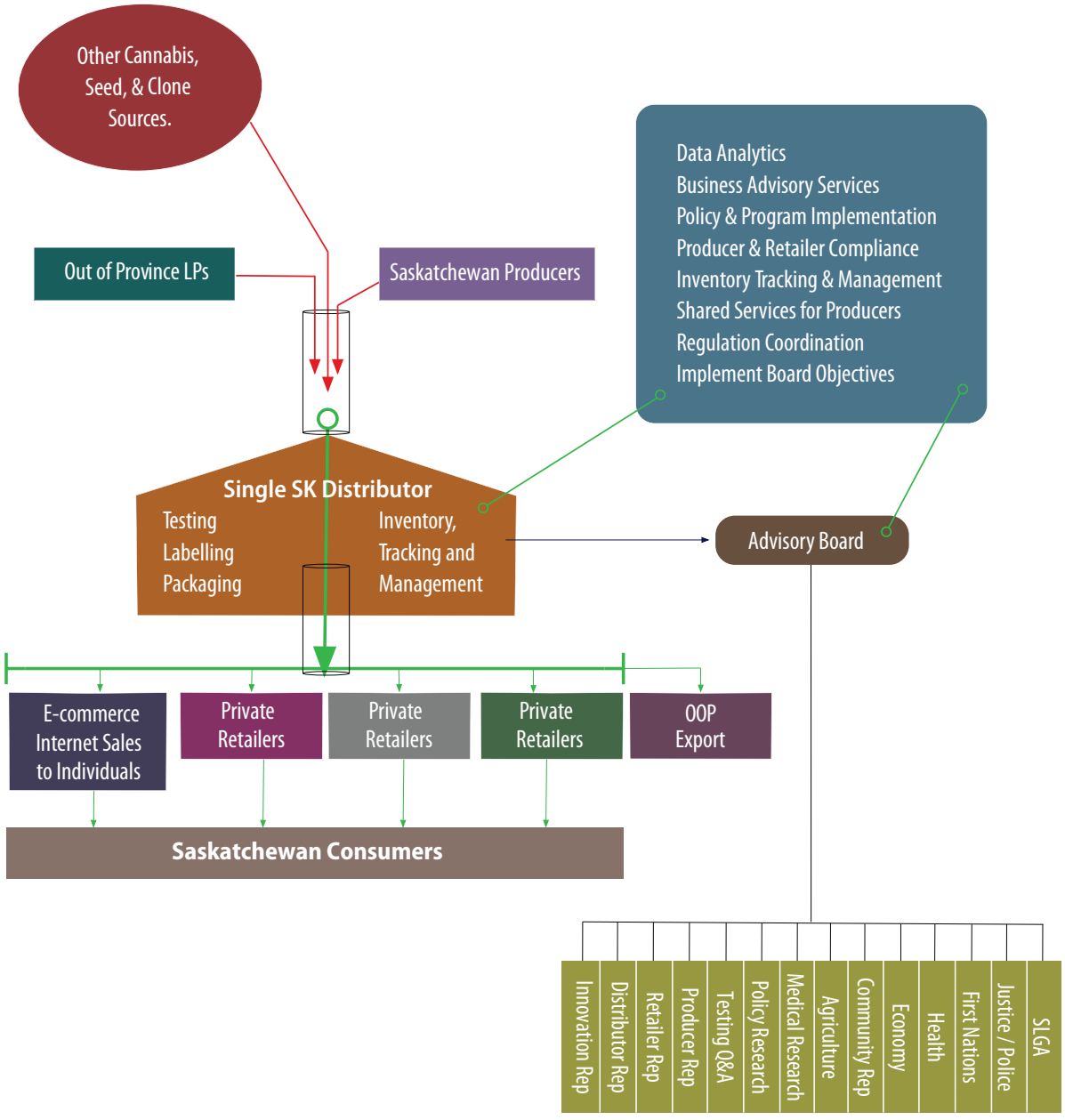
Table 7.1: Options with Criteria

Options	Competition with Illicit Market	Restricting outh Access	Product Safety	Economic Benefits	Non-Monetary Costs
Government Owned & Operated	Low	Moderate	Moderate	Moderate	Low
Unlimited Private Distributors & Retailers	High	Low	Low	Moderate-High	High
Private Single Distributor & Limited Private Retailers	Moderate-High	Moderate-High	High	High	Moderate

Source: Johnson Shoyama Graduate School of Public Policy

The following chart shows an overview of the recommended market structure for the legalization of recreational cannabis in Saskatchewan. The single Saskatchewan distributor represents a choke point for all cannabis coming into the province regardless of the source. The distributor procures, tests, packages, labels, and delivers it to Saskatchewan retailers or to consumers who order directly from the distributor on line. The distributor also manages a provincial seed-to-sale-tracking and inventory management system, and coordinates with an advisory/governing board to ensure regulatory compliance, implement new regulation and policies to protect the public, and support economic growth and innovation. In addition, the distributor will support entrepreneurs in the province who wish to establish production facilities or other cannabis related businesses by providing shared services (testing, packaging, data analytics, etc.) and other business advisory services.

Figure 7.1: Recommended Market Structure



Source: Johnson Shoyama Graduate School of Public Policy

As already discussed, positive legal adult-usage cannabis market customer experiences will be critical to displacing the illicit market. As we have learned was the case in several American jurisdictions, there is a delicate balance between pricing and illicit market mitigation. While cannabis prices may initially be set higher in the legal market, customers will be willing to pay more for the experiences and safety and that legal retailers will offer. If pricing is set too stringently or if cannabis is taxed at too high a rate, then the result will be a low margin of profits for retailers, thus providing less incentive to offer customers a positive experience with the legalized adult usage cannabis sector.

7.6 INNOVATION SYSTEM

- **Recommendation 27:** Establish a multi-ministry team to coordinate efforts and evaluate an industry-wide branding effort.
- **Recommendation 28:** Innovation Saskatchewan and the Saskatchewan Ministry of Agriculture offer support for market and product development through existing programming and facilitation.
- **Recommendation 29:** Industry partners establish a provincial industry association.
- **Recommendation 30:** Deregulate the hemp market and remove the current red tape.
- **Recommendation 31:** The Ministry responsible for monitoring Federal regulatory development provide regular updates to other Ministries and agencies.

Both Canada and Saskatchewan have numerous industry associations that provide sectoral support to advance growth, establish best practices, provide education, develop industry standards, and offer a collective position on policy and regulation. Currently in Canada, there are a number of different industry associations, including Canadian Association of Petroleum Producers, Aerospace Industries Association, Beverage Association, Federation of Independent Business, Meat Council, Nuclear Association, Recording Industry Association, Tourism Industry Association, Utilities Technology Council of Canada and many more. Similarly, in Saskatchewan there are numerous associations including the Saskatchewan Media Production Industry Association, Saskatchewan Cattlemen's Association, Saskatchewan Trucking Association, the Association of Creative Industries of Saskatchewan, Saskatchewan Mining Association, and many others. In some instances, the government financially supports industry associations; however, the norm is for the industry to self-organize.

Industry associations are member-based non-profit organizations that are typically governed by a volunteer board of directors. The main function of industry associations is to provide leadership toward a common goal or purpose in a specific industry.

Establishing a similar provincial body for the cannabis sector will support and advance standards for occupation health and safety, appropriate vendor training, new market opportunities, education to members and consumers on new industry trends, and opportunities for industry players to build networks of buyers and sellers. While industry associations were once thought to be little more than lobbyists, it is well established that such associations play a critical role in innovation and improve business performance (Doner and Sheneider 2000; Nordqvist, Picard, and Pesämaa 2010).

Research information is not available from current producers of medical cannabis, as strict corporate confidentiality is enforced. This type of containment will impede innovation as companies guard their trade secrets and corporate knowledge. Innovation funded by a producers group would result in a stronger and more nationally competitive sector; however, building sector-wide cooperation will be challenging.

Innovation Saskatchewan will play a major role in the development of the supply chain and identity preserved management systems as this will be aligned with efforts to support technology companies and their program, entitled Co-Labs could provide incubation support as well as linkage to other development programs.

Market research shows that Cannabis-infused foods will be very popular with Canadian consumers. However, the current challenges of quality control will mean extensive product testing will be needed before allowing the sale of cannabis-infused foods in the region.

7.7 DISTRIBUTION/RETAILING

- **Recommendation 32:** Do not distribute cannabis in the same retail outlets as tobacco and alcohol.
- **Recommendation 33:** Municipalities should develop zoning bylaws to limit the density of licensed retail outlets and their proximity of retail outlets to schools and youth centers.
- **Recommendation 34:** Implement a single licence retail outlet system for both medial and adult-usage cannabis.
- **Recommendation 35:** Set industry standards for packaging that allow for adult-usage branding.

Decisions surrounding distribution and retailing fall under the responsibility of the Government of Saskatchewan. From a public health and public safety perspective, there is strong evidence that cannabis should not be sold alongside alcohol or tobacco. There is a high concurrence of tobacco use with cannabis and it has been argued that co-use "could undermine the progress achieved over the last few decades on reducing smoking" (Task Force 2016, 22). When sold alongside alcohol, the effects of combining the products facilitates high risk behavior, such as driving while impaired (Mann et al. 2010).

When it comes to Cannabis concentrates, we recommend the province follow the precautionary principle. These products that can have up to a 70 per cent concentration of THC, such as dabbing or shatter, are largely un-researched and may be potentially more harmful (Weiss et al. 2017). The government should move slowly on permitted this legal yet potential harmful type of until such time as further research determines whether or not health impacts are detrimental.

Online sales of illicit cannabis are not uncommon and, thus, the e-commerce market will need to be regulated as well. With Saskatchewan's dispersed population, rural and northern communities will likely be accessing adult-use markets and medical cannabis through online sales.

With regard to municipal jurisdiction, there should be limits to the location of where cannabis can be sold to protect public health and safety; this can include restrictions on proximity to places such as schools, community centres, and public parks. It is suggested that a maximum of four plants be allowed for personal cultivation, with plants being properly secured from youth.

We also recommend a single retail distribution system, for both medical and adult-usage of cannabis, opposed to parallel systems. Streamlined systems that avoid administrative duplications will be a key part of tracking both medical and adult-use inventory. As the Canadian Association of Chiefs of Police (2017c) have suggested,

Combining the regulatory framework associated to the production, distribution and legal access to cannabis under the new *Act* for both adult-usage cannabis and medical marijuana would:

1) Reduce the risk of confusion between the two systems and the associated burden placed on frontline police officers who have to interpret the relevant legislations;
2) Align the efforts of Health Canada officials and law enforcement agencies responsible for enforcing the associated legislation;
3) Limit the number of corporations authorized to produce and distribute marijuana thereby allowing for more robust vetting and quality control;
4) Provide an opportunity to go beyond reducing the risks associated to diverting legal cannabis and/or medical marijuana by mitigating the capabilities of organized crime to money launder within the current medicinal marijuana framework and the proposed *Cannabis Act* (4).

There is also an economic advantage demonstrated by the American experiences, showing that retailers that sell both adult-usage and medical cannabis experience higher profit margins (Marijuana Business Daily 2017, 11). The major caveat to this recommendation is protecting patient rights. According to the Task Force (2016), the potential loss of access and legitimacy of medical cannabis may be negatively impacted. As such, a single system would have to ensure these concerns are addressed.

The approach to packaging for adult-based usage will be key to industries' ability to compete with the illicit market. Packaging that is clearly stamped with regulatory approval/warnings, quality and potency, and branding will be a critical difference between the purchase of legal and illicit cannabis. For example, a child-resistant container clearly labelled as tested and safe is far more desirable to the average consumer than a Ziploc bag. According to Philippe Lucas, executive director of the Canadian Medical Cannabis Council, branding for the adult-usage market will help "eliminate confusion between the illegal and legal markets, allow professional companies to separate themselves from 'less scrupulous' competitors, differentiate high-quality products from low-quality products and provide an opportunity to educate consumers about responsible consumption" (MacDonald 2017)

Regulatory and licensing requirements for the retail sector must also be carefully planned. The framework must include limitations on purchase and possession quantities, both for the individual and the retail outlet. Signage and other promotional materials should adhere to required standards. As previously indicated, offering cannabis sales in locations that are firmly disconnected from the alcohol industry is in the best interest of the public.

This is particularly important for protecting youth, who are less likely to use cannabis, or at least delay the age of first use, when they live further away from the source. Regulation of retail outlets should stipulate a minimum distance away from schools and other places frequented by youth. There are some that believe industrial areas are the safest and healthiest option for a cannabis shop. In some States that have legalized cannabis, municipal authorities retain the right to ban commercial sales. The relationship between the municipal governments and provincial government will be important in creating a lasting regulatory framework that minimizes negative outcomes.

7.8 LICENSING

- **Recommendation 36:** Develop a merit-based model of licensing that rewards meeting security and quality expectations or standards.

- **Recommendation 37:** Grant a limited number of licenses to private retailers to minimize the illicit market.

- **Recommendation 38:** The mandate of the Saskatchewan Liquor and Gaming Authority should be expanded to include cannabis regulation.

Regardless of the model chosen for the retail portion of the cannabis market and the system of distribution, the cannabis market will require government oversight. Meeting the objectives laid out in the *Cannabis Act*, along with the objectives of the provincial government, will require that rules and regulations be enforced. As such, the Saskatchewan Liquor and Gaming Authority mandate should be expanded to include cannabis.

SLGA already has authority over both liquor and gaming in the province and thus has expertise and experience in the regulation of addicting and intoxicating substances. SLGA's role in the cannabis market should include inspections of retail sites and the enforcing of adherence to age of majority. In the event that the provincial government opts to own and operate at either the retail or distribution level of the market, SLGA already has experience running both retail and distribution facilities with alcohol. They are the natural arm of the provincial government to own and operate these facilities if private sector options are not pursued.

Licensing will play an important role in public safety. Regardless of the model chosen for the retail portion of the cannabis market and the system of distribution, the cannabis market will require government oversight. Meeting the objectives laid out in the *Cannabis Act* along with the objectives of the provincial government will require that rules and regulations are enforced. As such, SLGA's mandate should be expanded to include cannabis.

A licence should be required for anyone involved in the supply chain. This will allow for the traceability of all products and protect against divergence. As such, the design of a seed-to-sale tracking system, which will be the responsibility of the federal government, will be a critical tool for inventory control of the legal market. This will help regulators track seeds and plants, including those which are grown and used, as well as waste products. An effective tracking system monitors the cannabis during cultivation, harvest, production, and sales phases, which helps minimize product loss. Decreased diversion of product will reduce support to the illicit market. While there are several different methods of tracking the product, there has been a recent shift towards technological advances, such as radio frequency identification tags being required in some jurisdictions. Licensing of all phases of the cannabis industry will enhance compliance with the seed-to-sale tracking system.

Approving licenses for production and retail granted through a merit-based system that rewards meeting public safety and public health expectations, while maximizing economic benefits, would be preferred. Selecting the best candidates to licence maximizes the potential for a safe supply chain that minimizes the illicit market. However, this system of licensure has been criticized as biased and favouring larger more established companies. While some jurisdictions (Arizona, for example) went with a lottery system to determine retailing licensing decisions, this may not be the best option for minimizing negative public impact. A lottery system may appear fairer by allowing market access for smaller companies and not specifying geographical preferences. However, emerging companies may not have the same capacity for industry support as ones that are more established. Furthermore, Saskatchewan may have more of a desire to select locations that meet preferred criteria. Unfortunately, both the merit system and lottery system have received criticism and have been subjected to legal action in the U.S. Nevertheless, selective approval of production and retail licences based upon worthiness and quality allows for the governing body to consider a careful balance of industry needs and protecting public health and safety. Some jurisdictions have considered a merit based system for the applications, where a lottery is used to solve a tie-breaker for equally qualified applications.

7.9 HOME CULTIVATION

- **Recommendation 39:** Prior to legalization engage in careful planning for home grown cultivation within the defined limits.

With respect to youth access within homes, regulation and strict penalties can hold parents responsible for securing cannabis in the home and for securing any homegrown production. The other option for homegrown cannabis is to continue with prohibition. However, individuals who currently grow cannabis within their homes have chosen to do this despite the current prohibition and will likely have more incentive to continue after legalization, as it will no longer be the production of an illicit good. Furthermore, consumers who have preferences towards non-commercially grown cannabis may decide, if homegrown cannabis is allowed, to leave the illicit market and grow their own, leading to the benefits of reducing the size of the illicit market.

Allowing home cultivation is going to be a very thorny issue that will require careful planning and application. Home cultivation limits can be changed by the Province, but currently best practices in how to police or monitor this activity are lacking. In the United State the various jurisdiction have taken very different approach with Colorado allowing six plants, Washington prohibiting home grown cannabis and Alaska limiting mature plants to 3 but allowing the cultivation of 6. The federal plan is to allow up to 4 plants per household; however, one of the problems with this plan is that the crop from four plants will yield far more cannabis then might be needed for personal consumption. So then what?

Quebec officials have given signals that the province will not move to allow home cultivation for the July 2018 deadline, and any mention of home cultivation in Ontario's plan was absent. The Canadian Association of Chiefs of Police has also identified concerns around over-production, youth exposure, fire hazards, in-home mold development, and diversion to illicit markets (Canadian Association of Chiefs of Police 2017a). While the potential ancillary markets are significant, provincial capacity to handle the issues that will arise is lacking. Saskatchewan should not rush to permit home cultivation until such time as a full collaborative process among ministries has occurred, including public consultation and stakeholder engagement (police, municipal governments, landlords/tenant and condo associations, and so forth).

7.10 MONITORING IMPACTS

- **Recommendation 40:** Invest in data collection and further research to accurately monitor the short-, mid-, and long-term outcomes of the legalization of adult-use cannabis.

Significant gaps exist in modern cannabis policy because the sector is so new and, as a result, the government will inevitably have to adjust various policy instruments following implementation. Additionally, the rapid pace of the planned implementation will limit the time that public officials will have to develop Saskatchewan-specific indicators. Despite these constraints—and also because of them—there is a responsibility to evaluate the outcomes of this massive policy change. Future evidence-based policy making will be enhanced by analytical evaluations in the early period of adult-use cannabis, and local context is highly important. The Canadian Centre on Substance Use and Addiction 2016 report recommends that a minimum of 10 per cent of cannabis industry revenue should be dedicated to research, especially given the complete gap of knowledge about the potentially harmful outcomes of high potency and genetically modified cannabis. This group also recommends an immediate investment in funding for research and central coordination. Currently, it is unknown what data will be collected at a federal level and, therefore, it is uncertain how this may be used within the province. Maslov, Lawrence, and Ferguson (2016) have suggested the use of 18 performance metrics; however, there is currently no data being collected on a number of these metrics. It will be important to measure changes related to negative outcomes of cannabis use in terms of public safety, healthcare system demands, and impacts on education and social services. It will also be important to measure positive outcomes of adult-use cannabis in terms of economic growth and sector innovation. Current metrics related to cannabis use in Saskatchewan are minimal and, therefore, it may be prudent to expedite baseline data collection. This information may be critical for effective comparison of conditions before and after legalization, and to monitor changes over time. Governing the sector will require careful monitoring and, thus, the collection of data will require significant investment. Eventually, investment from taxation revenue within the sector will be able to sustain financial support for research and evaluation, but an initial funding structure will require support from other more immediate sources.

References

Adlaf, E. M., Mann, R. E., & Paglia, A. (2003). Drinking, cannabis use and driving among Ontario students. *Canadian Medical Association Journal*, *168*, 565–566.

Agriculture and Agri-Food Canada. (2013). Consumer Trends - Wine, Beer and Spirits in Canada. Market Indicator Report. Retrieved on October 16 from http://www.agr.gc.ca/resources/prod/Internet-Internet/MISB-DGSIM/ATS-SEA/PDF/6476-eng.pdf.

Alberta. (2017). Alberta's approach to cannabis legalization. Retrieved from https://www.alberta.ca/cannabis-legalization.aspx.

Amadee & Company, Inc. (2015). From Illicit to Legal and Beyond to Pharmaceuticals - Global markets, Competitors and Opportunities: 2015 - 2020 Analysis and Forecasts. Retrieved on October 16 from https://www.researchandmarkets.com/reports/3108312/from-illicit-to-legal-and-beyond-to#pos-0.

Allard v. Canada. 2016 FC 236, (2016). Retrieved from https://www.canlii.org/en/ca/fct/doc/2016/2016fc236/2016fc236.html on 2017-07-25.

Angus Reid Institute (2017). Canadians disjointed on pot plan: Most support the bill, but think it will fail in its key goals. *Angus Reid Institute*. Retrieved from http://angusreid.org/marijuana-legalization-bill/.

Antoniou, T. & Juurlink, D. (2014). Five things to know about synthetic cannabinoids. *Canadian Medical Association Journal, 186* (3), 210.

Appelboam, A. & Oades, P. (2006). Coma due to cannabis toxicity in an infant. *European Journal of Emergency Medicine, 13*, 177-179.

Argurell, S., Halldin, M., Lindgren, J., Ohlsson, A., Widman, M., Gillespie, H., & Hollister, L. (1986). Pharmacokinetics and metabolism of delta 1-tetrahydrocannabinol and other cannabinoids with emphasis on man. *Pharmacological Reviews*, 38 (1), 21-43. Retrieved from http://pharmrev.aspetjournals.org/content/38/1/21.

Asbridge M, Hayden, J.A., & Cartwright, J.L. (2012). Acute cannabis consumption and motor vehicle collision risk: Systematic review of observational studies and meta-analysis. *BMJ*, 344-e536.

Balodis, I.M., Potenza, M.N., & Olmstead, M.C. (2009). Binge drinking in undergraduates: Relationships with sex, drinking behaviors, impulsivity, and the perceived effects of alcohol. *Behavioral Pharmacology., 20*, 518–526.

Baxter, D. (2017, September 8). Sask. government launches survey on recreational marijuana legislations. *Global News*. Retrieved from http://globalnews.ca/news/3729913/sask-government-launches-survey-on-adult-usage -marijuana-regulations/.

Beauchesne, L. (2002). Conditions for real public policy on harm reduction: The role of the federal government. (Brief Submitted to the House of Commons Special Committee on the Non-Medical Use of Drugs). March 2002. p. 4.

Beirness, D. J. & Smith, D.R. (2017). An assessment of oral fluid drug screening devices. *Canadian Society of Forensic Science Journal, 50* (2), 55-63.

Borchardt, D. (2017, July 19). Colorado hits another cannabis milestone with half a billion in tax revenue. *Forbes*. Retrieved from https://www.forbes.com/sites/debraborchardt/2017/07/19/colorado-hits-another-cannabis-milestone-with-half-a-billion-in-sales/#243eee4c6d63.

---- (2017, January 3). Marijuana sales totaled $6.7 billion in 2016. *Forbes*. Retrieved from https://www.forbes.com/sites/debraborchardt/2017/01/03/marijuana-sales-totaled-6-7-billion-in-2016/#697d481d75e3.

Boros, C.A., Parsons, D.W., Zoanetti, G.D., Ketteridge, D., & Kennedy, D. (1996). Cannabis cookies: A cause of coma. *Journal of Paediatrics and Child Health*, *32* (2), 194-195.

Bozinoff, L. (2015, November 9). Majority approved of legalized, regulated, taxed cannabis. *The Forum Poll.* Retrieved from http://poll.forumresearch.com/post/2426/most-want-it-licensed-and-sold-through-government-agencies/.

Spurgeon, D. (2001). Canada legalises the medical use of cannabis. *British Medical Journal*, *323* (68), 68-69.

Burns, J.K. (2013). Pathways from cannabis to psychosis: a review of the evidence. *Frontiers in Psychiatry*, *14*. Retrieved from https://doi.org/10.3389/fpsyt.2013.00128.

Campbell, M. (2017). Legalizing weed: how Uruguay tripped up. *Maclean's*. March 17. Retrieved from http://www.macleans.ca/politics/legalizing-weed-how-uruguay-tripped-up.

Canadian Association of Chiefs of Police (2017a). *Government Introduces Legislation to Legalize Cannabis*. CACP Discussion Paper. (CACP Discussion Paper No. 2017-1382). Retrieved from https://cacp.ca/index.html?asst_id=1382.

---- (2017b). *Recommendations of the Task Force on Cannabis Legalization and Regulation*. (CACP Discussion Paper No. 2017-1332). Retrieved from https://cacp.ca/index.html?asst_id=1332

---- (2017c). *Written Brief to the Standing Committee on Health*. Retrieved from https://www.cacp.ca/index.html?asst_id=1509.

Canadian Centre on Substance Abuse (2015). *Cannabis regulation: Lessons learned in Colorado and Washington State*. Retrieved from http://www.ccsa.ca/Resource%20Library/CCSA-Cannabis-Regulation-Lessons-Learned-Report-2015-en.pdf.

---- (2017). N*ational research agenda on the health impacts of non-medical cannabis use*. Retrieved from http://www.ccsa.ca/Resource%20Library/CCSA-National-Research-Agenda-Non-Medical-Cannabis-Use-Summary-2017-en.pdf.

---- (2014, March). *Synthetic cannabinoids in Canada*. Retrieved from http://www.ccsa.ca/Resource%20Library/CCSA-CCENDU-Synthetic-Cannabis-Bulletin-2014-en.pdf.

Canadian Centre on Substance Use and Addiction (n.d.). *Substance Use During Pregnancy.* Retrieved from http://www.ccsa.ca/Eng/topics/Treatment-and-Supports/Substance-Use-during-Pregnancy/Pages/default.aspx.

Caputo, M. R. & Ostrom, B. J. (1994). Potential tax revenue from a regulated marijuana market: A meaningful revenue source. *The American Journal of Economics and Sociology, 53* (4), 475-490.

Carstairs, C. (2000). 'Hop heads' and 'hypes': Drug use, regulation and resistance in Canada, 1920-1961 (Doctoral dissertation). *University of Toronto*. Retrieved from http://www.collectionscanada.gc.ca/obj/s4/f2/dsk2/ftp03/NQ53757.pdf.

CBC News (2012). Most in Sask. oppose decriminalizing marijuana, poll says. *CBC/Radio-Canada*. November 7, Retrieved from http://www.cbc.ca/news/canada/saskatchewan/most-in-sask-oppose-decriminalizing-marijuana-poll-says-1.1271250.

---- (2017, September 8). Sask. government launches cannabis survey as part of "aggressive" legalization timeline: Minister. *CBC/Radio-Canada*. Retrieved from http://www.cbc.ca/news/canada/saskatchewan/cannabis-survey-1.4280982.

---- (2013, February 26). Synthetic pot widely available amid legal grey area. *CBC/Radio-Canada.* Retrieved from http://www.cbc.ca/news/canada/newfoundland-labrador/synthetic-pot-widely-available-amid-legal-grey-area-1.1307869.

Cerdá M., Wall M., Feng, T., Keyes, K.M., Sarvet, A., Schulenberg, J., O'Malley, P.M., Pacula, R.L., Galea, S., & Hasin, D.S. (2017). Association of state recreational marijuana laws with adolescent marijuana use. *The Journal of the American Medical Association Pediatrics, 171* (2), 142–149.

Chadwick, B., Miller, M. L., & Hurd, Y. L. (2013). Cannabis use during adolescent development: susceptibility to psychiatric illness. *Frontiers in Psychiatry, 4,* 129.

Chang, T. & Jacobson, M. (2017). Going to pot? The impact of dispensary closures on crime. *Journal of Urban Economics, 100*, 120-136.

Chief Medical Officers of Health of Canada & Urban Public Health Network (2016). Public health perspectives on cannabis policy and regulation. Urban Public Health Network. Retrieved from http://uphn.ca/wp-content/uploads/2016/10/Chief-MOH-UPHN-Cannabis-Perspectives-Final-Sept-26-2016.pdf.

City and County of Denver (2016). *Leading the Way in Municipal Marijuana Management*. Retrieved from https://www.denvergov.org/content/dam/denvergov/Portals/782/documents/Annual%20Report_Reader.pdf.

City of Calgary (2017). *Cannabis (Marijuana)* in Calgary. Retrieved from http://www.calgary.ca/CSPS/ABS/Pages/Bylaws-by-topic/Cannabis.aspx.

Colorado Association of Chiefs of Police (2015). Colorado's legalization of cannabis and the impact on public safety: A practical guide for law enforcement. *Police Foundation*. Retrieved from http://www.policefoundation.org/wp-content/uploads/2015/06/Legalized-Marijuana-Practical-Guide-for-Law-Enforcement_Rev6_18_15_LOW_0.pdf.

Colorado Office of State Planning and Budgeting (2016). State of Colorado Marijuana Tax Cash Fund Appropriations and Actual Expenditure. *State of Colorado*. Retrieved from https://drive.google.com/file/d/0B-GHuI9KBfjVQ0h4U2dOMGxZYWc/view.

Cronk, C. E. & Sarvela, P. D. (1997). Alcohol, tobacco, and other drug use among rural/small town and urban youth: A secondary analysis of the monitoring the future data set. *American Journal of Public Health*, 87 (5), 760-764. Retrieved from http://ajph.aphapublications.org/.

Darnell, A.J. & Bitney, K. (2017). *I-502 evaluation and benefit-cost analysis: Second required report.* (Document number 17-09-3201). Olympia: Washington State Institute for Public Policy.

Decort, T. (2010). The case for small-scale domestic cannabis cultivation. *International Journal of Drug Policy, 21* (4), 271–275.

Deloitte (2016). Recreational marijuana: Insights and opportunities. *Deloitte Touche Tohmatsu Limited*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/Analytics/ca-en-analytics-DELOITTE%20Adult-usage %20Marijuana%20POV%20-%20ENGLISH%20FINAL_AODA.pdf.

Doner, R. F. & Sheneider, B. R. (2000). Business associations and economic development: Why some associations contribute more than others. *Business and Politics, 2* (3), 261-288.

Dormer, D. (2017, June 2). Province wants feedback on marijuana legalization in Alberta. *CBC News*. Retrieved from http://www.cbc.ca/news/canada/calgary/alberta-marijuana-legalize-survey-1.4143376.

Drug Policy Alliance (2014). A Comparison of the World's First Three Jurisdictions to Legally Regulate Marijuana: Colorado, Washington and Uruguay. *Drug Policy Alliance*. Retrieved from http://www.drugpolicy.org/resource/comparison-worlds-first-three-jurisdictions-legally-regulate-marijuana-colorado-washington-.

Drummer, O. H., Gerostamoulos, J., Batziris, H., Chu, M., Caplehorn, J., Robertson, M.D., & Swann, P. (2004). The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes. *Accident Analysis and Prevention, 36* (2), 239-48.

Dumouchel, A. (2017). How the marijuana industry will boost Canadian innovation. *The Globe and Mail.* April. Retrieved from https://beta.theglobeandmail.com/report-on-business/rob-commentary/how-the-marijuana-industry-will-boost-canadian- innovation/article34765691/?ref=http://www.theglobeandmail.com.

Ekos Research Associates (2016). Baseline Survey on awareness, knowledge and behaviour associated with recreational use of marijuana - Final report. *Health Canada*. Retrieved from http://epe.lac-bac.gc.ca/100/200/301/pwgsc-tpsgc/por-ef/health/2016/046-15-e/report-rapport-eng.html.

Elvik R. (2012). Risk of road accident associated with the use of drugs: A systematic review and meta-analysis of evidence from epidemiological studies. *Accident Analysis & Prevention 60*, 254-267.

Enns, A. (2017). Survey says: Canadians split on cannabis legalization. *NRG Research Group*. Retrieved from https://www.nrgresearchgroup.com/survey-says-canadians-split-on-marijuana-legalization/.

Erickson, P. G. & Oscapella, E. (1999). Cannabis in Canada—A puzzling policy. *International Journal of Drug Policy, 10* (4), 313-318.

Fayerman, P. (2016, August 25). Doctors to give Trudeau an earful for his marijuana legalization plans. *The Vancouver Sun*. Retrieved from http://vancouversun.com/news/national/doctors-weigh-in-on-pm-trudeaus-plans-for-marijuana-legalization.

Fernando, N. A. (2006). Open-ended space: Urban streets in different cultural contexts. In K. Franck, K. & Stevens, Q. (Eds.), *Loose Space: Diversity and Possibility in Urban Life*. Routledge. (pp. 54-72). Retrieved from http://link.library.deakin.edu.au/portal/Loose-space--possibility-and-diversity-in-urban/zz9u4V7uoDM/.

Fischer, B., Kuganesan, S., & Room, R. (2015). Medical cannabis programs: Implications for cannabis control policy –observations from Canada. *International Journal of Drug Policy, 26* (1), 15-19.

Fischer, B., Rodopoulos, J., Rehm, J., & Ivsins, A. (2006). Toking and driving: Characteristics of Canadian university students who drive after cannabis use—an exploratory pilot study. *Drugs: Education, Prevention and Policy, 13* (2), 179-187.

Freeman, S. (2017, February 14). Canopy Growth Corp almost triples revenue as number of patients soars. *Financial Post*. Retrieved from http://business.financialpost.com/commodities/agriculture/canopy-growth-corp-almost-triples-revenue-as-number-of-patients-soars.

Freisthler, B., Ponicki, W.R., Gaidus, A., & Gruenewald, P.J. (2016). A micro-temporal geospatial analysis of medical marijuana dispensaries and crime in Long Beach, California. *Addiction, 111* (6), 1027-1035.

Freisthler, B., Kepple, N. J., Sims, R., & Martin, S. E. (2013). Evaluating medical marijuana dispensary policies: Spatial methods for the study of environmentally- based interventions. *American Journal of Community Psychology, 51* (1-2), 278–288

Freisthler, B. & Gruenewald, P.J. (2014). Examining the relationship between the physical availability of medical marijuana and marijuana use across fifty California cities. *Drug Alcohol Dependence*, *143*, 244– 250.

Freeman, K., McHenry, M. A., Cats-Baril, W., & Grace, T. (2015). Cannabis testing for public safety: best practices for Vermont analytical laboratories. *Phyto Science Institute*. Retrieved from https://static1.squarespace.com/static/57b47200b8a79b78f9395478/t/57b4894bebbd1afe9c938f26/1471449421608/Cannabis+Testing+for+Public+Safety+-+Best+Practices+for+Vermont+Analytical+Laboratories+v1.0.pdf.

Gage, S., Zammit, S., & Hickman, M. (2013). Stronger evidence is needed before accepting that cannabis plays an important role in the aetiology of schizophrenia in the population. *F1000 Medicine Reports, 5*.

Ghosh, T., Van Dyke, M., Maffey, A., Whitley, E., Gillim-Ross, L., & Wolk, L. (2016). The public health framework of legalized marijuana in Colorado. *American Journal of Public Health, 106* (1), 21–27.

Giffen, P.J., Endicott, S.J., & Boorman, S. (1991). Panic and Indifference: The Politics of Canada's Drug Laws: *A Study in the Sociology of Law.* Ottawa, Canada: Canadian Centre on Substance Abuse.

Government of Canada. (2012, February 4). Marihuana for medical purposes regulations. *Canada Gazette, 146* (5). Retrieved from http://gazette.gc.ca/rp-pr/publications-eng.html.

---- (2015). Drug impaired driving: Consultation document. *Department of Justice*. Retrieved from http://www.justice.gc.ca/eng/cons/did-cfad/theor.html.

---- (2016a). Access to cannabis for medical purposes regulations. *Canada Gazette, 150* (17). Retrieved from http://gazette.gc.ca/rp-pr/publications-eng.html.

---- (2016b). Consumer information - cannabis (marihuana, marijuana). *Health Canada.* Retrieved from https://www.canada.ca/en/health-canada/services/drugs-health-products/medical-use-marijuana/licensed-producers/consumer-information-cannabis-marihuana-marijuana.html.

---- (2016c). Understanding the new Access to Cannabis for Medical Purposes Regulations. *Health Canada*. Retrieved from https://www.canada.ca/en/health-canada/services/publications/drugs-health-products/understanding-new-access-to-cannabis-for-medical-purposes-regulations.html.

---- (2017a). Authorized Licensed Producers of Cannabis for Medical Purposes. Retrieved from https://www.canada.ca/en/health-canada/services/drugs-health-products/medical-use-marijuana/licensed-producers/authorized-licensed-producers-medical-purposes.html

---- (2017b). A strong Canada at home and in the world. *Federal Budget 2017*. Retrieved from http://www.budget.gc.ca/2017/docs/plan/chap-03-en.html#Toc477707432.

---- (2017c). Backgrounder: Changes to impaired driving laws. *Health Canada*. Retrieved from https://www.canada.ca/en/health-canada/news/2017/04/backgrounder_changestoimpaireddrivinglaws.html.

---- (2017 d). Drug Screening Device Pilot Project receives positive views from police. *Public Safety Canada*. Retrieved from https://www.canada.ca/en/public-safety-canada/news/2017/06/drug screeningdevicepilotprojectreceivespositivereviewsfrompoli.html.

---- (2017e). Introduction of the Cannabis Act: Questions and answers. *Health Canada*. Retrieved from https://www.canada.ca/en/services/health/campaigns/introduction-cannabis-act-questions-answers.html#a7.

---- (2017f). Legalizing and strictly regulating cannabis: The facts. *Health Canada*. Retrieved from https://www.canada.ca/en/services/health/campaigns/legalizing-strictly-regulating-cannabis-facts.html.

---- (2017g). Legislative background: Reforms to the transportation provisions of the Criminal Code (Bill C-46). *Department of Justice*. Retrieved from http://www.justice.gc.ca/eng/csj-sjc/pl/sidl-rlcfa/c46/c46.pdf.

---- (2017h). List of approved cultivars for the 2017 growing season - Cannabis Sativa L. *Health Canada*. Retrieved from https://www.canada.ca/en/health-canada/services/health-concerns/controlled-substances-precursor-chemicals/industrial-hemp/commercial-licence/list-approved-cultivars-2017-growing-season-cannabis-sativa.html.

---- (2017i). Market data: Access to Cannabis for Medical Purposes Regulations. *Health Canada*. Retrieved from https://www.canada.ca/en/health-canada/services/drugs-health-products/medical-use-marijuana/licensed-producers/market-data.html.

---- (2017j). Procedures for accessing cannabis for medical purposes from a licensed producer. *Health Canada*. Retrieved from https://www.canada.ca/en/health-canada/services/drugs-health-products/medical-use-marijuana/procedures-accessing-cannabis-medical-purposes-licensed-producer.html.

Green, M. & Miller, R.D. (1975). Cannabis use in Canada. In Rubin, V. (Ed.), *Cannabis and Culture*. The Hague: Mouton Publishers, 497-520. Retrieved from https://sencanada.ca/content/sen/committee/371/ille/library/spicer-e.htm#B.

Gunn, J.K., Rosales, C.B., Center, K. E., Nunez, A., Gibson, S.J., Christ, C., & Ehiri, J.E. (2017). Prenatal exposure to cannabis and maternal and child health outcomes: a systematic review and meta-analysis. *British Medical Journal Open, 6,* 1-8.

Hakkarainen, P., Frank, V.A., Barratt, M. J., Dahl, H.V., Decorte, T., Karjalainen, K., Lenton, S., Potter, G., & Werse, B. (2015). Growing medicine: Small-scale cannabis cultivation for medical purposes in six different countries. *International Journal of Drug Policy, 26* (3), 250-256.

Hall, W. (2015). What has research over the past two decades revealed about the adverse health effects of recreational cannabis use? *Addiction, 110* (1), 19–35.

Harris, K. (2017, February 13). Liberals table bills to legalize pot, clamp down on impaired driving. *CBC News.* Retrieved from http://www.cbc.ca/news/politics/marijuana-legal-bill-1.4069178.

Hawken. A., Caulkins, J., Kilmer, B., & Kleiman, M. (2013). Quasi-legal cannabis in Colorado and Washington: local and national implications. *Addiction, 108* (5), 837-838.

Health Technology Assessment Unit (HTAU) (2017). Cannabis evidence series: An evidence synthesis. *Alberta Ministry of Health*. Retrieved from http://www.health.alberta.ca/documents/AHTDP-Cannabis-Evidence-Series-2017.pdf.

Hemachandra, D., McKetin, R., Cherbuin, N., & Anstey, K. J. (2016). Heavy cannabis users at elevated risk of stroke: evidence form a general population survey. *Australian and New Zealand Journal of Public Health, 40* (3), 226-230.

Hibpshman, D. (2017). Marijuana licensing updates. *Oregon Liquor Control Commission*. Retrieved from http://www.oregon.gov/olcc/marijuana/Documents/Presentations/OLCC_RecMJ_Licensing_Workshop_Update_020817.pdf.

Hoffer, J. (2017, May 29). Can residential landlords restrict cannabis activity in rental units? *The Lawyer's Daily*. Retrieved from https://www.thelawyersdaily.ca/articles/3779/can-residential-landlords-restrict-cannabis-activity-in-rental-units.

Hough, M., Warburton, H., Few, B., May, T., Man, L., Witton, J., & Turnbull, P.J. (2003). A growing market: The domestic cultivation of cannabis. *Joseph Rowntree Foundation & National Addiction Centre.* Retrieved from https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/1859350852.pdf.

Illescas, C. (2016, May 26). Marijuana sales tax revenue huge boon for Colorado cities. *The Denver Post.* Retrieved from http://www.denverpost.com/2016/05/26/marijuana-sales-tax-revenue-huge-boon-for-colorado-cities/

Ingold, J. (2010, January 24). Analysis: Denver pot shops' robbery rate lower than banks. *The Denver Post*. Retrieved from http://www.denverpost.com/ci_14275637.

Ingold, J. & Lofholm, N. (2011, January 24). Medical marijuana dispensaries' effect on crime unclear. *The Denver Post*. Retrieved from http://www.denverpost.com/ci_17178820.

Insightrix (2017). *Support for legalization of cannabis*. Retrieved from https://insightrix.com/support-for-legalization-of-cannabis/.

Instituto de Regulación y Control del Cannabis Association (IRCCA) (2014). Objectives and tasks. *IRCCA Convencion*. Retrieved from http://www.ircca.gub.uy/objetivos-y-cometido.

Iversen, L. (2003). Cannabis and the brain. *Brain, 126* (6), 1252-270.

Jacques, S.C., Kingsbury, A., Henschke, P., Chomchai, C., Clews, S., Falconer, J., Abdel-Latif, M.E., Feller, J.M., & Oei, J.L. (2014). Cannabis, the pregnant woman and her child: weeding out the myths. *Journal of Perinatology, 34*, 417-424.

Johnson, G. (2015, July 4). Washington state has brought in $70 million in tax revenue from legal marijuana sales. *Business Insider*. Retrieved from http://www.businessinsider.com/adult-usage -marijuana-washington-state-tax-revenue-2015-7.

Keeping, Z. & Huggins, R. (2017). Final report on the oral fluid drug screening device pilot project. *Public Safety Canada*. Retrieved from https://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/rl-fld-drg-scrnng-dvc-plt/index-en.aspx.

Kepple, N. J. & Freisthler, B. (2012). Exploring the ecological association between crime and medical marijuana dispensaries. *Journal of Studies on Alcohol and Drugs*, *73* (4), 523-8.

Kirkup, K. (2017). Western provinces expect Ottawa to pay costs associated with cannabis legalization plan. *The Canadian Press*. Retrieved from https://www.theglobeandmail.com/news/politics/western-provinces-expect-ottawa-to-pay-costs-associated-with-marijuana-legalization-plan/article34607311/.

Klemaier, J. (2014, June 5). Golden city council votes to ban marijuana sales. *The Denver Post*. Retrieved from http://www.denverpost.com/.

Koven, P. (2016, September 17). Tweed marijuana renames itself Canopy Growth Corp as it charts growth path at AGM. *Financial Post.* Retrieved from http://business.financialpost.com/commodities/agriculture/tweed-marijuana-renames-itself-canopy-growth-corp-as-it-charts-growth-path-at-agm.

Krishna, M. (2017). The economic benefits of legalizing weed. *Investopedia, LLC*. Retrieved from http://www.investopedia.com/articles/insights/110916/economic-benefits-legalizing-weed.asp.

Laate, E. A. (2015). Industrial Hemp Production in Canada. *Government of Alberta: Alberta Agriculture and Rural Development*. Retrieved from http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/econ9631.

Lambert, Steve. (2017). Manitoba wants to know about your marijuana use as it prepares for legalization. *Canadian Broadcasting Company.* Retrieved from http://www.cbc.ca/news/canada/manitoba/marijuana-legalization-manitoba-1.4201190.

Laucius, J. (2017, February 4). With cannabis legalization, a new problem sprouts: How to test for high drivers. *Ottawa Citizen*. Retrieved from http://ottawacitizen.com/news/national/marijuana-will-likely-be-legalized-this-spring-that-that-creates-a-whole-lot-of-problems-for-roadside-testing.

Lee, M. A. (2012). *Smoke Signals: A Social History of Marijuana-Medical, Recreational and Scientific*. New York: Scribner.

Leeds School of Business (2017). Colorado Business Economic Outlook. *University of Colorado* Boulder. Retrieved from http://www.colorado.edu/business/business-research-division/brd-publications/colorado-business-economic-outlook/2017-outlook.

Liberal Party of Canada (2017). *Marijuana: We Will Legalize, Regulate and Restrict Access to Marijuana*. Retrieved from https://www.liberal.ca/realchange/marijuana/.

Li, M.C., Brady, J.E., DiMaggio, C.J., Lusardi, A.R., Tzong, K.Y., & Li, G. (2012). Cannabis use and motor vehicle crashes. *Epidemiol Rev. 34* (1), 65-72.

Light, M., Orens, A., Lewandowski, B., & Pickton, T. (2014). Market size and demand for marijuana in Colorado. *Marijuana Policy Group.* Retrieved from https://www.colorado.gov/pacific/sites/default/files/Market%20Size%20and%20Demand%20Study%2C%20July%209%2C%202014%5B1%5D.pdf.

Light, M., Orens, A., Rowberry, J., & Saloga, C.W. (2016). The economic impact of marijuana legalization in Colorado. *Marijuana Policy Group.* Retrieved from http://www.mjpolicygroup.com/pubs/MPG%20Impact%20of%20Marijuana%20on%20Colorado-Final.pdf.

MacDonald, B. (2017, September 11). 'Naive' to think criminal element will end with pot legalization, senior Mountie tells MPs. *CBC News.* Retrieved from http://www.cbc.ca/news/politics/health-committee-marijuana-legalization-1.4282569

---- (2017, September 12). 'Impossible': Senior police officials tell MPs they won't be ready for legal cannabis. *CBC News.* Retrieved from http://www.cbc.ca/news/politics/police-chiefs-cannabis-impossible-1.4285235.

Macdonald, S., DeSouza, A., Mann, R.E., & Chipman, M. (2004). Driving behaviour of alcohol, cannabis and cocaine abuse clients and population controls. *American Journal of Drug Alcohol Abuse*, *30*, 429–444.

Macdonald, S., Stockwell, T., Reist, D., Belle-Isle, L., Benoit, C., Callaghan, R., Cherpitel, C., Dyck, T., Jansson, M., Pauly, B., Roth, E., Vallance, K., & Zhao, J. (2016). Legalization of cannabis in Canada: Implementation strategies and public health. *Center for Addictions Research of BC.* Retrieved from https://www.uvic.ca/research/centres/carbc/assets/docs/bulletin-16-legalization-of-cannabis-in-canada.pdf.

Mair, C., Freisthler, B., Ponicki, W.R., & Gaidus, A. (2015). The impacts of marijuana dispensary density and neighborhood ecology on marijuana abuse and dependence. *Drug and Alcohol Dependence, 154*, 111-116.

Mann, R. E., Stoduto, G., Lalomiteanu, A., Asbridge, M., Smart, R.G., & Wickens, C.M. (2010). Self-reported collision risk associated with cannabis use and driving after cannabis use among Ontario adults. *Traffic Injury Prevention*, *11* (2), 115-122.

Mark, K. & Terplan, M. (2017). Cannabis and pregnancy: Maternal child health implications during a period of drug policy liberalization. (In press). *Preventative Medicine*. Retrieved from http://dx.doi.org/10.1016/j.ypmend.2017.05.012.

Marijuana Business Daily (2017). *Marijuana Business Factbook: Executive Summary*. Retrieved from https://mjbizdaily.com/wp-content/uploads/2017/05/Factbook2017ExecutiveSummary.pdf.

Maslov, A., Lawrence, A., & Ferguson, M. (2016). Cannabis performance metrics for policy consideration-What do we need to measure? *Public Safety Canada*. Retrieved from https://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/2016-r009/2016-r009-en.pdf.

McGhee, T. (2014, July 25). Legal pot blamed for some of the influx of homeless in Denver this summer. *The Denver Post*. Retrieved from http://www.denverpost.com/.

McGuire, F., Dawe, M., Shield, K.D., Rehm, J., & Fischer, B. (2011). Driving under the influence of cannabis or alcohol in a cohort of high-frequency cannabis users: Prevalence and reflections on current interventions. *Canadian Journal of Criminology and Criminal Justice*, *53* (2), 247-59.

McLaren, J., Swift, W., Dillon, P., & Allsop, S. (2008). Cannabis potency and contamination: A review of the literature. *Addiction*, *103* (7), 100-1109.

Melamede, R. (2005). Cannabis and tobacco smoke are not equally carcinogenic. *Harm Reduction Journal*, *2* (21), 1-4.

Mello, M.M., Wood, J., Burris, S., Wagenaar, A.C., Ibrahim, J.K., & Swanson, J.W. (2013). Critical opportunities for public health law: A call for action. *American Journal of Public Health*, *103* (11), 1979–1988.

Metz, T.D. & Stickrath, E.H. (2015). Marijuana use in pregnancy and lactation: a review of the evidence. *American Journal of Obstetrics and Gynecology, 213* (6), 761-778.

Miller, J. (2016, December 12). Number of Canadians buying legal medical marijuana triples in just one year. *Ottawa Citizen*. Retrieved from http://ottawacitizen.com/news/local-news/number-of-canadians-buying-legal-medical-marijuana-triples-in-just-one-year.

Nanos Research (2017, May). Impression of Canadians on the legalization of marijuana. *The Globe and Mail.* Retrieved from http://www.nanosresearch.com/sites/default/files/POLNAT-S15-T740.pdf.

National Academies of Sciences, Engineering, and Medicine (2017). *The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research*. Washington, D.C.: National Academies Press. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK425763/.

National Drug Board (2014). *National Survey on Drug Use Among High School Students, 2014*. Retrieved from http://www.infodrogas.gub.uy//images/stories/pdf/VI_Encuesta_Nacional_Consumo_Drogas_Estudiantes_Ense%C3%B1anza_Media.pdf.

Newton, C. (2017). Canadians support legalizing cannabis but worry about social impact. *NRG Research Group*. Retrieved from https://www.nrgresearchgroup.com/canadians-support-legalizing-marijuana-but-worry-about-social-impact/.

Nordqvist, M., Picard, R.G., & Pesämaa, O. (2010). Industry associations as change agents: the institutional roles of newspaper associations. *Journal of Media Business Studies*, 7 (3), 51-69.

Office of the State Auditor (2013). Medical marijuana regulatory system part II: Department of Public Health and Environment and Department of Revenue performance audit June 2013. *State of Colorado*. Retrieved from http://www.leg.state.co.us/OSA/coauditor1.nsf/UID/C9112BFFDE1559CE87257BA5007AE40F/$file/2194B+MedMarijPart2+June+2013.pdf?OpenElement.

Ogborne, A. C. & Smart, R. G. (2000). Cannabis users in the general Canadian population. *Substance Use and Misuse* 35 (3), 301–311.

Ogden, E.J. & Moskowitz, H. (2004). Effects of alcohol and other drugs on driver performance. *Traffic Injury Prevention*, 5 (3), 185-198.

Oregon Department of Revenue Research Section (2016). Oregon marijuana tax statistical report: January-March 2016. *Oregon Department of Revenue*. Retrieved from http://www.oregon.gov/DOR/programs/gov-research/Documents/marijuana_tax_report-2016-Q1.pdf.

Oregon State Police (2017). A baseline evaluation of cannabis enforcement priorities in Oregon. *Drug Enforcement Section*. Retrieved from https://digital.osl.state.or.us/islandora/object/osl%3A81976/datastream/OBJ/vie.

Pacula, R.L., Powell, D., Heaton, P., & Sevigny, E.L. (2015). Assessing the effects of medical marijuana laws on marijuana Use: The devil is in the details. *Journal of Policy Analysis and Management*, *34* (1), 7–31.

Pacula, R.L., Kilmer, B., Wagenaar, A.C., Chaloupka, F.J., & Caulkins, P. (2014). Developing public health regulations for marijuana: Lessons from alcohol and tobacco. *American Journal of Public Health*, *104* (6), 1021–1028.

Palali, A. & van Ours, J. (2015). Distance to cannabis shops and age of onset of cannabis use. *Health Economics, 24* (11), 1483-1501.

Pardo, B. (2014). Cannabis policy reforms in the Americas: A comparative analysis of Colorado, Washington, and Uruguay. *International Journal of Drug Policy, 25* (4), 727-735.

Parker, H. J., Williams, L., & Aldridge, J. (2002). The normalization of 'sensible' adult-usage drug use: Further evidence from the North-West England longitudinal study. *Sociology, 36* (4), 941–964. London: Sage Publishers.

Pélissier, F., Claudet, I., Pélissier-Alicot, A.L., & Franchitto, N. (2014). Parental cannabis abuse and accidental intoxications in children. *Pediatric Emergency Care, 30* (12), 862-866.

Pepin, D., Hoss, A., Schauer, G., & Baker-Holmes, C. (2017). Public use of recreational marijuana: A legal landscape of state law. *Seton Hall Legislative Journal, 41* (2), 283-303. Retrieved from http://scholarship.shu.edu/cgi/viewcontent.cgi?article=1117&context=shlj.

Perreault, S. (2016). Impaired driving in Canada, 2015. *Canadian Centre for Justice Statistics.* Retrieved from http://www.statcan.gc.ca/pub/85-002-x/2016001/article/14679-eng.pdf.

Pirie, T. & Simmons, M. (2014). *Cannabis Use and Risky Behaviours and Harms: A Comparison of Urban and Rural Populations in Canada.* Ottawa, Ontario: Canadian Centre on Substance Abuse.

Porath-Waller, A.J., Notarandrea, R., & Vaccarino, F.J. (2015). Young brains on cannabis: It's time to clear the smoke. *Clinical Pharmacology & Therapeutics, 97* (6), 551-552.

Price, R.J., Renwick, A.B., Walters, D. G., Young, P.J., & Lake, B.G. (2004). Metabolism of nicotine and induction of CYP1A forms in precision-cut rat liver and lung slices. *Toxicology in Vitro, 18* (2), 79-85.

Queirolo, R., Boidi, M. F., & Cruz, J.M. (2015). Cannabis clubs in Uruguay: The challenges of regulation. *International Journal of Drug Policy, 34*, 41-48.

R. v. Parker, 2000 CanLII 5762 (ON CA), (2000). Retrieved from http://canlii.ca/t/1fb95.

R. v. Smith. 2015 SCC 34, (2015). Retrieved from http://canliiconnects.org/en/commentaries/37415.

Ramaekers, J.G., Berghaus, G., van Laar, M., & Drummer, O.H. (2004). Dose related risk of motor vehicle crashes after cannabis use. *Drug and Alcohol Dependence, 73* (2), 109-19.

Reed, J. (2016). Marijuana legalization in Colorado: Early findings. *Colorado Department of Public Safety*. Retrieved from https://cdpsdocs.state.co.us/ors/docs/reports/2016-SB13-283-Rpt.pdf.

Reid, M. (2016). An introduction to the new Access to Cannabis for Medical Purposes Regulations (ACMPR). *McMillan LLP.* Retrieved from http://www.mcmillan.ca/Files/192564_An_Introduction_to_the_New_Access_to_Cannabis_for_Medical_Purposes.pdf.

Residential Tenancies Act, 2006, SS 2006, c R-22.0001, <http://canlii.ca/t/52zsr> retrieved on 2017-10-25. Retrieved from http://canlii.ca/t/wr8.

Retail Marijuana Public Health Advisory Committee (RMPHA) (2017). Monitoring health concerns related to marijuana in Colorado: 2016. *Colorado Department of Public Health & Environment*. Retrieved from https://drive.google.com/file/d/0B0tmPQ67k3NVQlFnY3VzZGVmdFk/view?usp=sharing.

Risula, D. (2017). *Hemp Production in Saskatchewan*. Revised from original by Mooleki, S.P., McVicar, C., Brenzil, C., Panchuk, K., Pearse, P., Hartley, S., and Hanks, A. (2006). Retrieved from http://publications.gov.sk.ca/documents/20/84152-Hemp%20Production.pdf.

Robertson, G. (2014). High hopes: Investors take aim at Canada's cannabis industry. *The Globe and Mail*. Retrieved from https://www.theglobeandmail.com/report-on-business/high-hopes-investors-take-aim-at-canadas-marijuana-industry/article20085181/.

Robertson, R.D., Woods-Fry, H., & Morris, K. (2016). Cannabis and road safety: policy challenges. *Traffic Injury Research Foundation*. Retrieved from http://tirf.ca/wp-content/uploads/2016/12/TIRF_DruggedDriving_Policy-Challenges_13_published.pdf.

Roffman, R. (2016). Legalization of cannabis in Washington State: How is it going? *Addiction, 111* (7), 1139-1140.

Rotermann, M. & Langlois, K. (2015). Prevalence and correlates of marijuana use in Canada. *Statistics Canada*. Health Reports, 26 (4), 10-15.

Royal Canadian Mounted Police (RCMP) (2014). Alcohol and drug impaired driving: Tests, criminal Charges, penalties, suspensions and prohibitions. *Traffic Services*. Retrieved from http://www.rcmp-grc.gc.ca/ts-sr/aldr-id-cfa-aldr-eng.htm.

Rucke, K. (2014, February 7). Has legalized marijuana sparked a crime wave? *MintPress News*. Retrieved from http://www.mintpressnews.com/has-legalized-marijuana-sparked-a-crimewave/179037/.

Sankin, A. (2013, April 19). Medical marijuana dispensaries reduce crime, advocates argue. *The Huffington Post.* Retrieved from http://www.huffingtonpost.com/2013/04/19/medical-marijuanacrime_n_3114287.html.

Saskatchewan Medical Association (SMA) (2013). *SMA fee guide (for uninsured services)*. Retrieved from http://www.sma.sk.ca/kaizen/content/files/SMA%20Fee%20Guide%20October%202013%20Combined%20File.pdf.

Schelling, Thomas (1967). Economics and criminal enterprise. *The Public Interest, 7* (spring), 61-78.

Schmunk, R. (2015, July 28). Victoria, B.C. medical marijuana dispensary robbed at gunpoint. *The Huffington Post.* Retrieved from http://www.huffingtonpost.ca/2015/07/28/victoria-marijuana-robbed_n_7889856.html.

Sevigny, E. L., Pacula, R. L., & Heaton, P. (2014). The effects of medical marijuana laws on potency. *The International Journal on Drug Policy, 25* (2), 308–319.

Scheer, S. D., Borden, L. M., & Donnermeyer, J. F. (2000). The relationship between family factors and adolescent substance use in rural, suburban, and urban settings. *Journal of Child and Family Studies, 9* (1), 105-115.

Sewell, R. A., Poling, J., & Sofuoglu, M. (2009). The effect of cannabis compared with alcohol on driving. *American Journal on Addictions, 18* (3), 185-93.

Shi, Y., Meseck, K., & Jankowska, M.M. (2017). Availability of medical and recreational marijuana stores and neighborhood characteristics in Colorado. *Journal of Addiction*, 1-7.

Singh, T., Kennedy, S.M., Sharapova, S.S., Schauer, G.L., & Rolle, I.V. (2016). Modes of ever marijuana use among adult tobacco users and non-tobacco users—Styles 2014. *Journal of Substance Use, 21* (6), 631-635.

Solomon, R., Chamberlain, E., & Lynch, C. (2010). Canada's new impaired driving legislation: Modest gains and missed opportunities. *Criminal Law Quarterly, 56* (1-2), 51-58. Retrieved from http://lawlib.wlu.edu/CLJC/index.aspx?mainid=733&issuedate=2010-06-14&homepage=no.

Spicer, L. (2002). Historical and cultural uses of cannabis and the Canadian "marijuana clash". *Library of Parliament*. Retrieved from https://sencanada.ca/content/sen/committee/371/ille/library/spicer-e.htm#_ftn122.

Spithoff, S., Emerson, B., & Spithoff, A. (2015). Cannabis legalization: adhering to public health best practice. *Canadian Medical Association Journal, 187* (16), 1211-1216.

Statistics Canada (2013). Canadian community health survey: Mental health, 2012. *The Daily.* Retrieved from http://www.statcan.gc.ca/daily-quotidien/130918/dq130918a-eng.htm.

Stewart, K. (2006). Drugs and traffic: A symposium. Overview and summary. *Transportation Research Circular E-C096*. Retrieved from http://onlinepubs.trb.org/onlinepubs/circulars/ec096.pdf.

Tan, C.E. & Glantz, S.A. (2012). Association between smoke-free legislation and hospitalizations for cardiac, cerebrovascular, and respiratory diseases: A meta-analysis. *Circulation, 126* (18), 2177-2183.

Tanda, G., Gianluigi, Pontieri, F.E., & Di Chiara, G. (1997). Cannabinoid and heroin activation of mesolimbic dopamine transmission by a common mu1 opioid receptor mechanism. *Science, 276* (5321), 2048-50.

Tashkin, D.P., Baldwin, G.C., Sarafian, T., Dubinett, S., & Roth, M.D. (2002). Respiratory and immunologic consequences of marijuana smoking. *Journal of Clinical Pharmacology, 42* (S11), 71S-81S.

Taylor, V. (2016). Amendments introduced to the Smoke-free Places Act. *New Brunswick Department of Health*. Retrieved from http://www2.gnb.ca/content/gnb/en/news/news_release.2016.11.1121.html.

Task Force on Marijuana Legalization and Regulation (2016a). Final report of the Task Force on Cannabis Legalization and Regulation. *Government of Canada*. Retrieved from https://hoban.law/blog/2017/2017-01/final-report-task-force-cannabis-legalization-and-regulation.

---- (2016b). Toward the legalization, regulation and restriction of access to marijuana (Discussion Paper). *Government of Canada*. Retrieved from http://Healthycanadians.Gc.Ca/Health-System-Systeme-Sante/Consultations/Legalization-Marijuana-Legalisation/Alt/Legalization-Marijuana-Legalisation-Eng.Pd.

The Legislative Assembly of Manitoba. (2017). *The Cannabis Harm Prevention Act, Statutes of Manitoba Current Session*. Retrieved from https://web2.gov.mb.ca/bills/41-2/b025e.php.

Thomas, C. & Freisthler, B. (2016). Examining the locations of medical marijuana dispensaries in Los Angeles. *Drug Alcohol Review, 35* (3), 334–337.

UNICEF Office of Research (2013). Child well-being in rich countries: A comparative overview. *Innocenti Report Card 11*. Retrieved from https://www.unicef-irc.org/publications/pdf/rc11_eng.pdf.

VS Strategies (2017). Colorado exceeds $500 million in cannabis revenue since legalization. *Colorado Legislative Council Staff Issue Brief.* Retrieved from http://vsstrategies.com/wp-content/uploads/VSS-CO-MJ-Revenue-Report-July-2017.pdf.

Walsh, J. & Ramsey, G. (2015). Uruguay's drug policy: Major innovations, major challenges. *Center for 21st Century Security and Intelligence Latin America Initiative*. Retrieved from https://www.brookings.edu/wp-content/uploads/2016/07/Walsh-Uruguay-final.pdf.

Wang, G., Narang, S., Wells, K., & Chuang, R. (2011). A case series of marijuana exposures in pediatric patients less than 5 years of age. *Child Abuse and Neglect, 35*, 563-565.

Washington State Healthy Youth Survey (2016). Data brief: Marijuana. *US Department of Health.* Retrieved from http://www.doh.wa.gov/Portals/1/Documents/8350/160-NonDOH-DB-MJ.pdf.

Weiss, S.R.B., Howlett, K.D., & Baler, H.R. (2017). Building smart cannabis policy from the science up. *International Journal of Drug Policy, 42,* 39-49.

Werb, D., Nosyk, B., Kerr, T., Fischer, B., Montaner, J., & Wood, E. (2012). Estimating the economic value of British Columbia's domestic cannabis market: Implications for provincial cannabis policy. *International journal of drug policy, 23* (6), 436-441.

Whitmore, M., Belz, M., Cacioppo, L., Iorio, P., Peters, T., & Thakore, C. (2016). Adult-usage marijuana: insights and opportunities. *Deloitte Touche Tohmatsu Ltd*. Retrieved from https://www2.deloitte.com/ca/en/pages/legal/articles/publications-and-presentations.html.

Wikipedia. (2017). Legality of cannabis by U.S. jurisdiction. Retrieved from https://en.wikipedia.org/wiki/Legality_of_cannabis_by_U.S._jurisdiction

Wodrich, N. (2016). Legalized cannabis: Fiscal considerations. *Office of the Parliamentary Budget Officer.* Retrieved from http://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2016/Legalized%20Cannabis/Legalized%20Canabis%20Fiscal%20Considerations_EN.pdf.

Wong, K. & Clarke, C. (2015). The legalization of cannabis in Colorado: The impact. *Rocky Mountain High Intensity Drug Trafficking Area.* Retrieved from http://www.rmhidta.org/html/2016%20FINAL%20Legalization%20of%20Marijuana%20in%20Colorado%20The%20Impact.pdf.

Wright, L. (2017, May 28). Canadians worried Ottawa rushing into pot legalization: poll. *Toronto Star Newspaper.* Retrieved from https://www.thestar.com/news/gta/2017/05/28/canadians-worried-ottawa-rushing-into-pot-legalization-poll.html.

Young et al. v. Saanich Police Department et al. 2004 BCCA 224, (2004). Retrieved from http://canlii.ca/t/1gxsj.

Zarfin, Y., Yefet, E., Abozaid, S., Nasser, W., Mor, T., & Finkestein, Y. (2012). Infant with altered consciousness after cannabis passive inhalation. *Child Abuse and Neglect, 36*, 81-83.

Zeese, K. B. (1999). Cannabis in the 20th century: A chronology of use and regulation. *International Journal of Drug Policy, 10* (4), 339–346. Retrieved from http://www.ijdp.org/issues#decade=loi_decade_199.

List of Figures