

Regulation of Cannabis Edibles and Cannabis Cafés

Literature Search and Environmental Scan

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1.0 Executive Summary

On October 17, 2018 recreational cannabis will be legal across Canada. Federal legislation (Bill C-45) will make the possession of cannabis for personal use legal in all provinces and territories. Bill C-45 will also control and regulate how cannabis is grown, distributed and sold. Additionally, Bill C-45 does not propose to authorize the legal sale of cannabis edible products immediately; however, individuals will be allowed to make edible products for their own consumption. The federal government has stated that cannabis edibles will be added to the list of products permitted for legal sale once regulatory measures are developed. This is expected to occur no later than 12 months following the coming into force of the proposed legislation. Thus, the sale of edibles should be legal in Canada by October 2019.

The purpose of this report was to provide a review of current research literature regarding cannabis edibles and cannabis cafés, and an environmental scan (e-scan) of regulatory practices in jurisdictions that have legalized recreational cannabis. Specifically, the objectives of this report were to:

- Provide an overview of cannabis edibles (e.g., definition, prevalence, adverse effects)
- Determine labelling and packaging requirements of edibles
- Determine food safety standards of edibles (e.g., production, preparation, testing for pathogens)
- Determine current practices regarding cannabis consumption (all product types) in cannabis cafés/lounges
- Determine if the sale of edibles at farmers' markets are permitted in other jurisdictions

Understanding Edibles

Cannabis edibles are food products made with cannabis flower or extract. Edibles come in a wide variety of forms, including baked goods, butters/oils, hard candies, gelato, gummy bears, and beverages that can be prepared at home or commercially. Due to the processes used to make edibles from cannabis, edible products often seem stronger to consumers and can vary significantly in terms of potency and long-lasting psychoactive effects.

The onset of effects from inhalation of cannabis typically occur in minutes, whereas the onset after ingestion can take hours. Consumers of edibles, particularly novice ones, can have trouble predicting what kind of effect will occur and when it will occur, and may consume more edibles to achieve the desired effect, which can result in adverse health outcomes. Edible products may also contain multiple-dose units, intended to be ingested in multiple doses over time. Accidental consumption of the entire product can result in overdose in adults and be life-threatening for children.

Evidence suggests that accidental exposure to cannabis may become more common as legalization of recreational cannabis comes into effect and that a significant amount of health care visits for cannabis intoxication are due to edibles use. Children are particularly susceptible to accidental exposure as they are often unable to distinguish between cannabis-infused products and non-infused products.

Food Safety Standards

Contaminated cannabis can pose a serious risk to public health. Cannabis species are susceptible to infection by a host of contaminants, which necessitates rigorous testing by licensed facilities or laboratories for the presence of mould, mildew, pesticides and other pathogens. The e-scan revealed that cannabis edible regulation was relatively similar across jurisdictions, although there were notable differences on some topics.

- The majority of jurisdictions regulate edibles more like a food than a drug.
- Most jurisdictions reported that edibles are allowed to contain a maximum THC content of 10 mg per serving and 100 mg per product.
- All jurisdictions require that edible products be processed in separate and distinct facilities from conventional foods that do not contain cannabis.
- All jurisdictions indicated that there are additional restrictions on types of edibles that can be produced when they are appealing to children.
- Jurisdictions had mixed policies with regards to time-temperature controlled edible products.
- All jurisdictions have a testing and quality control process in place that includes cannabis cultivation and manufacturing facilities having to submit testing samples to independent, licensed testing facilities that are then audited by the state.
- None of the jurisdictions indicated that there were any guidelines created for consumers on how to home-prepare edible products.

Packaging and Labelling Requirements

There have been several tragic incidents involving cannabis intoxication from edible products in jurisdictions with legal cannabis laws. Some jurisdictions have also seen an increase in cannabis pediatric exposure. In light of these developments, jurisdictions have implemented stricter packaging and labelling requirements for edibles, although discrepancies still exist.

- All jurisdictions require that commercially sold edibles include warnings about use during pregnancy/nursing, keeping the product away from children, and not to drive after consumption.
- Most jurisdictions require a universal symbol for cannabis, warn about delayed and intoxicating effects, and potential health risks.
- All jurisdictions require the marking of individual servings in multi-serving edibles and child-resistant packaging.
- Most jurisdictions require opaque and re-sealable packaging, but policies concerning edible package coloring were mixed.
- All jurisdictions require that edible products include an ingredient list, total amount of active THC, and a unique ID or batch number.
- The majority of jurisdictions include instructions for use; however, policies varied in terms of disclosure of pesticides, expiry dates, and nutritional facts.

Cannabis Cafés, Social Clubs and Farmers' Markets

Cannabis cafés are formalized spaces that allow adult consumers to eat and potentially buy cannabis. Several jurisdictions included in the e-scan do not permit these types of establishments

due to laws prohibiting public cannabis use, controls on smoking in public spaces, and strict licensing issues. Other jurisdictions consider these types of establishments as grey areas in their recreational cannabis laws. Local jurisdictions have the responsibility of enforcement in some states. For example, Denver, Los Angeles and San Francisco have been able to pass bylaws permitting cannabis cafés. In the Netherlands, the total number of cannabis coffee shops has gradually reduced over the past two decades. This decline is attributed, in part, to increasingly strict licensing conditions.

Cannabis social clubs (CSCs), or cannabis clubs, are non-profit associations of cannabis consumers that self-supply and self-organize. CSCs are present in several countries with varying cannabis legal frameworks including Spain, Belgium and Uruguay. Advocates of the CSC model contend that these clubs provide a safe environment for peer-delivered harm reduction practice, in which consumers have direct control over product quality and consumption. Detractors are concerned that some of these clubs have hidden motives and that under-regulation can result in poor quality control practices.

All jurisdictions included in the e-scan do not currently allow for the sale of commercial edibles by licensed manufacturers or home-prepared edibles by individuals at farmer's markets. Jurisdictions provided a number of reasons for this restriction, including: public consumption laws, public safety, the presence of minors, and a lack of security, control, and monitoring of edible products sold in this manner.

Jurisdictional successes, challenges, and recommendations are summarized on page 23 of the report.

2.0 Methodology

LITERATURE SEARCH

Searches for academic literature were conducted in the following electronic databases: PubMed, MEDLINE, CINAHL, Embase, Google Scholar and PsycINFO. A variety of search terms related to cannabis and edibles were used. These were coupled with terms related to food safety, cannabis cafés, public health, and labelling/packaging. The search was limited to English language, peer-reviewed research articles from the last 7 years (2011-2018); however, in exceptional cases, articles published prior to 2011 were considered. For a detailed list of search terms, see Appendix A.

A search for grey literature was also undertaken. A number of websites of relevant organizations were searched; these included: the Canadian Centre on Substance Use and Addiction, the Centre for Addiction and Mental Health, the National Institute on Drug Abuse, the Agency for Healthcare Research and Quality, the National Guideline Clearinghouse, the National Institute for Health and Care Excellence, the Substance Abuse and Mental Health Services Administration, and a number of government websites in Canada and abroad. In addition, a Google search was conducted using the same search strategy used in the electronic database search.

Literature items were evaluated for relevance based on their title and abstract or introduction. Full text copies of relevant items were retrieved and appraised, the results of which are presented in this report.

ENVIRONMENTAL SCAN

An environmental scan (e-scan) was launched to supplement the information found through the literature search. The purpose of the e-scan was to investigate how other jurisdictions with commercial sales of cannabis have regulated edibles. In order to best inform Canada's future implementation of commercially available cannabis edibles, evidence was drawn from the United States only. The specific selection is due to the likely similarities between recreational cannabis regulation in legalized states and the future laws around cannabis in Canada. Topics covered in the interviews are the same as those covered in the literature search and outlined in the objectives.

Initial Scan

Before contacting jurisdictions, an initial scan to determine relevant states that have legalized recreational cannabis was completed. Government websites were used to examine state legislation around the legality of recreational cannabis within their accompanying jurisdictions. In addition, specific regulations of recreational cannabis use were examined to determine whether a jurisdiction allowed for both personal use and commercial sales of recreational cannabis, with an emphasis on cannabis edibles.

Inclusion Criteria

Jurisdictions within the United States with policy regulations that closely resembled Canada’s upcoming recreational cannabis laws were chosen as potential interview sources. Specifically, states that both legalized personal use of cannabis and legalized the commercial sales of cannabis products (including cannabis edibles) were selected. Vermont and the District of Columbia were excluded as current laws prohibit commercial production and sales. Maine and Massachusetts were also excluded as legalized commercial sales has not yet come into effect in those states. Note, Vermont legalized the commercial sales of cannabis edibles at the end of data collection and has not been included for this reason. See Table 1 and Table 2 for included and excluded jurisdictions, respectively. The final states matching the criteria were: Alaska, California, Colorado, Nevada, Oregon, and Washington.

TABLE 1: INCLUDED JURISDICTIONS

Jurisdiction	Personal Use	Commercial Sales
Alaska	✓	✓
California	✓	✓
Colorado	✓	✓
Nevada	✓	✓
Oregon	✓	✓
Washington	✓	✓
✓ <i>Legalized</i>		

TABLE 2: EXCLUDED JURISDICTIONS

Jurisdiction	Personal Use	Commercial Sales	Notes
District of Columbia	✓	×	Recreational use legalized in 2015 with no plans to legalize commercial sales at this point
Maine	✓	○	Commercial sales have been approved, but have not yet been made available
Massachusetts	✓	○	Commercial sales have been approved, but have not yet been made available
Vermont	✓	×	Recreational use became legal July 1, 2018 with no plans to legalize commercial sales at this point
✓ <i>Legalized</i> ○ <i>Not available at time of data collection</i> × <i>Not legalized</i>			

Secondary Scan

Once jurisdictions were selected, websites of specific state departments were examined to search for possible points of contact. A list of department names, website links, and potential contacts were compiled. If the best department to contact was not clear through the search, information from multiple departments was stored and their websites were examined more closely. Once a point of contact was determined for all six included states, an email screen was sent to at least one department per included jurisdiction. See Appendix B for e-scan email screen.

Contacts were informed of the purpose of the e-scan and asked to participate in a 30 to 40 minute interview. Snowball sampling was also used by asking contacts to forward the email if they felt another person would be better suited to answer questions relating to cannabis edibles policies and regulations. Emails that were sent without a response within a week were sent again to a different department within the same jurisdiction. All six states agreed to participate in an interview, the findings of which are included in this report. See Appendix C for e-scan interview guide.

Interviewed representatives were from state departments, including:

- the Alaskan Alcohol and Marijuana Control Office of the Department of Commerce, Community, and Economic Development,
- the Manufactured Cannabis Safety Branch of the Californian Department of Health,
- the Marijuana Enforcement Division (MED) of Colorado's Department of Revenue,
- the MED of Nevada's Department of Taxation,
- the Oregon Liquor Control Commission, and
- the Washington State Liquor and Cannabis Board.

To protect individual identities, all other identifying information was removed. Regulatory documents from each of the six states were also collected and cross-examined to confirm specific policy regulations concerning labelling, packaging, and food safety standards of cannabis edibles.

LIMITATIONS

Due to time constraints, a systematic review of the literature was beyond the scope of this report. As the purpose of this report is to provide an overview of current literature, the included studies were not thoroughly assessed for quality. Also, due to time constraints, only jurisdictions from the United States that had implemented recreational regulations around cannabis edibles were chosen to be included within the e-scan. Vermont legalized the commercial sale of cannabis edibles at the end of data collection and was therefore not included. In addition, the information gathered from this e-scan is meant to provide a broad overview of specific cannabis edible regulations and does not extensively describe every jurisdictional regulation as they are illustrated in their full policies. Lastly, the policies and regulations discussed in this report are current to July 2018. Given the fluidity of cannabis laws, these may change after the drafting of this report.

3.0 Findings

3.1 Understanding Edibles

WHAT ARE EDIBLES?

Cannabis edibles are food products made with cannabis flower or extract. They can contain entire leaves or very finely ground material; semi-refined material like hashish, sinsemilla or resin; or moderately to highly refined cannabis extracts and concentrates such as hash oil (Klein, 2017). Unlike other methods of cannabis administration (e.g., smoking, vaping), edibles are not associated with issues of odor and stigma because they can be consumed inconspicuously (Barrus et al., 2016). For these reasons, among others, edibles have emerged as a popular and profitable area of the legalized cannabis market (Barrus et al., 2016).

Edibles come in a wide variety of forms, including baked goods, butters/oils, hard candies, gelato, gummy bears, and beverages that can be prepared at home or commercially. The proliferation of edibles has given rise to an industry of continual innovation. Not only has it led to the widespread availability of more conventional edibles (e.g., baked goods and candies), but an explosion of new products has occurred in the past few years. For example, products as varied as THC-infused water and coffee, mouth sprays, breath strips, capsules, beauty products, and even pet food and chew toys for family pets are widespread (see Appendix D for a broader product list). An already robust edibles industry will undoubtedly continue to grow as more product and consumption options emerge.

A common misconception about edibles is that they are food products that contain the cannabis plant materials used for smoking. In reality, the cannabis extracts used in edibles can be significantly different (Barrus et al., 2016). There are hundreds of chemical constituents in the cannabis plant, including approximately 100 cannabinoids, which is a type of chemical compound that causes drug-like effects in the body (Radwan et al., 2015). Tetrahydrocannabinol (THC) is one of the most well-known cannabinoids found in cannabis and is the primary psychoactive component of the cannabis plant.

Basic methods of cannabinoid extraction include heating the flowers from the female plant. This process is called decarboxylation and helps convert non-psychoactive constituents like tetrahydrocannabinolic acid (THCA) into psychoactive ones like THC (Ciolino, Ranieri, & Taylor, 2018). By combining decarboxylate marijuana to oil or butter, the oil or butter becomes psychoactive and can be used in cooking to create cannabis edibles (Barrus et al., 2016). The rest of the plant is often discarded.

Tinctures, an alcoholic extract of cannabis, can also be created by decarboxylate cannabis. Instead of oil or butter, it is mixed with alcohol for a set amount of days (Peschel, 2016). Tinctures can be placed into a dropper and used by itself or added to a multitude of alcohols, beverages, and foods. Alcoholic beverages that contain marijuana can also be made by infusing the plant leaves and stems, and teas may contain entire marijuana leaves or very finely ground material of the plant.

As many of the compounds have been removed and THCA has been converted into a psychoactive cannabinoid, edibles may contain high levels of THC and only a small amount of the

cannabis plant's other constituents. As a result, there can be substantial variation in the amount and homogeneity of cannabinoids included in an edible product, which makes it difficult to control how much THC is consumed (Barrus et al., 2016). Often this is why edible products seem stronger to consumers, and helps to explain why THC quantity in homemade edibles can vary even more than commercially produced products in terms of potency and long-lasting psychoactive effects (Alcohol & Drug Abuse Institute, 2014).

PREVALENCE

Edible cannabis products appear to be very popular in the U.S. states with legal cannabis markets. In 2017, Colorado cannabis retail outlets sold 9.29 million units of edibles and medical businesses sold 1.85 million units of medicinal edible products (Hartman et al., 2018). In Washington, a representative from the Liquor and Cannabis Board indicated that the market share of liquid/solid edibles in the recreational cannabis market was 9% in 2017. In Oregon, a state representative reported that the market share of edibles and tinctures was 8.7% in 2017. Taking into account that the purchase of cannabinoid-infused oil or cannabis to make homemade edibles is not reported as an edibles sale, the actual figures are likely higher (Barrus et al., 2016).

In 2017, Colorado cannabis retailers generated \$1.51 billion in sales of medical and recreational cannabis, marking an increase in the amount of reported sales from 2016 (\$1.31 billion) (Colorado Department of Revenue, 2017). The state collected around \$247 million in tax and fee revenue from cannabis sales in 2017, a 27% increase in revenue from 2016 (\$194 million) (Colorado Department of Revenue, 2017).

A 2014 national survey of adults in the US found that 16% of current cannabis consumers reported using edibles/beverages over the past month (Schauer et al., 2016). Among respondents that reported using cannabis at some point in their life, nearly 30% had used it in edible or beverage form (Schauer et al., 2016), although that says very little about edibles share of sales. Based on US data, edibles appear to be particularly popular with Baby Boomers (Murphy et al., 2015) and medical cannabis users (Pacula, Jacobson, & Maksabedian, 2016), although it is important to remember that some US states do not recognize or allow smoked forms of cannabis as medicine. Recent surveys in California, Washington, Colorado, and Canada found that 11% to 26% of medicinal cannabis users had consumed an edible product at some point in their life (Grella, Rodriguez, & Kim, 2014; Walsh et al., 2013), although again, that says little about edibles share of all consumption, which would be expected to be a far smaller proportion. A 2018 Canadian survey asked which types of products cannabis consumers had used in the past three months. Edibles were the second most commonly used product (32%), behind dried flowers (86%), and ahead of hashish and kief (20%) and liquid concentrates (20%) (Statistics Canada, 2018). Nearly a fifth (17%) of Canadian students in grade 7 to 12 reported using cannabis in 2016-2017 (Health Canada, 2018b). The same report found that edibles were the second most common method of cannabis consumption behind smoking (Health Canada, 2018b).

A recent study found that the longer legal cannabis laws have been in effect and the higher the retail outlet density in a jurisdiction, the more likely youth will try vaping and edibles (Borodovsky et al., 2017). Allowing home cultivation of cannabis was also associated with an increased likelihood and younger age of onset of edibles use (Borodovsky et al., 2017).

ADVERSE EFFECTS

Although edibles are commonly perceived as a safe and effective method of achieving the psychoactive effects of cannabis without exposure to the potential harms of smoking, there is a paucity of research examining how ingestion of cannabis differs with other methods of use (Barrus et al., 2016). When ingested, cannabis edibles are absorbed by the stomach and liver, and then enter the bloodstream and other parts of the body (Barrus et al., 2016). In oromucosal administration, when substances are applied under the tongue or in the lining of the cheeks like in sprays and tinctures, the substance enters the bloodstream directly without going through the gastrointestinal tract (Zhang et al., 2002; Electronic Medicines Compendium, n.d.). During inhalation of cannabis, THC is passed from the lungs to the bloodstream; blood then carries THC to the brain and other parts of the body (Barrus et al., 2016).

The onset of psychoactive effects from inhalation typically occur in minutes, whereas the onset after ingestion can take a few hours (Grotenhermen, 2003; Health Canada, 2018a). In addition, the effect of ingesting cannabis usually lasts between 4 to 12 hours, whereas the effects of smoking cannabis lasts between 2 to 4 hours (Grotenhermen, 2003; Barrus et al., 2016). Some studies suggest that the onset and duration of effects after oromucosal administration are similar to those of ingestion (Health Canada, 2018a). It is important to note, however, that these times are approximate and can vary significantly depending on the consumer and product.

People that use edibles, particularly novice ones, can have trouble predicting what kind of effect will occur and when it will occur. This delayed effect may cause consumers to eat more edibles to achieve the desired effect, which can result in adverse health outcomes (Kim & Monte, 2016). Delayed effects can also convince a consumer that they feel safe to drive, when in reality they risk driving impaired. Moreover, because an edible product may contain multiple-dose units, intended to be ingested in multiple doses over time, accidental consumption of the entire product can result in overdose in adults and be life-threatening for children (Richards et al., 2017; Cao et al., 2016). According to the Canadian Institute for Health Information, cannabis-related emergency room visits have almost tripled in Ontario (449 to 1370 cases) and almost doubled in Alberta (431 to 832 cases) from 2013-14 to 2017-18 (2018).

The majority of health care visits for cannabis intoxication are due to edibles use (Monte, Zane, & Heard, 2015). Overconsumption of edibles in adults is associated with an increase in emergency department (ED) visits resulting from severe agitation, nausea, vomiting, panic attacks, and anxiety (Monte et al., 2015). Children exposed to edibles are more likely than adults to experience severe respiratory depression, which can lead to airway compromise or risk of aspiration (Cao et al., 2016; Wang et al., 2014).

Edibles present a clear risk for children, especially in jurisdictions with legalized cannabis where edibles are more accessible. Edibles are often sold as baked goods, candies, and other appealing products, therefore children are often unable to distinguish between cannabis-infused products and non-infused products. This has resulted in a significant increase in ED visits for childhood cannabis exposure (Berger, 2014).

Evidence suggests that accidental exposure to cannabis may become more common as legalization of recreational cannabis comes into effect. The average rate of cannabis-related visits to the Children's Hospital in Aurora, Colorado, increased from 1.2 per 100,000 two years before legalization to 2.3 per 100,000 two years after legalization, and of the cannabis products

responsible, nearly half (48%) were edibles (Wang et al., 2016). In addition, annual Colorado Regional Poison Centre pediatric cannabis cases increased by more than five times from 2009 to 2015, and edibles were involved in over half (52%) of the cases between 2013 and 2015 (Wang et al., 2016).

3.2 Food Safety Standards

Contaminated cannabis can pose a serious risk to public health. Cannabis species are susceptible to infection by a host of contaminants, which necessitates rigorous testing by licensed facilities or laboratories for the presence of mould, mildew, pesticides and other pathogens. Strict regulation of testing facilities is required to ensure effective quality control of edible products. Other food safety concerns, including storage conditions and temperature control also need to be considered. Mandating food safety training and food handling practices for producers of edible products can help to reduce the risk of foodborne illness (Akhigbe et al., 2017).

In addition to food quality control, regulations regarding THC content are necessary to protect consumers. The amount of THC in an edible product can vary considerably (MacCoun & Mello, 2015). In one study, the labelled THC content varied up to 10% from the amount detected at a Johns Hopkins laboratory (Vandrey et al., 2015). The development of standardized measurement protocols and oversight of testing facilities can help improve the accuracy and validity of the testing process (Gourdet et al., 2017).

FOOD SAFETY ENFORCEMENT

The e-scan revealed that the current ways in which commercially available cannabis edibles are being regulated is heavily impacted by the specific state department responsible for regulations. For example, California exclusively relies on their public health department to oversee edible regulations and views them as neither food nor drug. Instead, edible products are regulated by their own standards, which is based on current food and drug policies. Cannabis edible regulations are tailored to have stricter food regulations and more relaxed drug regulations to balance the dichotomy that cannabis edibles have as being part-food and part-drug.

Washington, Alaska, Nevada, and Oregon regulate cannabis more like food, relying on partnerships with departments that regulate food products and food safety standards, such as the Alaskan Department of Environmental Conservation and the Department of Agriculture in Oregon, Washington, and Nevada. Additionally, all four states incorporate drug regulations and licensing standards set by their individual liquor and cannabis boards, commissions, or divisions. In Nevada, the Marijuana Enforcement Division of the Department of Taxation provides oversight and licensing, and the Department of Agriculture provides conformational testing of licensed cannabis testing sites. In Alaska, the Alcohol and Marijuana Control Office has ultimate authority over edibles and provides cultivating, manufacturing, and retailing licenses, while the Department of Environmental Conservation provides food safety permits and ensures testing and quality control. Representatives mentioned that part of this decision was based on the lack of capacity that the control office has to be able to test products. Unlike Canada, states within the USA have more limitations on government testing facilities as they do not receive funding from the federal government because cannabis is considered an illegal substance nationally. Other states like Washington cited edible regulations as closer to food regulations mainly because they are meant

for human consumption, contain food ingredients, and the only non-food grade item allowed within them is cannabis.

Colorado, however, has regulated cannabis edibles to closely resemble the regulations imposed on alcohol, although there is a shared responsibility between their Marijuana Enforcement Division and their Department of Environmental Health. This is mainly due to the alcohol-related language used within their amendment and a larger focus on how cannabis regulations can be enforced consistently across local jurisdictions than what best describes them. In other words, it does not matter which set of regulations cannabis best fits into, either as a food or as a drug, but that these regulations should be enforced and adhered to.

THC CONTENT

Four of six jurisdictions specified that commercially available cannabis edibles were allowed to contain a maximum THC content of 10 mg per serving and 100 mg per product (Table 3). Alaska and Oregon have more conservative regulations on maximum THC content, allowing for 5 milligrams per serving and 50 milligrams per edible product. Most states indicated that THC levels were decided through collaborative stakeholder consultations with industry members, health professionals, consumers, and states that had already set regulations around legalized and commercially available edibles. Additionally, THC limits also accounted for possible misuse from inexperienced and uninformed cannabis consumers. Setting moderate restrictions on THC content was perceived as making edibles safer for consumers and an effective practice that will likely reduce the risk of accidental overdoses. In Canada, the proposed regulations for cannabis oil in a cannabis product stipulate that the product cannot exceed a maximum yield quantity of 30 mg of THC per milliliter of the oil (Department of Justice Canada, 2018). Furthermore, if the cannabis oil in a product is intended to be ingested, it must not dispense more than a maximum yield quantity of 10 mg of THC (Department of Justice Canada, 2018). It is unclear if these regulations will also apply to cannabis edibles or if stricter rules will be enforced.

TABLE 3: MAXIMUM THC CONTENT PER SERVING AND PER EDIBLE PRODUCT

Jurisdiction	THC content per serving	THC content per product
Alaska	5 mg	50 mg
Oregon	5 mg	50 mg
Colorado	10 mg	100 mg
California	10 mg	100 mg
Nevada	10 mg	100 mg
Washington	10 mg	100 mg

FOOD RESTRICTIONS

All jurisdictions interviewed required that edible products be processed in separate and distinct facilities from conventional foods that do not contain cannabis. Restrictions around specific types

of foods that are/are not allowed to be infused with cannabis varied from state to state. Colorado, Oregon, Alaska, and Nevada have some of the most relaxed restrictions. Colorado only restricts the addition of nicotine or alcohol to edibles and Oregon only restricts meat products from being infused. Alaska also has more lenient guidelines regarding what edible products could be infused, restricting only infused butters, oils, and fats and items that closely resemble familiar drinks or food such as candy, from being purchasable in retail stores. Nevada also prohibits commercially available products from being infused, as well as ice cream and lollipops.

Unlike the aforementioned states, Washington and California have more restrictive policies around what manufacturers can infuse and what consumers can purchase from the recreational edible market. Under Washington's regulations, items perceived as being potentially 'hazardous' or 'high risk' are not allowed to be infused with cannabis. These items include any food that needs to be acidified to become shelf stable, fruit or vegetable juices and butter, pies containing eggs, milk or milk products, dried or cured meats, and jams and jellies that do not use a standardized recipe. Edible regulations in California prohibit the addition of cannabis to all seafood products, meat products other than jerky, milk and milk products, alcohol, and products that have added caffeine, such as energy drinks.

In all six states interviewed, respondents indicated that there are additional restrictions on types of edibles that can be produced when they are appealing to children. All states require that edible products not be made in the shape of an animal, insect, car, human, cartoon, or superhero. Oregon also indicated that novel shapes that cannot be differentiated, like blow pops, are not permitted. California, Colorado, Nevada, and Oregon all allow products or flavouring (e.g., bubble gum) that are especially appealing to children. An interviewee from Oregon mentioned that although there is no current restriction on flavours that may be appealing to children, such as bubble gum, this was something that the state may be moving towards.

Colorado, Oregon, Alaska, and Nevada also all prohibit adulterated food or drink meant to closely resemble widely distributed, brand name food products. Nevada and Alaska have banned the altering of existing products (e.g., infusing gummy bears with THC); however, both states allow for things like puff wheat squares to be infused. This discrepancy is in part due to the fact that the Alaskan Alcohol and Marijuana Control Office and the Nevada Marijuana Enforcement Division decide what foods are allowed to be manufactured on a case-by-case basis. Washington is the only state to indicate that especially appealing edibles (e.g., gummies, lollipops, and cotton candy) are not permitted to be manufactured or sold. As well, Washington and Alaska do not permit any cannabis edible products to be brightly colored.

TIME-TEMPERATURE CONTROLLED PRODUCTS

In terms of whether cannabis edibles could be sold as foods that are time-temperature controlled (i.e., foods that require refrigeration, freezing, or hot holding), responses from jurisdictions were mixed. Alaska, California and Oregon allow for time-temperature controlled edible products but their implementation of such allowances were varied. For example, representatives from California indicated that only specific edibles, such as cannabis-infused water, would be allowed to fit under this category, whereas Oregon stated that an additional warning on time-temperature controlled products would be needed to describe what measures consumers need to take. Unlike these states, representatives from Alaska mentioned that their Department of Environmental Conservation presumes food products to not be shelf stable and requires licensees to go through

further processes to verify otherwise. In Nevada, only infused butters and oils can be time-temperature controlled. Representatives from Nevada specified that ingredients may be time-temperature controlled, but the final edible product may not. With this being said, infused oils and butters are allowed. Lastly, in Washington it was stated that no cannabis edible can be time-temperature controlled.

TESTING & QUALITY CONTROL

All six jurisdictions interviewed have a testing and quality control process in place that includes cannabis cultivation and manufacturing facilities having to submit testing samples to independent, licensed testing facilities that are then audited by the state. Licensed testing facilities in all six states are also obligated to test for contaminants and pesticides, which are also audited.

California and Colorado use their respective Bureau of Cannabis Control and Marijuana Enforcement Division to randomly audit testing facilities. Similarly, Oregon licenses, regulates, and audits licensed testing facilities through their cannabis commission which is accredited by their Department of Health. States like Washington, Nevada, and Alaska randomly sample and verify results from testing facilities by coordinating with Washington and Nevada's Department of Agriculture and the Alaskan Department of Environmental Conservation. Washington differs slightly, however, as it does so on a more complaint-based/investigative basis.

EDIBLE PRODUCT RECALLS

When asked about edible product recalls due to mildew, mould, pesticides, or other pathogens, all six jurisdictions indicated that there had been no recalls specifically related to pathogenic contaminants. Representatives from California and Nevada both suggested that part of this success may be due to their testing requirements which tests edibles in their final form, after the possibility of gaining a pathogen through its transformational process from flower to edible.

Although there were no edible recalls attributed directly to pathogens, five of the represented states did mention the recall of edible products for other reasons. For example, Colorado stated that were recalls on edibles produced with 'hot' flowers, meaning that were created with the use of banned pesticides. Washington representatives were unsure about any edible-specific recalls, but similarly indicated that recalls on contaminated or mislabeled concentrates could have impacted edibles that were produced with them. Oregon officials mentioned that they experienced a recall of edibles when a soy spray was used in production but was not labelled as a food allergen on the product package. Similarly, Nevada described an instance where terpene levels had been misreported on the label of an edible product and a consumer report was alerted, although no health risks were posed. Lastly, Alaska indicated that a manufacturer's license had been revoked and a consumer alert was submitted when they were found to be improperly testing all of their cannabis products and THC levels were 2-3 times higher than what was being indicated.

HOME-PREPARED EDIBLES

None of the jurisdictions interviewed indicated that there were any guidelines created for consumers on how to home-prepare edible products. Almost all state respondents specified that their respective departments did not have the authority or responsibility to inform or direct consumers on how to prepare edibles. Instead, there was a consensus that it was their responsibility to ensure edible products are commercially available, regulated in a safe matter, and the public is aware of the risks and understand how to use them responsibly. Washington and

Oregon, however, were uncommon in that home extraction of cannabis is deemed illegal. Representatives discussed that as such, any home-prepared edible guidelines provided by the state would be inappropriate.

PUBLIC EDUCATION

In terms of public education and awareness campaigns, all respondents indicated that their associated Department of Public Health was responsible for providing public information on basic legal changes and descriptions surrounding recreational cannabis, as well as health information for the general public and clinicians. States with cannabis boards or commissions provided general legal, licensing, labelling, packaging, and required warning information on their associated websites. Some states also mentioned television commercials, standalone webpages, and online infographics to ensure that the general population could access them readily through different mediums.

3.3 Packaging and Labelling Requirements

In 2014, a Colorado man died from trauma after consuming a cannabis-infused cookie and jumping from a fourth floor balcony (Hancock-Allen et al., 2015). The man was instructed by the salesperson at the retail outlet to eat one serving of the cookie, which was equal to one-sixth of the entire product (Hancock-Allen et al., 2015). The man, feeling no effects after 60 minutes since consumption, ate the whole cookie within two hours (Hancock-Allen et al., 2015). The autopsy report found that cannabis intoxication was a major factor in the man's death (Hancock-Allen et al., 2015). After this tragic incident, the state of Colorado implemented new packaging and labelling requirements which stipulated a maximum amount of THC per product and a clear separation of each standardized serving. Similar measures were initiated in other states where recreational cannabis was legal. Although packaging and labelling requirements of edibles have improved since this incident, there are still concerns.

Pediatric exposure is a major risk with edible products. Some edibles available for retail sale have brightly colored packaging and are made to look like products that may be appealing for children (e.g., candies, other sweets). As a result, children, as well as adults, may accidentally consume edibles. Many states with legal cannabis laws have taken action to curb the desirability of edibles to children and necessitate child-resistant packaging in response to a spike in accidental overdoses (Wang et al., 2016). Homemade edibles, however, are not legally mandated to follow edible packaging regulations. Public health campaigns can spread awareness about the risks of pediatric exposure and may help to reduce accidental ingestion (Richards et al., 2017). Healthcare professionals can also help mitigate risk by informing parents of the potential risks of accidental ingestion and providing safe storage and packaging advice (Richards et al., 2017).

Labelling of edibles is only effective if consumers understand the information included on products. Kosa et al. (2017) found that adult consumers and non-consumers of edibles in Denver and Seattle had concerns about current labelling practices. Participants were especially concerned that there was too much information on the labels, which may dissuade consumers from reading it, and that the information regarding safe consumption was not clear (Kosa et al., 2017). Participants recommended that public education could help inform consumers about the possible risks of edibles, help prevent accidental ingestion, and provide direction on how to

properly read labels (Kosa et al., 2017). In addition, labelling practices should account for consumers with lower literacy and numeracy skills.

PACKAGING & LABELLING ENFORCEMENT

Alaska, Colorado, Oregon, Nevada, and Washington have a specific cannabis control board, commission, office, or division dedicated to the enforcement of all cannabis edible labelling and packaging requirements. Oregon and Washington's departments control labelling and packaging requirements solely, whereas Alaska, Nevada, and Colorado's cannabis control departments have state oversight by the Department of Commerce, Community, and Economic Development (Alaska), Department of Taxation (Nevada), and the Department of Revenue (Colorado), respectively. In California, the Department of Public Health is responsible for the regulation of manufactured edible products and their labelling and packaging requirements.

REQUIRED WARNING INFORMATION

All six states require that commercially available cannabis edibles have a warning to keep edibles away from/out of the reach of children. Five of six jurisdictions have a warning about driving while impaired, a warning describing that the product is for adult use only, a description of intoxicating and delayed effects the edible may have, and a description of health risks associated with edible use. The use of a universal symbol for cannabis or THC is fully mandatory in three states. One other state, Washington, allows for licensees to use current protocol (no symbol) or use a symbol made available by the Washington Poison Center (WPC), which states "not for kids". Alaska and Nevada are the only states to not use a universal symbol; however, interviewees from both states revealed that the adoption of one is currently being discussed. Cross-state comparisons can be found in Table 4.

All six states also require a warning for those who are or who may become pregnant and/or are nursing. Washington and Nevada are the only states to provide this through accompanying material given to the consumer at retail locations. Accompanying material also includes warnings explaining the risks associated with child use, that potential criminal charges and involvement of child welfare services can occur if a child ingests or is given the product, as well as warnings related to health and intoxication.

Other required warnings that some states discussed were disclosures of pesticides, a warning stating the edible product is not FDA approved, the product may be unlawful outside of the state it is purchased from, ingestion with alcohol and/or other drugs may be dangerous, as well as more general warnings like "please use extreme caution" or "this product contains marijuana".

TABLE 4: REQUIRED WARNING INFORMATION OF CANNABIS EDIBLES

Criteria	Jurisdiction					
	Alaska	California	Colorado	Oregon	Nevada	Washington
Universal Symbol for cannabis (or THC/CBD)	x	✓	✓	✓	x	✓
Keep away from/out of reach of children	✓	✓	✓	✓	✓	✓
Warning for those who are pregnant or nursing	✓	✓	✓	✓	✓	✓
Intoxicating effects	✓	✓	✓	x	✓	✓
Warnings about driving	✓	✓	✓	✓	✓	✓
Health risks	✓	✓	✓	x	✓	✓
Delayed effects	x	✓	✓	✓	✓	✓
✓ Required x Not required						

PACKAGING REQUIREMENTS

All six states interviewed require the marking of individual edible servings in multi-serving packages by requiring that servings either be delineated or a cutting guide be included. For liquids, interviewees discussed that serving sizes be indicated by cap servings, horizontal stripes on the side of the bottle, or some sort of measurement guide that clearly shows what a serving size is. Washington requires that all edible servings be individually wrapped within an exterior package. Cross-state comparisons can be found in Table 5.

TABLE 5: PACKAGING REQUIREMENTS OF CANNABIS EDIBLES

Criteria	Jurisdiction					
	Alaska	California	Colorado	Oregon	Nevada	Washington
Marking of individual servings in multi-serving edibles	✓	✓	✓	✓	✓	✓
Child-resistant packaging	✓	✓	✓	✓	✓	✓
Opaque packaging	✓	✓	x	x	✓	x
Re-sealable packaging	✓	✓	✓	✓	✓	x
✓ Required x Not required						

Five of six states also indicated that they require all edible products to be placed in re-sealable packages. California and Colorado only require re-sealable packaging if there is more than one serving of the product, as well as Oregon, which has this requirement when there is 15mg or more of THC in a product. Washington does not require re-sealable packaging, but does require edible products to have no easy tear entries. Opaque packaging of cannabis edibles is required in half of the jurisdictions interviewed.

All six jurisdictions require cannabis edible products to be in child-resistant packaging either as they are manufactured or as they leave retail sites. All states interviewed also have restrictions on packaging of cannabis edibles that may be appealing to children. This includes packaging that uses images of children, cartoon characters, mascots, and depictions of unnatural/extra-human abilities, anthropomorphic characteristics, and comically exaggerated features. Designs/brands or celebrities that are marketed to or by children are also not allowed. Additionally, Alaska, Colorado, Oregon, Nevada, and Washington do not allow packaging that mimics already commercially available non-cannabis products, and Washington does not allow for child-like fonts on packing (e.g., bubble font). In Colorado and Nevada, the word 'candy' or 'candies' cannot be used on the package or label.

In terms of edible package coloring, responses among states were less consistent. Alaska, California, Nevada and Washington stated that there were no restrictions on bright colors used on packaging; however, this was a requirement Washington indicated their state was moving towards as they had difficulties in keeping things consistent and determining what is/is not acceptable. Both Oregon and Colorado determine acceptability of coloring on a specific, case-by-case basis.

Four of six states also require that cannabis edible packaging make no claim about any therapeutic benefits associated with the product or make any false, misleading, or over-exaggerated claims or comments. Two states indicated that edible packages cannot promote or display consumption. In Washington, it was specified that the edible package itself must not be made of toxic substances.

Although regulations specific to edibles have yet to be enacted in Canada, existing regulations for other cannabis products may provide some insight into future packaging requirements. Current packaging requirements in Canada include:

- The container of a cannabis product must be opaque or translucent, while the covering of any container must be transparent and colorless.
- The interior and exterior surface of any container, as well as the covering, must not display any brand element or image.
- The color of the interior and exterior surface of any container must be one uniform color; however, the interior surface may be a different color than that of the exterior surface.
- The color of the interior and exterior surface cannot resemble metal or have metallic properties, or be fluorescent or have fluorescent properties.
- The container, and any covering, must have a smooth texture without any raised features, embossing, decorative ridges, bulges, or other irregularities.
- The container, and any covering, must not be capable of emitting a scent or sound. (Department of Justice Canada, 2018, p. 52-55)

LABELLING REQUIREMENTS

In relation to labelling requirements, all six jurisdictions require that cannabis edibles include an ingredient list, the total amount of THC within the product, and a unique ID or batch number that makes the specific cannabis edible traceable according to state and/or licensee tracking systems. Most states require that the net weight of the cannabis product be included on the label, and one state requires that activation time be labelled. Nutrition facts panels, including carbohydrates, total fat, sodium, and sugar content are required in California and Oregon. An expiration/‘best-by’ date is required in Colorado and on perishable items in Nevada. Half of the states interviewed require that labels must include the date the edible product was made. Two states also require the date of packaging to be included and California includes the date of cultivation and the type of cannabis used. The differing requirements around expiry and manufacturing dates could be related to some states being more restrictive in what edible products can be sold and whether they need to be shelf stable. In Colorado, an additional label explaining instructions for use and/or storage is needed when foods are perishable. California and Washington include instructions for use on all of their cannabis edible products. Cross-state comparisons can be found in Table 6.

TABLE 6: PRODUCT LABELLING REQUIREMENTS OF CANNABIS EDIBLES

Criteria	Jurisdiction					
	Alaska	California	Colorado	Oregon	Nevada	Washington
Ingredient list	✓	✓	✓	✓	✓	✓
Disclosure of pesticides and contaminants	✓	×	✓	×	×	○
Expiration or ‘best-by’ date	×	×	✓	×	○	×
Nutritional facts panel	×	✓	×	✓	×	×
Total amount of active THC in product	✓	✓	✓	✓	✓	✓
Unique ID/batch number	✓	✓	✓	✓	✓	✓
Instructions for use	×	✓	✓	✓	×	✓
✓ Required	○ Policy-specific			×	Not required	

Three of six states require that the name of the manufacturer be provided on the label, and that there be either a license number or mailing address to be included. Two states also required that the retail store be identified on the label, either by name, logo, license number, or address. Only one state required that the label include the testing laboratory name, tracking number, and dates of testing on the product.

Half of the states interviewed prohibit edible products from being labelled as organic. One respondent from Washington stated that in their jurisdiction individual ingredients that are not

cannabis can be listed as organic in the ingredient list, but the total product cannot. Three of six states also require edible labelling to include disclosure of pesticides and/or contaminants, with Washington requiring this to be a part of the accompanying materials they provide to consumers at retail stores.

Other labelling requirements discussed were statements citing the product as unlawful outside of the associated state or that the product used solvents to extract cannabis or used artificial flavorings where applicable. Requirements such as using easy to read fonts and font sizes and labelling the distinct product identity (e.g., fruit chews) were also mentioned. Oregon stated that there was a restriction on labels that encourage the use of cannabis because of its intoxicating effects or encourage excessive or rapid consumption. In order to protect children, labels including false or misleading claims (e.g., green crack), labels that were marketed to or by children (e.g., Girl Guide cookies), or labels that used the name of children toys or characters (e.g., Optimus Prime) were also prohibited in Oregon.

Although regulations specific to edibles have yet to be enacted in Canada, existing regulations for other cannabis products may provide some insight into future labelling requirements. Current labelling requirements in Canada include:

- The label must contain information about the name, telephone number and email address of the licensed cultivator or manufacturer.
- It must also include the brand name, lot number, recommended storage conditions, packaging date, and expiry date.
- The label must also have a warning “KEEP OUT OF REACH OF CHILDREN,” as well as a health warning message.
- The standardized cannabis symbol must be included if a cannabis product contains THC in a concentration greater than 10 µg/g.
- The label of a cannabis oil container, or a cannabis accessory that contains oil must include the net weight/volume of total cannabis oil in the product as well as in each unit, the number of units, the quantity of THC and CBD in each unit, and any food allergens contained in the oil. (Department of Justice Canada, 2018, p. 56-64)

3.4 Cannabis Cafés, Social Clubs and Farmers’ Markets

CANNABIS CAFÉS

One of the challenges jurisdictions with legal cannabis laws are encountering is determining where cannabis is allowed to be used. In some jurisdictions, consuming cannabis in public places is not permitted. Other jurisdictions allow consumption in certain public spaces, but prohibit use near schools or other areas where children are present. Due to strict public consumption rules, many adults are unsure about where they are allowed to legally consume cannabis. As a result, there is interest in permitting formalized spaces such as cafés or lounges to provide access to cannabis for adults. These would be licensed establishments that allow the use of legal cannabis by adults on the premises, and in some cases, permit the sale of cannabis products for use on-site (Government of Alberta, 2017a). These venues may provide a unique, frontline opportunity to educate consumers about safe consumption practices and product information (Government of Alberta, 2017a). Some protections, including prohibiting the co-consumption of alcohol, preventing

underage use, and ensuring health safety would need to be implemented (Government of Canada, 2017).

There were some inconsistencies regarding restrictions on cannabis cafés from the interviewed jurisdictions. Alaska, Oregon, and Washington all indicated that they do not allow for such places to exist within their states currently. In Washington, strict requirements and laws prohibiting public use and cannabis clubs were one of the reasons why cannabis cafés cannot be implemented. Furthermore, the Washington and Oregon State Clean Indoor Air Acts, which heavily control smoking in public places, hinder the development of cafés. Alaskan representatives mentioned legal barriers to allowing for cannabis cafés, speaking more about how cannabis cafés would require a new and separate license type which can only be created through the Alaskan State Legislature, as well as a separate set of regulations regarding onsite consumption areas. However, it was commented that there has been growing consideration over the past two years as to whether or not public consumption at retail site locations should be approved within Alaska.

California and Colorado have approached cannabis cafés more uniquely. Representatives from both states indicated that cannabis cafés and lounges are seemingly 'grey' areas in their recreational cannabis laws. In Colorado, it was mentioned that because local and state jurisdictions have the responsibility of enforcement, cities like Denver have been able to pass bylaws allowing for establishments that are BYOC (bring-your-own-cannabis). Additionally, the state itself has been unable to pass a bill that allows for these establishments statewide and the representatives spoken to were not able to comment on the specific regulations of these establishments as they do not follow Denver's local regulations of cannabis consumption establishments. In California, representatives mentioned that these sorts of establishments have been permitted in a few places like Los Angeles and San Francisco and are regulated by their Bureau of Cannabis Control, but they could not speak on the specific types of establishments allowed or whether these establishments have the authority to also sell cannabis or cannabis products. It may be necessary to contact local officials to ascertain specific regulations surrounding cannabis cafés.

The Netherlands, often perceived as a mecca of cannabis, is a unique case. Although the cultivation, supply and possession of cannabis are criminal offences in the Netherlands, there is a policy of tolerance that evolved into what is now known as cannabis 'coffee shops', which are retail outlets where consumers can legally buy and use cannabis products. Tolerance of coffee shops reflects the focus of public health Dutch drug policy which is to prevent consumers from entering dangerous illegal drug markets and decrease exposure to hard drugs (Monshouwer et al., 2011). Coffee shops are considered a safe environment to buy and consume cannabis (Van Ooyen-Houben et al., 2016).

Since their inception, cannabis coffee shops have faced increased restrictions. Nuisance issues, including traffic problems, noise, loitering, and large numbers of tourists were problematic (Van Ooyen-Houben et al., 2016). In response, policy measures were implemented to relocate coffee shops away from city centres, and in some instances, were closed by local authorities (Van Ooyen-Houben et al., 2016). In addition, coffee shops were originally allowed to sell up to 30 grams of cannabis per person per day, which was eventually reduced to five grams, and a 500 gram limit was issued for stocks of cannabis (Monshouwer et al., 2011). Similarly, consumers can only carry up to five grams of cannabis into a shop for consumption.

Cannabis coffee shops are licensed by municipalities. To approve the licensing of coffee shops, the mayor consults with the public prosecutor and the police, and city council endorsement is required (Van Ooyen-Houben et al., 2016). If a license is granted, coffee shops are subject to strict conditions, including:

- age-access restrictions,
- a ban on selling or consuming other drugs (e.g., hard drugs, alcohol, tobacco),
- controls on advertising and marketing, and
- zero tolerance for public nuisance in the nearby vicinity (Government of Alberta, 2017a; Van Ooyen-Houben et al., 2016).

Compliance with these conditions are intermittently checked by municipalities, local police and tax authorities (Van Ooyen-Houben et al., 2016).

In 2012, two conditions known as the private club criterion and the residence criterion marked a radical change in cannabis coffee shop policy. The private club criterion proposed to convert coffee shops into closed clubs for registered members; however, this idea was abandoned soon after its introduction (European Monitoring Centre for Drugs and Drug Addiction, 2016). The residence criterion required that only residents of the Netherlands, proven by identity card or residence permit, be allowed to enter coffee shops. The aim of this measure was to address nuisance issues from high volumes of tourists and to make shops more controllable. The residence criterion is still in effect; however, implementation and enforcement of this rule varies by municipality (EMCDDA, 2016).

Nearly two-thirds of Dutch municipalities do not permit cannabis coffee shops, and the total number of coffee shops in the Netherlands has gradually reduced from 846 in 1999 to 614 in 2013 (EMCDDA, 2016). In 2018, The Hague, the third largest city in the Netherlands, banned public consumption of cannabis. Although coffee shops appear to be on the decline, there is no indication that the system will be discarded, as the number of municipalities that allow coffee shops have remained the same over time (Transform Drug Policy Foundation, 2014).

CANNABIS SOCIAL CLUBS

Cannabis social clubs (CSCs), or cannabis clubs, are non-profit associations of cannabis consumers that self-supply and self-organize (Belackova et al., 2016). This consumer driven model allows consumers to bypass illegal markets and their associated risks (Belackova et al., 2016). Although individual CSCs have their own unique designs, general criteria consists of the following:

- the club must be officially registered,
- only adult nationals/residents are granted membership upon payment of a fee,
- only a closed group of adults are supplied with cannabis, and
- the only purpose of cannabis cultivation is meeting the consumption needs of its members (Decorte et al., 2017).

Typically, there is a fixed annual limit of cannabis for each member, which serves as the basis for estimating production (Belackova et al., 2016; Decorte et al., 2017). CSCs are present in several countries with varying cannabis legal frameworks including Spain, Belgium and Uruguay.

In Uruguay, where a 2013 national law allowed for the regulation, supply and use of cannabis, state-registered consumers can be members of CSCs (EMCDDA, 2016). Consumers can join a social club of up to 45 members with a legal limit to grow a maximum of 99 plants (Queirolo et al., 2016). All growers and consumers must be registered with the Institute for the Control and Regulation of Cannabis (IRCCA), which administers national cannabis laws (Queirolo et al., 2016). Failure to work inside this regulatory framework can lead to criminal charges.

Advocates of the CSC model contend that these clubs provide a safe environment for peer-delivered harm reduction practice, in which consumers have direct control over product quality and consumption (Belackova & Wilkins, 2018). Detractors are concerned that some of these clubs have hidden motives and that under-regulation can result in poor quality control practices (Belackova & Wilkins, 2018; Decorte et al., 2017). Nonetheless, the nonprofit nature of the model suggests that clubs are not incentivized to increase consumption among members. This enables public health policies to help educate members about product quality, harm reduction activities, and other issues related to public health and safety (Belackova et al., 2016; Belackova & Wilkins, 2018).

FARMERS' MARKETS

All six jurisdictions included in the e-scan do not currently allow for the sale of commercial edibles by licensed manufacturers or home-prepared edibles by individuals at farmer's markets. Reasons for this restriction included public consumption being banned within all states, a concern for public safety, and lasting impressions on those who are under the legal age of consumption. The lack of security, control, and monitoring of edible products sold in this manner was also a concern among jurisdictions. In addition, representatives mentioned that manufacturer licenses in many of the interviewed states required edible products to be processed at a fixed and approved location and only sold to retail stores, making these licenses illegitimate and unlawful at a farmer's market.

3.5 Jurisdictional Successes, Challenges & Recommendations

SUCCESSES & KEY DOCUMENTS

All six jurisdictions believed that the regulation of cannabis edibles within their state has been successful up to this point and that there will always be room for improvement as new obstacles or challenges emerge. One jurisdiction mentioned that the existence of a medical cannabis system before the introduction of a recreational cannabis system was beneficial because there was not a new introduction of a drug, but a new consumer market for the drug. This pre-existing system, mentioned by Californian representatives, was deemed to have brought recreational cannabis regulations to a higher standard.

All states also mentioned that there was a large amount of interstate collaboration among jurisdictions who had implemented similar regulations. Specific success factors contributing to this process included, "[...] leaning on the experiences of others who did it first", creating opportunities for early feedback on regulatory drafts, and collaborating with experts. This involved law enforcement, people in the cannabis industry, academics, state agencies, health professionals, and consumers. Echoed among all respondents was the realization that the industry of recreational cannabis always has new and evolving parts, and pretending to know all the answers, operating in silos, or expecting a distinct endpoint, could create unintended challenges or barriers.

It was identified that learning from mistakes and being adaptive as the industry grows and matures can help make commercial sales of cannabis edibles a success. Interviewees from Washington, Alaska, and Nevada also mentioned that seeing no major health or safety issues around edibles, like a major increase in accidental child overdoses or a large spike in young adult use, was an encouraging reference that the regulations set in place were achieving their intent. Another respondent from Oregon discussed how they were expecting more negative reactions to labelling and packaging restrictions from manufacturers and retailers, but found their overall reaction to be quite positive. Likewise, interviewees from Nevada felt that maximum THC limits would be met with more pushback than experienced. An additional success factor stated by one jurisdiction was being flexible with regulations while also approaching cannabis edibles from a conservative standpoint. They went on to say that regulations need to be both clear and adjustable in order to suit the needs of citizens. All state representatives agreed with this and added that approaching policy-making cautiously is easier than having to create new or emergency regulations after negative experiences occur.

Key documents mentioned that were used to inform policy-making within these states included the U.S. Food and Drug Administration regulations, individual state food regulations, and the policies of states that had already implemented commercially available edibles. The American Herbal Pharmacopeia, which outlines developmental standards around the identity, purity, analysis, efficacy, and safety guidelines of botanicals was cited, as well as the Cole Memorandum, a guide created by the U.S. Department of Justice regarding cannabis enforcement.

CHALLENGES

Although interviewed jurisdictions suggested that the implementation of cannabis edible regulations in their states have been successful overall, challenges and setbacks were also discussed. A particular issue voiced by those interviewed was the 'culture shock' that occurred when recreational cannabis markets became legal. Many representatives felt that all cannabis-related regulations fell under the authority of their department or division and although they had experience with either drug, food, tax, licensing, testing, or public health regulations, few felt they had a complete grasp on all of them combined. Likewise, differing levels of education and experience in the commercial or illicit market, as well as dissimilar regulation perceptions and backgrounds was mentioned to be a perceived learning curve for jurisdictions and industry members as well. As such, consensus on certain regulations or policy decisions of a new cannabis edibles market sometimes proved to be more difficult. One interviewee mentioned that this also caused coinciding pushback from other departments and a reluctance to work with them. Due to the infancy, complexity, and fast-paced nature of the market, it was discussed that collaborative efforts like stakeholder meetings had to be used in order to generate buy-in from government agencies, industry leaders, and the general public.

Another challenge pointed out by representatives was the difficulty in homogenizing specific cannabis edible requirements. Jurisdictions stated that packaging or labelling on a case-by-case basis, enforcement inconsistency, gaps in information management, and a lack of clarification in the regulations provided were barriers in effective regulation of products. This made it both difficult and confusing for regulators and industry members, especially as methods of production, types of products, and sampling techniques are in constant flux. The recreational cannabis industry was also described as innovative and "[...] impossible to put into a box," making it difficult for policymakers to predict future developments. As one interviewee stated, "every day is something

new, something borderline, something grey”; regulating edibles can become a reactive process no matter how proactively they are developed. States that have more fixed regulation procedures and policies also expressed their challenges in smoothly transitioning those regulations from one product to the next. An example given was having specific restrictions on the demarcation of serving sizes in edible products that are difficult to demarcate under these specifications, such as granola.

The ability to be proactive in regulating cannabis edibles also proved to be challenging when considering public health and safety. It was discussed among representatives that keeping the public safe, particularly those under the legal age of use, was one of the most important considerations while developing regulations around edibles. However, this consideration required regulators to balance with making legal products available in a safe manner too. Stifling businesses arbitrarily or leaving huge amounts of products susceptible to the unregulated, illicit market was counteractive to the decision to legalize edible sales.

Interviewees also felt that there was difficulty in regulating labelling and packaging restrictions because they wanted to ensure that the label or package was meeting child safety and protection requirements, while also ensuring that any labeling or packaging was easy and clear for the consumer to understand. With insufficient requirements in place, there was a susceptibility for accidental ingestions, a misunderstanding of dosage or risks associated with edible use, as well as unexpected emergency regulations that may need to be implemented after an incident occurs. With too many requirements, a consumer may be overwhelmed by the material and not notice or understand key pieces of information. Some states also indicated that determining responsibility for key considerations such as child protective and opaque packaging was a complication that was now being brought to their attention by industry members.

Adherence and accountability among production and food safety standards was also raised as a challenge among interviewed states. Particularly, it was voiced that edible manufacturers rarely had backgrounds in harm reduction, food safety standards, and public health and safety. This concerned some jurisdictions because even hand washing regulations could be a new guideline that recently licensed manufacturers have to practice. One jurisdiction stated that they implemented food safety managers within manufacturing sites in order to improve adherence to food safety standards.

Struggles around accountability in sampling and testing guidelines, as well as auditing procedures were also discussed. Because cannabis is illegal federally, states felt that they had limited resources available to them to test and audit the quality of cannabis-infused edibles. Some states mentioned that their auditing procedures were flawed because their regulations stated that they were able to test products from manufacturing sites but if they wanted to test products available to consumers at retail locations, they would need to spend money to gather and then test them. This was deemed dysfunctional as buying these products from retailers in order to test their quality would not be sustainable long-term, nor beneficial for consumers who could potentially buy something that had not been tested. One state also mentioned that the lack of state reference labs made it more difficult to test for levels of THC content in edibles. Other states discussed that their auditing procedures were deficient because audits were usually done after initial complaints or concerns had already arisen. In addition, the lack of clarity on research relating to cannabis in general, and the appropriate amount of THC in edible products more specifically, proved

challenging as jurisdictions felt that the manner in which edibles were regulated and tested needed to be constantly re-worked and improved as research progressed.

RECOMMENDATIONS

During the interviews, states also specified key recommendations that they would provide a jurisdiction who is currently in the process of developing edible regulations. All representatives mentioned that developing regulations with balance, collaboration, and purpose in mind was essential to creating effective policy. Specifically, feedback from a variety of groups, and collaboration with multiple stakeholders, is needed to ensure safety and address potential issues from industry perspectives.

This also meant that regulations should not be drafted for the sake of drafting regulations. Instead, representatives offered the perspective that starting from a more conservative standpoint and then enabling flexibility allowed for regulations to accurately reflect the evolving, fast-paced nature of the cannabis industry. Additionally, it was mentioned that with the speed and creativeness of this industry, regulators need to expect the unknown, seek clarity, and respond to new issues with clearer guidelines. This included responding to research as more studies on the long-term effects of cannabis use emerge, as well as collecting baseline data that can be used to compare information before and after implementation of commercially available edibles.

Representatives advised that jurisdictions should determine how cannabis-infused products will be classified before implementing regulations. As one state mentioned, not defining cannabis edibles as separate and distinct from tobacco or other drugs can heavily impact regulation in a manner that may create unnecessary restrictions. Another state added that regulating cannabis edibles through a cannabis perspective only ignored the need to safely control edibles as a food product.

A classification framework was also considered to be important when developing guidelines around serving sizes and accepted product and product forms. It was advocated to base restrictions and regulations on product type so that guidelines were very clear and simple for people to follow. Similarly, it was suggested to create clear guidelines around serving sizes among varying product forms or sizes. Jurisdictions recommended having a requirement that explains to manufacturers the allowed serving sizes, and how they are allowed to be delineated across all product types. This would help consumers understand what they are taking and how much to take independent of their experience with cannabis edible products.

Some specific processing recommendations that states gave included requiring single-serve portion sizes in order to reduce the amount of accidental overdoses or creating a stamp that could be pressed onto the actual edible product itself. The logic behind stamping was that if the edible package was lost or thrown away, there would still be an identifiable way that consumers could understand the product had been infused with cannabis. The representative who offered this suggestion also felt that this stamping technique might be useful in determining if the product is being used responsibly and/or legally. An example mentioned was that the stamp would enable consumers, like law enforcement, to better see and respond to consumers under the legal age of consumption using cannabis products or consumers using them in prohibited public places.

Lastly, it was recommended that in order to successfully implement the regulation of cannabis edibles, there needs to be detailed laboratory testing. For jurisdictions that have the capability, it was suggested that they run their own state (or provincial) testing labs. It was also mentioned that

the testing scheme of products needs to be carefully examined. Specifically, it should be determined if edibles need to be tested before, during the middle, or at the end of production, and whether the testing process should be standardized or not among specific products or between edibles, such as those that are created from flower to edible, versus those that are made in the order of flower to extract to edible. Multiple jurisdictions mentioned that testing edible products at various production points would be helpful in ensuring quality and food safety standards.

4.0 Conclusion

Edibles have become a popular product in the legalized cannabis market and are a profitable industry for manufacturers, retail outlets and jurisdictions. A recent Canadian survey found that nearly half of respondents were willing to try edible products once legalized (Charlebois et al., 2018). The study also showed that most respondents did not feel confident using cannabis as a food ingredient due to a lack of knowledge, and expressed concerns about potential health risks, especially for children (Charlesbois et al., 2018).

The increase of cannabis overdoses and accidental pediatric exposure in some jurisdictions with legalized cannabis laws raise public health concerns. Based on the findings of this report, comprehensive regulations for the labeling, packaging, and marketing of edibles may help diminish the risk posed to children and adults. In addition, standardization of product formulations and effective quality control measures may also alleviate potential risks. Consumer education can help to describe how edibles affect the body and explain how to properly read product labels.

This report showed that homemade cannabis edibles present a unique challenge. Adult family members who make their own edible products are not legally required to follow the labeling, packaging, and food safety standards that manufacturers and retail outlets must adhere to. This can increase the risk of overdose and accidental pediatric exposure. Findings from the literature indicated that parents and caregivers should take proactive measures to safeguard against potential risks. Healthcare professionals can also help mitigate risk by informing parents of the potential dangers of accidental ingestion and providing safe storage and packaging advice. Furthermore, public health campaigns can enhance knowledge about homemade edibles, associated risks, and provide a guideline for safe home cultivation.

This report found that cannabis cafés and lounges warrant a number of public health considerations. Due to current public consumption laws, many adults are unsure about where they are allowed to legally consume cannabis. Cannabis cafés are formalized spaces that would allow adult consumers to eat and potentially buy cannabis. Several states included in the e-scan do not permit these types of establishments due to laws prohibiting public cannabis use, controls on smoking in public spaces, and strict licensing issues. Conversely, other states consider these types of establishments as grey areas in their recreational cannabis laws. Local jurisdictions have the responsibility of enforcement in some states. For example, Denver, Los Angeles and San Francisco have been able to pass bylaws permitting cannabis cafés. Due to time constraints, these municipalities were not contacted for specific regulations surrounding cannabis cafés.

In the Netherlands, cannabis coffee shops are subject to strict licensing conditions that enforce age-access restrictions, a ban on selling or consuming other drugs (e.g., hard drugs, alcohol, tobacco), controls on advertising and marketing, and zero tolerance for public nuisance in the nearby vicinity. Coffee shops are also restricted to selling five grams of cannabis per person per day, and have a total stock limit of 500 grams. Similarly, consumers can only carry up to five grams of cannabis into a shop for consumption.

This report contributes to the public health and substance use prevention fields by providing a summary of information from other legalized jurisdictions that is relevant to the second phase of cannabis legalization in Canada. This will be helpful for anyone interested in understanding the legalization of cannabis edibles and how they were legalized in select US states.

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6.0 Appendix A: Literature Search Terms

TABLE 7: LITERATURE SEARCH TERMS

Concept	Key Terms
Cannabis	mari*uana, ganja, hashish, hemp, weed, cannabinoid, THC, CBD
Edibles	oil, extract, baked goods, gummies, candy, confectionary, beverages, resin, herbal, butter, chocolate
Food Safety	food safety, potency, contamination, pathogen, pesticide, mould, mildew, recall, outbreak, food handling, food storage, foodborne disease, food processing, quality control, temperature control, food quality, food testing, sanitation
Cannabis Cafés, Clubs & Farmers' Markets	coffee shop, café, lounge, bar, den, farmer market, food market, county fair, artisan market, commerce, club, social club
Public Health	Regulation, legislation, law, policy, practice, protocol, guideline, standard
Labelling/Packaging	product packaging, product labelling, packaging methods, packaging materials, product container, safety labelling, warning labelling, food labelling, nutrition labelling, product description, expiry date, serving size

7.0 Appendix B: Environmental Scan Email Screen

My name is [NAME] and I am a [JOB TITLE] with Alberta Health Services (AHS) – Provincial Addiction & Mental Health in Alberta, Canada. As Canada prepares to pass legislation to legalize the recreational use of cannabis, the province of Alberta is in the process of gathering information that will inform the development of policies and regulations for edible cannabis products.

One aspect of our work is to identify and report on how other jurisdictions have regulated cannabis edibles. Specifically, we want to know what policies or guidelines have been implemented or discussed regarding the commercial sale of cannabis edibles. We would like to schedule some time with you in the next two to three weeks to gain a better understanding of how your jurisdiction approached these aspects of regulation. The interview will cover four topics:

- 1) Required warning information, product labelling requirements and packaging requirements
- 2) Food safety standards
- 3) Current practices regarding cannabis consumption (all product types) in cannabis cafés/lounges and edibles in farmers' markets
- 4) Your state's overall experience with edibles regulation

8.0 Appendix C: Environmental Scan Interview Guide

Date of interview:

Jurisdiction:

Name of person interviewed and job title:

Interviewer:

As mentioned in the email that we sent to you earlier, I am calling from Alberta (Canada) on behalf of our provincial health authority, Alberta Health Services. We are in the process of collecting information that will inform the development of policies and regulations for cannabis edibles in our province.

One aspect of our work is to identify and report on how other jurisdictions have regulated cannabis edibles. The purpose of today's interview is to learn about the policies and guidelines implemented in your jurisdiction.

The information you provide will be confidential, which means that the final report we prepare will not link your name with the information you provide; however, your jurisdiction will be identified. The interview will take about 30-40 minutes to complete. Are you still willing to participate in the interview?

Section A: Labelling and Packaging

The first several questions will focus on information about labelling and packaging of cannabis edibles.

REQUIRED WARNING INFORMATION

A.1 Do retail edible products in your state have required warning information? *If no, proceed to A.4*

A.2 Does the required warning information contain...

Criteria	Y/N	Comments
Universal Symbol for cannabis (or THC/CBD)		
Keep away from/out of reach of children or pets		
Intoxicating effects		
Warnings about driving		
Health risks		
Delayed effects		

A.3 Is there any other required warning information?

PRODUCT LABELLING REQUIREMENTS

A.4 Do retail edible products in your state have product labelling requirements? *If no, proceed to A.7*

A.5 Does product labelling requirements include...

Criteria	Y/N	Comments
Ingredient list		
Disclosure of pesticides and contaminants		
Expiration or 'best-by' date		
Nutritional facts panel		
Total amount of active THC in product		
Unique ID/batch number		
Instructions for use		

A.6 Are there any other product labelling requirements?

PACKAGING REQUIREMENTS

A.7 Do retail edible products in your state have packaging requirements? *If no, proceed to B.1*

A.8 Does packaging requirements include...

Criteria	Y/N	Comments
Marking of individual servings in multi-serving edibles		
Child-resistant packaging		
Opaque packaging		
Re-sealable packaging		

A.9 Does your state prohibit *manufacturing* edibles that appeal to children (e.g., confectionery)?

A.10 Does your state prohibit *packaging* edibles that appeal to children (e.g., vibrant colors, cartoon characters)?

A.11 Are there any other packaging requirements?

OVERALL

A.12 How are labelling and packaging requirements enforced? [probe: *who is responsible for enforcement?*]

Section B: Food Safety

This next set of questions will focus on food safety standards of cannabis edibles.

B.1 Is there a governing body (e.g., Commission, Control Board) that oversees the regulation of edibles in your state? **If yes**, please briefly describe its role. [probe: *1) is production and manufacturing regulated by the state or by local jurisdictions? 2) how does the governing body verify that manufacturers are complying with regulations (e.g., concentration levels, etc)?*]

B.2 Are edibles regulated as food? Or something else (e.g., drugs)? [probe: *does cannabis fall under food regulation?*]

B.3 Is there a maximum THC content *per edible product*? **If yes**, what is the amount?

B.4 Is there a maximum THC content *per serving* in an edible product? **If yes**, what is the amount?

B.5 Are there restrictions on the types of food that can or cannot be infused with cannabis? **If yes**, please explain and provide examples.

B.6 Can edibles be sold in foods that are time-temperature controlled (i.e., foods that require refrigeration, freezing, or hot holding)?

B.7 Are edibles permitted to be processed in the same facility as conventional foods?

B.8 What role does the government play in the testing and quality control of edible products?

a. Are licensed facilities responsible for the testing of contaminants and pesticides? **If yes**, does the government separately verify the accuracy of these results?

B.9 Have there been edible product recalls as a result of mildew, mould, pesticides, or other pathogens? **If yes**, what do you think needs to be done to prevent future issues?

B.10 Are there guidelines for the preparation of home-prepared edibles? **If yes**, can you share with us?

- a.** Are there any other efforts to educate the public on this matter (e.g., awareness campaigns)? **If yes**, please briefly describe these efforts.

Section C: Cannabis Cafés/Lounges and Farmers' Markets

The next set of questions will focus on farmers' markets and cannabis cafés/lounges.

Farmers' Markets [a food/beverage market where local businesses and individuals sell products directly to consumers] (i.e., county fair, artisan market)

C.1 Is the sale of edibles by licensed manufacturers permitted at farmer's markets? **If yes**, how are these products regulated [probe: *in the same manner as those sold at retail locations?*]

C.2 Is the sale of home-prepared edibles permitted at venues such as farmers' markets or bake sales?

If yes, how are these products regulated?

CANNABIS CAFÉS/LOUNGES

*mention that some cities (e.g., San Francisco, Denver) have introduced these types of establishments. Make sure to bring this up when speaking with the relevant state.

C.3 Are cannabis cafés/lounges/coffee shops permitted in your state? **If no**, what was the rationale for that decision? [*probe: what information informed that decision?*]

C.4 **If yes**, please describe these types of establishments. [*probes: what types of cannabis products are permitted? Is it BYO? Do they also serve/sell cannabis products?*]

C.5 How are these types of establishments regulated?

Section D: Overall Experience

The next set of questions will focus on your state's overall experience with edibles regulation.

D.1 Were there any key documents that you used while developing regulations for edible cannabis products? (e.g., research, best practice guidelines, benchmarks, internal evaluations)?

If yes, can you share the documents with us?

D.2 Do you consider the regulation of edibles in your state to be a success? If so, please explain why.

a. Were there specific factors that contributed to the process being successful?

D.3 Were there any issues or challenges associated with the regulation of edibles? If so, please explain why. [*probe: packaging/labelling, food inspection, enforcement of regulations*]

D.4 Were there any unexpected things that happened during or after the development of edibles regulation?

a. If yes, what were they?

b. Were they positive or negative?

D.5 What key recommendations would you provide a jurisdiction that is developing edibles regulations?

In closing, is there anything else you'd like to mention about the regulation of edible cannabis products that you haven't already told us?

9.0 Appendix D: Sample of Cannabis Edibles Products

The following products were copied from several cannabis dispensary websites in Colorado and Oregon

Chocolates & Baked Goods

- Bars (mint crunch, classic marble, black cherry, orange dark chocolate, malted milk chocolate)
- Truffles (key lime, raspberry cheesecake, s'more, hazelnut chai)
- Cookies (peanut butter, vegan chocolate chip, gluten-free, snickerdoodle)
- Caramel (coffee, chocolate, bananas foster)
- Chocolate taffy
- Mini turtles
- Vegan chocolate covered goji berries
- Peanut butter krispie cups
- Brownie bites
- Chocolate marshmallows

Candies

- Gummies (mimosa, oranges & cream, passion fruit, tropical fruit)
- Lozenges (rainbow sherbet, butterscotch)
- Mints (orange zest, peppermint)
- Lollipop (boysenberry, strawberry)
- Candy drops (lemon, cherry)
- Dried fruit slices (mango, pineapple, kiwi)
- Hard candy (cherry, peach, green apple)
- Jelly bomb (pineapple, peach, orange)
- Blueberry sucker
- Sour tropical fruit chews
- Peach rings
- Sour straws
- Coconut snowballs

Beverages

- Soda (cherry cola, root beer, ginger ale, black cherry)
- Juice (cranberry, lemon-ginger, blueberry-lemon, watermelon nectar, pineapple mango delight, cranberry lime, blue raspberry, sparkling)
- Tea (blood orange, chamomile, peppermint)
- Sparkling water
- Magic buzz energy shot
- Cold brew coffee shot

Other

- Tinctures (berry, espresso, honey, medi-drops)
- Capsules (CBD plant matter, energy, herbanoids)
- Spicy cheddar crackers
- Honey mustard pretzels
- Roasted seed mix
- Espresso beans
- Hot cocoa
- Gelato
- Waffle mix
- Olive oil
- Coconut oil
- Oil-infused honey
- Cannabis salt
- Pot chips
- Syrup
- Hash bath salts
- Breath strips
- Oral sprays