Cannabis and Pregnancy

Transitioning into Legalization

Phase 2 Report

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Thunder Bay District Health Unit

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Thunder Bay District Health Unit Staff:

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Sarah Hyett

Jennifer McFarlane

Adena Miller

Janice Piper-Wilson

Eryn Pleson

Sunny Samira

Erica Sawula

Lyne Soramaki

Sophia Wenzel

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Guide to Acronyms Used

CBD - Cannabidiol

CPSCP - Community Perception Survey on Cannabis and Pregnancy

CUD - Cannabis Use Disorder

ED - Emergency Department

GP - General Practitioner

LBW - Low Birth Weight

LR - Literature Review

OB - Obstetrician

OCS - Ontario Cannabis Store

OPHS - Ontario Public Health Standards (2018)

PH - Public Health

PHCP - Primary Health Care Provider

PTB - Preterm Birth

RCT - Randomized Controlled Trials

SDOH - Social Determinants of Health

SES - Socio-Economic Status

SHS - Second-Hand Smoke

SP - Service Provider

TBDHU - Thunder Bay District Health Unit

THC – Tetrahydrocannabinol

Notes About the Study

Definition of Cannabis: For the purpose of this document the term "cannabis" is used consistently throughout the document, and refers to all forms and preparations of cannabis (eg: marijuana, hashish, hash oil, edibles, extracts, and topical).

Research Timelines in Relation to Legalization of Cannabis: Please note that although the report refers to all forms of cannabis, during the literature review (LR) timelines of this project cannabis was not legalized at all, and during the District of Thunder Bay community perception survey on cannabis and pregnancy (CPSCP) timelines the Cannabis Act-Bill C45 (2018) had been passed however, edibles, extracts and topicals were not yet legalized under this Act (see appendix 1-Project Timelines).

Breastfeeding and Cannabis/Effects of Cannabis Use during Pregnancy: A full LR was not conducted on breastfeeding and cannabis, nor on the effects of cannabis use during pregnancy. These topics merit a focus of their own and is beyond the scope of this report. There may, however, be some information about breastfeeding and effects of cannabis use that is included in this report as some information was combined with the literature on cannabis and pregnancy prevalence and practice from the LR, and a question about cannabis and breastfeeding was asked on the District of Thunder Bay CPSCP.

Terminology within Report: To be consistent with terminology found in the research, terms such as woman, women or pregnant women are used in this report. However we acknowledge that people who identify other than female are able to become pregnant.

Limited Studies/Low Levels of Evidence: It is important to keep in mind that when reading this report that the interventions and strategies discussed in this paper are within the overall context of limited studies and low levels of evidence from the LR. The research, including the limited grey literature, came mainly from the United States (U.S.), with only a few Canadian studies (see appendix 4 & 5 for LR Methodology).

Community Perception Survey on Cannabis and Pregnancy (CPSCP) Limitations: The survey was a convenience sample, meaning only those most accessible and willing to participate at the time of data collection were surveyed. This means representativeness to the general population is not ensured. The survey was cross-sectional and only represents a single point in time, at the time of data collection. The data likely contains a level of response bias, meaning respondents may have intentionally or unintentionally answered questions inaccurately based on what they felt was socially desirable. For example, respondents who use cannabis may have been hesitant to disclose use. The anonymity of this survey may reduce some response bias. The survey was available in English only, so people who could not read English likely did not participate. Therefore, the data cannot be used to determine causal relationships nor can it be generalized and should therefore be interpreted with caution (see appendix 2 & 3 for CPSCP Methodology and CPSCP Questionnaire).

Community Perception Survey on Cannabis and Pregnancy (CPSCP) Suppression of Data: To ensure ethical practice to keep anonymity of respondents to the CPSCP, if there were five or less responses in a category, then categories were combined to provide a larger community number, or if that was not possible then the category was not included in the report (see appendix 2 & 3 for CPSCP Methodology and CPSCP Questionnaire).

Executive Summary

In response to cannabis legalization, the Thunder Bay District Health Unit (TBDHU) embarked on a three-phased cannabis and pregnancy research project to help inform public health (PH) prevention initiatives to reduce cannabis-related harms during pregnancy.

Phase one examined gaps, barriers, promising practices and service provider (SP) needs to provide effective programming and interventions to reduce cannabis-exposed pregnancies prior to legalization of cannabis. This work resulted in the release of Cannabis and Pregnancy: Getting Ahead of Policy (Thunder Bay District Health Unit [TBDHU], 2018). These findings helped guide phase two research.

The current phase two report *Cannabis and Pregnancy: Transitioning into Legalization* focused on understanding community perceptions about cannabis use and pregnancy through a community perception survey (CPSCP), as well as, a literature review (LR) to identify pre-legalization promotion, prevention, intervention and screening practices aimed to reduce and/or prevent cannabis-exposed pregnancies. The results will provide PH professionals, SP and primary health care providers (PHCP) with an understanding of community attitudes and beliefs regarding risks of cannabis use during pregnancy as well as the changing landscape on programming and interventions to prevent cannabis-exposed pregnancies.

Summary of Phase Two Findings:

Surveillance

- Self-reported cannabis use during pregnancy by CPSCP respondents was higher than previous statistics identified; nearly one-third of pregnant respondents had used cannabis in the last three months.
- The perceived rates of cannabis use were congruent with the actual self-reported rates of cannabis use in the CPSCP.
- The frequency of cannabis use by CPSCP respondents was similar among the general public and people of all statuses of pregnancy (considering, currently and recently pregnant). Over half of users used cannabis daily or almost daily, and nearly one-quarter more used cannabis weekly or almost weekly.
- A greater proportion of CPSCP respondents who had a lower level of formal education were cannabis users in comparison to those with a higher level of formal education, however, respondents with a higher level of education who were users used cannabis more frequently.
- Cannabis is the most popular co-used substance alongside alcohol, tobacco and nonmedical opioid use among the studies reviewed (Jarlenski, Barry, et al., 2017; Kozhimannil, Graves, Levy, & Patrick, 2017).
- Umbilical cord sampling versus meconium testing shows promise as an effective surveillance strategy to assess prenatal cannabis exposure as compared to self-reported rates (Higginbotham & Jones, 2018; Lamy et al., 2017).

- Surveillance of cannabis user demographics is important when determining target audience for cannabis-exposed pregnancy prevention and intervention.

Attitudes/Beliefs

- CPSCP respondents believed that cannabis use and exposure to cannabis second-hand smoke (SHS) by both the general public and pregnant women, was safer than use or exposure to other substances such as tobacco, alcohol and tobacco SHS.
- A greater proportion of CPSCP respondents believed that cannabis use for medical reasons, as well as for nausea and vomiting during pregnancy, was safer than the use of cannabis recreationally.
- A greater proportion of CPSCP respondents who were cannabis users, in comparison to non-users, believed that the use of cannabis in all forms and exposure to cannabis SHS was safe for the general public.
- Overall, fewer respondents believed that, during pregnancy, it was safe to use cannabis or be exposed to cannabis SHS than use or exposure to cannabis for the general public; However, users were still more likely than non-users to believe use and exposure to cannabis during pregnancy was safe.
- A greater proportion of CPSCP respondents with lower levels of formal education believed that use and exposure to cannabis was safe, in comparison to those with a higher level of formal education.

Raising Awareness

- CPSCP respondents who were non-cannabis users were nearly two times more likely than users to believe that cannabis use during pregnancy can have a harmful effect on a baby before birth, after birth, as a child or youth, or once the exposed child is an adult.
- CPSCP respondents most preferred sources of information about cannabis and pregnancy were their PHCP and the Internet.
- CPSCP respondents who were considering becoming pregnant in the next three months generally had a greater interest in information on cannabis use and pregnancy than other respondents.
- PH agencies need to promote and disseminate messages on an ongoing basis about the effects of cannabis use during pregnancy and that there is no known safe amount, especially with the public beliefs that cannabis use is safe and beneficial (Krening & Hanson, 2018).

Education for Primary Health Care Providers (PHCP)

- PHCPs lack confidence and/or education in communicating information about cannabis with their clients, especially to women who are of reproductive age and pregnant (Brooks, Gundersen, Flynn, Brooks-Russell, & Bull, 2017; Enos, 2017).

- Most CPSCP respondents felt that their PHCP was a reliable source for information on cannabis and pregnancy.
- Most CPSCP respondents indicated they would be willing to discuss cannabis use with their PHCP.
- PHCP education on providing consistent messaging with regards to cannabis use in pregnancy for medical reasons such as use for prevention of nausea/vomiting is lacking (Vadivelu, Kai, Kodumudi, Sramcik, & Kaye, 2018).
- Education and training needs for PHCPs highlighted in the literature included, but are not limited to: How to talk to clients about cannabis; information on effects of cannabis, cannabis SHS exposure, safe storage, over consumption of edibles, new products like e-cigarettes and vapourizers, information on legalization, revised clinical guidelines and procedures, screening, medical cannabis and child welfare legalities (Brooks et al., 2017; Mark & Terplan, 2017; TBDHU, 2018; Vadivelu et al., 2018).

Screening and Intervention

- Screening regularly for cannabis use is as important as screening regularly for tobacco and alcohol use during pregnancy (Coleman-Cowger, Oga, Peters, & Mark, 2018; Coleman-Cowger, Pickworth, Lordo, & Peters, 2018).
- Settings like emergency departments (ED) can play an important role in providing education, screening and intervention to a pregnant woman using cannabis (Moyer, Johnson, Klug, & Burd, 2018).
- Self-reporting of cannabis use in women of reproductive age and a pregnant woman may occur more frequently as cannabis is legalized (Brooks et al., 2017; Krening & Hanson, 2018; Mark & Terplan, 2017).
- Nearly two-thirds of CPSCP respondents who were considering, currently, or recently pregnant would tell their PHCP about their cannabis use on their own. Nearly one-third would talk to their PHCP about their cannabis use only if asked.
- Novel technological approaches such as electronic brief intervention and text messaging programs, computer delivered brief intervention and mobile app interventions are being developed to include cannabis use in pregnancy (Dublin et al., 2018; Gray et al., 2017; Wernette, Plegue, Kahler, Sen, & Zlotnick, 2018).

Policy/Regulations

- The impact of cannabis legalization on the use of cannabis by women of childbearing age and pregnant women is a growing PH concern (Mark & Terplan, 2017; Petrangelo, Czuzoj-Shulman, & Abenhaim, 2018; Wood, 2018; Young-Wolff et al., 2017).
- Pregnant women may turn to cannabis dispensaries versus PHCPs for information on cannabis use during pregnancy particularly if concerned with legal/child welfare issues (Dickson et al., 2018).
- Debate with regards to the effects of cannabis use in pregnancy has resurfaced with cannabis legalization (Jarlenski et al., 2018).

Research

- Research opportunities regarding the prevalence of cannabis use during pregnancy may become less restrictive given that cannabis is now considered a licit drug (Association of Women's Health Obstetric and Neonatal Nurses [AWHONN], 2018).
- Much more evidence exists linking health risks such as smoking tobacco during pregnancy than health risks of smoking cannabis during pregnancy or co-use of tobacco and cannabis (Coleman-Cowger, Oga, et al., 2018; Coleman-Cowger, Pickworth, et al., 2018).
- Adverse effects of prenatal exposure to cannabis in pregnant women today may be underestimated (Ryan et al., 2018).

Next Steps - Highlights from Literature Review and Community Perception Survey

- A greater understanding of trends and issues related to attitudes and beliefs is needed to guide next steps (Hasin, 2018).
- Accurate and ongoing messaging on cannabis use in pregnancy need to be promoted and disseminated by PH agencies in an ongoing manner as the public believes cannabis use is safe (Krening & Hanson, 2018; Mark, Gryczynski, Axenfeld, Schwartz, & Terplan, 2017).
- Education and training opportunities for PHCPs and SPs are needed in a number of areas of practice and settings in order to increase the level of comfort needed to discuss cannabis use with people of reproductive age and pregnant persons in a non-biased manner (Brooks et al., 2017; Cook & Blake, 2018; Wood, 2018).
- Screening for cannabis use in people who are of age to become pregnant, are pregnant or planning to become pregnant requires PHCPs to screen consistently and regularly (Krening & Hanson, 2018; Northrup et al., 2017).
- Gaining an understanding of how legalizing cannabis may affect a pregnant person and their PHCPs in terms of attitudes, beliefs, behaviors and practices is needed to develop policies (Krening & Hanson, 2018).
- Given the low levels of evidence with regards to cannabis-exposed pregnancies, research related to surveillance, attitudes/beliefs, awareness, education, screening and interventions and policy/regulations is needed.

TBDHU's phase two report findings will help inform and guide phase three of the cannabis and pregnancy project. The third phase of the project *Cannabis and Pregnancy: One Year Post-Legalization* will explore changes in the landscape of community perceptions, as well as prevention and evidence-informed interventions of cannabis-exposed pregnancies post-legalization. The report will launch in the fall/winter of 2020.

About The Cannabis and Pregnancy Research Project

Research indicates that many people believe cannabis is safer than other substances, or safe in general (Association of Women's Health Obstetric & Neonatal Nurses [AWHONN], 2018; Krening & Hanson, 2018; Mark & Terplan, 2017). Research also predicts that cannabis usage would increase after legalization and would be considered a replacement for other substances currently used such as alcohol (Hasin, 2018; Statistics Canada, 2019b). Yet, there is no known safe amount of cannabis use during preconception and pregnancy. Adverse effects of cannabis use during preconception and pregnancy are associated with compromised child growth and development having potentially life-long effects (Department of Public Health & Environment, 2017; Society of Obstetricians & Gynaecologists of Canada [SOGC], 2017). The public perception that cannabis is safe is further compounded with cannabis legalization as well as cannabis being provided as a prescribed substance, including use during pregnancy for nausea (Fantasia, 2017; Kozhimannil, Graves, Levy & Patrick, 2017). With the legalization of cannabis in Canada, it is important for public health (PH) and primary care to understand how to prevent or mitigate potential health and social impacts the use of cannabis may pose, especially within the context of cannabis-exposed pregnancies.

In 2016, following the Government of Canada's announcement to legalize cannabis in 2018, the Thunder Bay District Health Unit's (TBDHU) Family Health (FH) program embarked on a three-phased cannabis and pregnancy research project aimed to obtain information on cannabis use and pregnancy. This information will assist with program planning at the TBDHU to prevent and reduce cannabis-exposed pregnancies as the landscape changes throughout the process of cannabis legalization (see appendix 1).

Phase One - Cannabis and Pregnancy: Getting Ahead of Policy (TBDHU, 2018)

The research project began its first phase, Cannabis and Pregnancy: Getting Ahead of Policy (Thunder Bay District Health Unit [TBDHU], 2018) with a literature review (LR) from ten years prior, up to May of 2017 to explore pre-legalization promotion, prevention, intervention and screening practices aimed to reduce and/or prevent cannabis-exposed pregnancies. It also aimed to gain an understanding of service provider (SP) perceived barriers and educational needs through a local primary health care and service provider survey, as well as an Ontario Public Health Unit scan. The phase one report, Cannabis and Pregnancy: Getting Ahead of Policy was released in October 2018 and is available at https://www.tbdhu.com/resource/cannabis-pregnancy-getting-ahead-of-policy.

Seven themes from the phase one LR and surveys were identified: Surveillance, attitudes and beliefs, raising awareness, education for primary health care providers (PHCP), screening/interventions, policy/regulations, and research. Social Determinants of Health (SDOH) emerged as an underlying theme among all seven themes. The seven themes were then further examined determining their relationship to the Ontario Public Health Standards (OPHS) (Ministry of Health and Long-Term Care [MOHLTC], 2008; 2018).

The phase one report recommended the following: 1) Monitoring and surveillance of the prevalence of cannabis use during pregnancy and the pregnancy outcomes, especially

with PHCPs indicating that they perceived a significantly higher usage rate of cannabis by their pregnant clients than local statistics indicated (Better Outcomes Registry & Network [BORN], 2016); 2) Ensuring an understanding of those who are able to become pregnant, as well as PHCPs, attitudes and beliefs around perceived risks of cannabis use and pregnancy to tailor interventions, education and discussions; 3) Creating consistent universal and targeted messaging for women about effects and safety of cannabis use during pregnancy; 4) Need for education for PHCP about cannabis and pregnancy in general and capacity-building in intervention and screening; 5) Need for development of effective screening tools, early identification (ID) of cannabis use and effective interventions as none currently exist that are specific to cannabis; 6) Need for clinical practice guidelines, institutional policies and an understanding how policies impact perception, belief and attitudes; 7) Need for randomized controlled trials (RCTs) on cannabis use and pregnancy, higher levels of evidence and more Canadian research on cannabis use during pregnancy. Collaboration using a multi-prong approach to address the seven identified themes is required to prevent and/or reduce cannabis-exposed pregnancies.

Phase Two - Cannabis and Pregnancy: Transitioning Into Legalization

This current report highlights phase two of the project, *Cannabis and Pregnancy: Transitioning into Legalization*. The second phase was launched at the end of 2018 and built on the findings from the first phase of the Cannabis and Pregnancy Research Project.

Phase two began with a continuation of the LR looking at research from May 2017 to October 2018 (leading up to cannabis legalization). The same research question was explored for phase two: "What are effective interventions and strategies during preconception and pregnancy to reduce and/or prevent cannabis-exposed pregnancies? Exclusion=after pregnancy" (see appendix 4 and 5).

The seven themes that emerged in phase one were also used to guide the second phase of research with attention to any differences in practice and knowledge leading into the legalization of cannabis. The themes considered were surveillance, attitudes/beliefs, raising awareness, education for PHCP, screening/interventions, policy/regulations and research. Subthemes within each of the above themes emerged from the LR, however no new main themes were identified. All themes are integrated within one another, which confirms the need to continue to work on a comprehensive multi-pronged approach.

The emergent themes were further examined to determine their relationship to the OPHS under the Healthy Growth & Development (HG&D) program standard (MOHLTC, 2018). **Figure 1** summarizes the linkages of the themes to the OPHS. It is important to note that additional program standards such as the SDOH, Injury Prevention, Chronic Disease and Mental Health relate to, or complement the HG&D program standard (MOHLTC, 2018).

***Figure 1**. Themes related to Ontario Public Health Standards (MOHLTC, 2018)*

	Theme	HG&D Requirement OPHS 2018
1	Surveillance	HG&D #1
2	Attitudes/Beliefs	HG&D #2
3	Raising Awareness	HG&D #1, #2
4	Education for PHCP	HG&D #2
5	Screening/Interventions	HG&D #1, #2
6	Policy/Regulations	HG&D #2
7	Research	HG&D #1, #2

With the importance of understanding community perceptions, attitudes, and beliefs towards the use of cannabis in pregnancy being emphasized in the findings from phase one, the TBDHU moved forward on conducting a cross-sectional community perception survey on cannabis and pregnancy (CPSCP) within the District of Thunder Bay. The survey's overall purpose was to obtain baseline information to determine the community perceptions, attitudes, and beliefs towards the use of cannabis in pregnancy within four months after cannabis legalization.

The survey was open from January 30, 2019 to March 1, 2019, including all persons 16 years of age and older that lived within the City and District of Thunder Bay. A total of 1,939 surveys were completed with 1,860 responses eligible to be included in the analysis. The majority of the respondents lived in Thunder Bay (87%) with 13% living in the District of Thunder Bay. Of the respondents (n=1859) who answered: "Which of the following describes how you think of yourself:" 10% indicated "male," 89% indicated "female," and 1% indicated "In another way." Regarding pregnancy status of "female" and "In another way" respondents (n=1666), 9% were currently pregnant, 10% were considering becoming pregnant in the next 3 months, and 7% were recently pregnant (had a child within the last 6 months). Only those who indicated they were born female, or prefer not to say (i.e. potential to have reproductive parts to become pregnant) were directed to answer questions if they were currently or considering becoming pregnant. When pregnancy status was stratified by respondents who indicated "they were born Female" (i.e. those that have the reproductive parts to become pregnant), the percentages for considering, currently and recently pregnant were consistent with the percentages reported from those who thought of themselves as female and in another way.

Highlights from the CPSCP will be shared in this report. These findings represent only a snapshot of all data provided by the CPSCP. Further survey methodology, data analysis, and limitations information can be found in Appendix 2. The full survey questions can be found in Appendix 3.

Phase Three - Cannabis and Pregnancy: One Year Post-Legalization

The third phase of the project *Cannabis and Pregnancy: One Year Post-Legalization* will explore changes in the landscape of prevention and evidence-informed interventions of cannabis-exposed pregnancies post-legalization. A LR of articles from November 2018 and onward will be conducted to identify promotion, prevention, intervention, and screening practices aimed to reduce and/or prevent cannabis-exposed pregnancies. In addition to the LR, the PHCP environmental scan will be repeated in early 2020 to compare previous data collected in the baseline scan from phase one as well as identify any additional promotion, prevention, intervention and screening practices aimed to reduce and/or prevent cannabis-exposed pregnancies locally and provincially in Ontario. The scan will also identify any changes in SP-perceived barriers and education needs for working with clients using cannabis during pregnancy. A follow-up CPSCP will also be conducted in early 2020 to collect feedback and gauge if there is any change in community perception, attitudes and beliefs regarding cannabis and pregnancy just over a year after legalization of cannabis, and 4 months after the legalization of edibles, extracts and topicals.

Research Findings

The following is a summary of the LR and highlights of the CPSCP categorized by the seven themes and linked to the OPHS (MOHLTC, 2018).

Surveillance

Self-Reported Rates of Cannabis Use

Prior to legalization of cannabis in Canada, there was a lack of Canadian information on prevalence rates with respect to cannabis use during pregnancy. Literature related to surveillance suggests that self-reported surveys underestimate the use of cannabis. Legalization of cannabis use brings the potential for more accurate self-reporting data, however, may not completely eliminate the stigma affecting self-reporting of cannabis use during pregnancy.

TBDHU's phase one report captured provincial data of self-reported cannabis use during pregnancy (1.5% provincial vs 6% in Thunder Bay) (BORN, 2016) . However, the literature and feedback from the environmental scan of local PHCPs and SPs as well as Ontario PH professionals in 2017 indicated that use during pregnancy was perceived to be significantly higher than statistics indicated even prior to legalization.

United States (U.S.) research indicates that cannabis use in pregnant women may become more prevalent as additional states legalize cannabis for medical and recreational use (AWHONN, 2018; Hasin, 2018; The American College of Obstetricians and Gynecologists [ACOG], 2017). The trend of increased cannabis usage is emerging in Canadian data after cannabis legalization. Although not specific to pregnant people, Statistics Canada (2019a) reports an increase in cannabis use by the general population in Canada from the first quarter in 2018 of 14% (before legalization) to that of 17.5% in the first quarter of 2019 (after legalization) (Statistics Canada, 2019b). In the first quarter of 2019, there were 646,000 Canadians who indicated using cannabis for the first time in the last three months which is double the estimate from before legalization (Statistics Canada, 2019a). In Ontario, cannabis use increased significantly from 13.5% in the beginning of 2018 to 20% in the beginning of 2019 (Statistics Canada, 2019a).

The TBDHU CPSCP correlates with the timeframe of *Statistics Canada* (2019a) *first quarter report*. The CPSCP self-reported rates found that within the City and District of Thunder Bay, 56% of the general public, 56% of those considering pregnancy, 30% of those currently pregnant, and 36% of those recently pregnant indicated they had used cannabis in the last three months. The survey results found that slightly more males (60%) used cannabis than females (52%) with a higher proportion of use in those who think of themselves in another way (75%). Similarly, the Statistics Canada (2019a) usage rates in males (22%) were higher than females (13%).

Breastfeeding and Cannabis Use

CPSCP respondents who indicated they were considering becoming pregnant in the next three months, were currently pregnant, or recently pregnant within the last six months, 15%, 12% and 23% respectively indicated that they would use cannabis while

breastfeeding. In addition, 14% of those who were considering becoming pregnant, 17% of those currently pregnant, and 9% of those recently pregnant were unsure if they would use cannabis while breastfeeding. Those that indicated they had no intentions of breastfeeding were excluded from the results of the question.

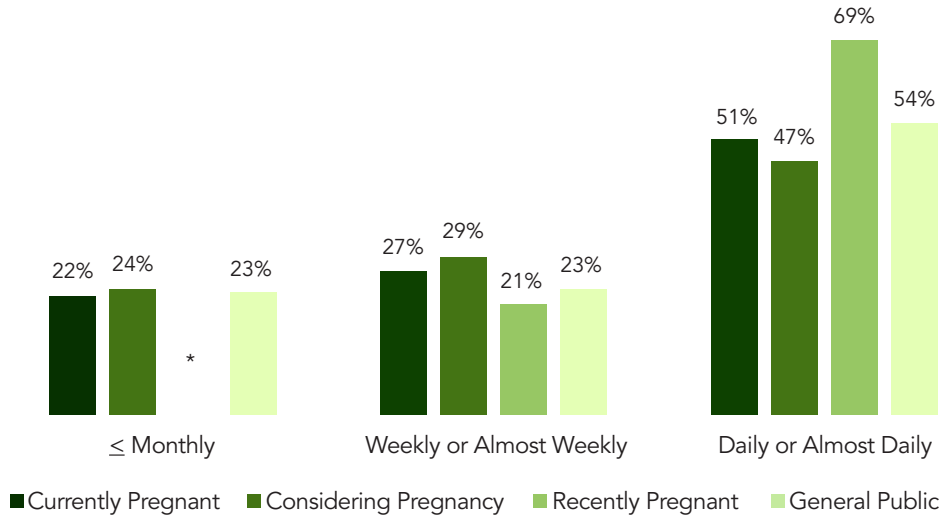
Frequency of Cannabis Use

According to Statistics Canada First Quarter 2019 report (2019a) "After legalization, 6% of Canadians aged 15 and older, or nearly 1.8 million people, reported using cannabis on a daily or almost daily basis. Another 4% reported using weekly, 2% monthly and 6% just once or twice in the last three months. Comparisons with the first quarter of 2018 (Statistics Canada, 2019b) (pre-legalization) suggest daily and monthly use remained stable, whereas weekly use increased (from 2% to 4%), as did occasional use (from 4% to 6%)" (p. 2).

From the CPSCP, similar frequencies of cannabis use among users were found among the general public and people at various stages of pregnancy (considering, currently, or recently pregnant) **(Figure 2)**. A high proportion of cannabis users used cannabis frequently. Of users in the general public, just over half (54%) used cannabis daily or almost daily. Similar results were found among cannabis users regardless of pregnancy status, with close to half of people considering pregnancy (51%), currently pregnant (47%) and recently pregnant (69%) using cannabis daily or almost daily.

An additional 23% of the general public users, 27% of users considering pregnancy, 29% of users who are currently pregnant and 21% of users who were recently pregnant used cannabis weekly or almost weekly. This leaves just under a quarter of the cohort of cannabis users, both general public and all pregnancy statuses, who only used cannabis monthly or less than monthly.

Figure 2. *Frequency of cannabis use, by respondents who were Currently Pregnant, Considering Pregnancy, Recently Pregnant, and the General Public.*



**Data supressed (n≤5) to protect anonymity of respondents.*

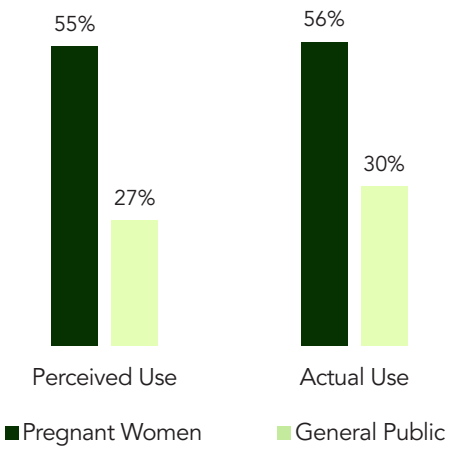
Education and Cannabis Use

The CPSCP found a higher proportion of respondents with a lower level of formal education (61%) were cannabis users than respondents with a higher level of formal education (47%). Regarding frequency of cannabis use, however, those with a higher level of formal education (65%) used cannabis more frequently (e.g. from a weekly to a daily basis) than those with a lower level of education (56%). According to Wood (2018), there is an increase in number of well-educated, high-salary employed women who are choosing cannabis during pregnancy for treatment and perceived natural cure. Thus, surveillance of cannabis user by education level is important when determining target audience for cannabis-exposed pregnancy prevention and intervention.

Perceived Rates vs Actual Rates of Cannabis Use

CPSCP respondents' perceived rates of cannabis use were congruent with the actual self-reported cannabis use **(Figure 3)**. Respondents perceived that 55% of the general public used cannabis and 27% of those who were pregnant used cannabis. Actual self-reported cannabis use among respondents was 56% of the general public and 30% of pregnant people.

Figure 3. *Perceived use and actual cannabis use by the* ***GENERAL PUBLIC*** *and* ***PREGNANT WOMEN****.*



Surveillance Highlights from Phase Two Literature Review

Women of Reproductive Age:

Unplanned or poorly timed pregnancies:

Surveillance of women of reproductive age is important as unplanned and poorly timed pregnancies are associated with adverse maternal and neonatal outcomes. Data analyzed from a U.S. prospective study found increased odds of unplanned or poorly timed pregnancy among women with preconception binge drinking, marijuana use and opioid use (Lundsberg, Peglow, Qasba, Yonkers, & Gariepy, 2018).

Stress prior to pregnancy:

Data obtained and analyzed from the Pregnancy Risk Assessment Monitoring System (PRAMS), a U.S. population-based surveillance system, found an association between stressful life events in the three months prior to pregnancy with smoking cigarettes and cannabis use during pregnancy (Allen et al., 2017).

Cannabis use and nonmedical opioid use:

A cross-sectional study using a U.S. nationally representative sample highlighted the high use of cannabis in those women also indicated nonmedical use of opioids (Jarlenski, Barry, et al., 2017). The authors comment that "Polysubstance use is highly prevalent among reproductive age women in the [U.S.] reporting nonmedical opioid use… It is the norm and not the exceptions" (p. 1310). The most frequently used other substance among women using opioids nonmedically were cigarettes (56.5% ≥ 5 cigarettes per day), alcohol binge drinking (49.7%) and cannabis (32.4%).

Pregnant Women

Surveillance of cannabis use in perinatal women is important in understanding how cannabis use impacts birth outcomes, postpartum issues and infant neurodevelopmental issues (Ko et al., 2018). Phase two LR highlighted a few studies that support areas that need further exploring:

Co-use of cannabis with other substances:

The extent of cannabis use by pregnant women while also engaging in additional substance use is still unclear (Jansson, Jordan, & Velez, 2018). However, a predominant issue found in the LR was co-use of cannabis with licit drugs such as alcohol and/or tobacco.

A U.S. retrospective study by Kozhimannil et al., (2017) using a nationally representative sample looking at characteristics of U.S. pregnant women who reported prescription opioid misuse in the past year or during the past month found that pregnant women who indicated use of more than one substance like alcohol, tobacco and cannabis are at greater risk of nonmedical opioid use.

Co-use of tobacco and cannabis in pregnancy:

Co-use of tobacco and cannabis in pregnancy is a concern because of potential additive risks of adverse fetal outcomes and synergistic effects (Oga, Mark, & Coleman-Cowger, 2018). Co-use of cannabis and tobacco can mean a variety of ways it is being used such as "use in the same episode, use within the same product (blunt or spliff smoking) or use within the same time period (in the past month)" (Coleman-Cowger, Oga, Peters & Mark, 2018). Authors of this study suggest that "because cannabis and tobacco are so closely associated, changing cannabis use patterns could have downstream effects on tobacco use patterns" (p.84-85).

As surveillance and research expands with regards to co-use of tobacco and cannabis, increases in cigar smoking and smoking of blunts (contain both tobacco and cannabis) are becoming an issue of concern for maternal and child health (Coleman-Cowger, Pickworth, Lordo & Peters, 2018). Authors discuss that cigar and blunt smoking is not as prevalent as cigarette smoking but they indicate that there may be increased regular use of these amongst pregnant women.

Cannabis and Low Birth weight:

A retrospective cohort study completed in Canada (Campbell et al., 2018) looking at associations between socio-economic status (SES), low birth weight (LBW) and preterm birth (PTB) in Southwestern Ontario did not find a strong relationship between SES and birth outcomes unlike what is found in countries like the U.S. The authors suggest that this may be due in part to Canada's universal health care system. Two risk factors "strongly associated with LBW" included maternal cannabis use and smoking tobacco during pregnancy (p.111).

A cross-sectional U.S. study from Colorado (Crume et al., 2018) highlighted that prenatal cannabis use was found to result in a 50% increased likelihood of LBW but not PTB.

Cannabis and co-use with alcohol:

A cross-sectional study of pregnant women reporting alcohol use during admission to a substance use treatment centre for the first time found that cannabis was "the most popular co-used substance among pregnant women who use alcohol as primary drug of choice in the dataset" next to tobacco (Washio, Martin, Goldstein, & Terplan, 2017, p. 85).

Cannabis and Biological Sampling:

A study of California pregnant females looking at trends of prenatal cannabis use using universal screening by self-report and urine testing found that age-specific self-reported surveys were similar to U.S. data but toxicology prevalence was higher than self-reports (Young-Wolff et al., 2017).

Findings from a retrospective study (Higginbotham & Jones, 2018) looking at associations between prenatal cannabis and tobacco exposure through umbilical cord tissue analysis support other studies which used self-report measures as well as meconium biological specimen. The study provides additional evidence in a different manner that maternal co-use of tobacco and cannabis are associated. The study highlights the importance of umbilical cord tissue analysis in epidemiological surveillance.

A study in France by Lamy et al., (2017) assessing tobacco, alcohol and cannabinoid metabolites in meconium samples of newborns compared to self-reports concluded that there is a need for improvement in meconium testing to assess prenatal cannabis exposure as opposed to cotinine detection which was found to be a "valuable" meconium biomarker (p. 92).

A cross-sectional study by Metz et al., (2018) comparing maternal exposure by self-report to umbilical cord sampling in the state of Colorado, where cannabis is legalized, concluded that "umbilical cord sampling results in higher estimates of maternal cannabis use than self-report" (p. 137).

Key Consideration - Surveillance

Overall, surveillance of cannabis use during pregnancy is important in order to determine effective interventions and strategies that will reduce cannabis-exposed pregnancies and ultimately prevent adverse maternal and fetal outcomes. Legalization of cannabis in Canada may help to provide more accurate self-reporting usage rates, however, reliable biological testing methods would provide a more accurate assessment of prenatal cannabis use.

Research on the prevalence of co-use of cannabis and tobacco use and associated birth outcomes is needed (Coleman-Cowger, Oga, et al., 2018). It is of utmost importance to

determine and specifically identify the prevalence of prenatal cannabis use disorder (CUD) and CUD/Polysubstance use among pregnant and breastfeeding women in order for easier prediction of fetal/child outcomes and identification of intervention efforts for both the mother and child (Jansson et al., 2018).

Surveillance and continued monitoring of cannabis and tobacco use patterns is needed in order to identify the impact cannabis and tobacco policy changes have on the prevalence of co-use in pregnant women. It will be important to identify whether trends of co-use increase over time in pregnant women (Coleman-Cowger, Oga, et al., 2018; Coleman-Cowger, Schauer, & Peters, 2017). In addition the authors of one study suggest that it should be a PH priority to keep abreast of blunt use during pregnancy as it is apparent that rates of cannabis use is increasing among pregnant women (Coleman-Cowger, Pickworth, et al., 2018).

Given the importance of the umbilical cord's role in drug metabolite detection, future work should focus on whether maternal cannabis use can be detected through sampling of the umbilical cord on its own (Metz et al., 2017). Additional studies of the association between maternal cannabis use and adverse perinatal outcomes using biological sampling are needed as this may help to educate women and PHCPs about the possible effects of using cannabis in pregnancy (Metz et al., 2017).

Attitudes/Beliefs

Public Perception

Americans view of cannabis use is more favorable than existing evidence supports. A national survey of U.S. adults related to risks and benefits of cannabis use found that 81% of U.S. adults believe cannabis has at least one benefit and only 17% believe it has no benefit. About 18% believe exposure to cannabis SHS is somewhat or completely safe for adults whereas 7.6% indicated it was somewhat or completely safe for children. 7.3% agree that cannabis use is somewhat or completely safe during pregnancy (Keyhani et al., 2018).

Pregnant women have a wide range of views toward legalization of cannabis that may impact their use both during and after pregnancy. In a U.S. nationally representative study of pregnant and non-pregnant reproductive age women, researchers asked women about perception of risk of cannabis use in general and not specifically about perinatal cannabis use (Jarlenski, Koma, et al., 2017). Results found there was a three-fold increase from 2005 through 2015 in which they perceived cannabis to have no risk. Pregnant and non-pregnant women who used cannabis 30 days prior more often perceived that regular use (once or twice a week) had no risk, in comparison to women who had no such cannabis use.

Perceived Safety - All Respondents

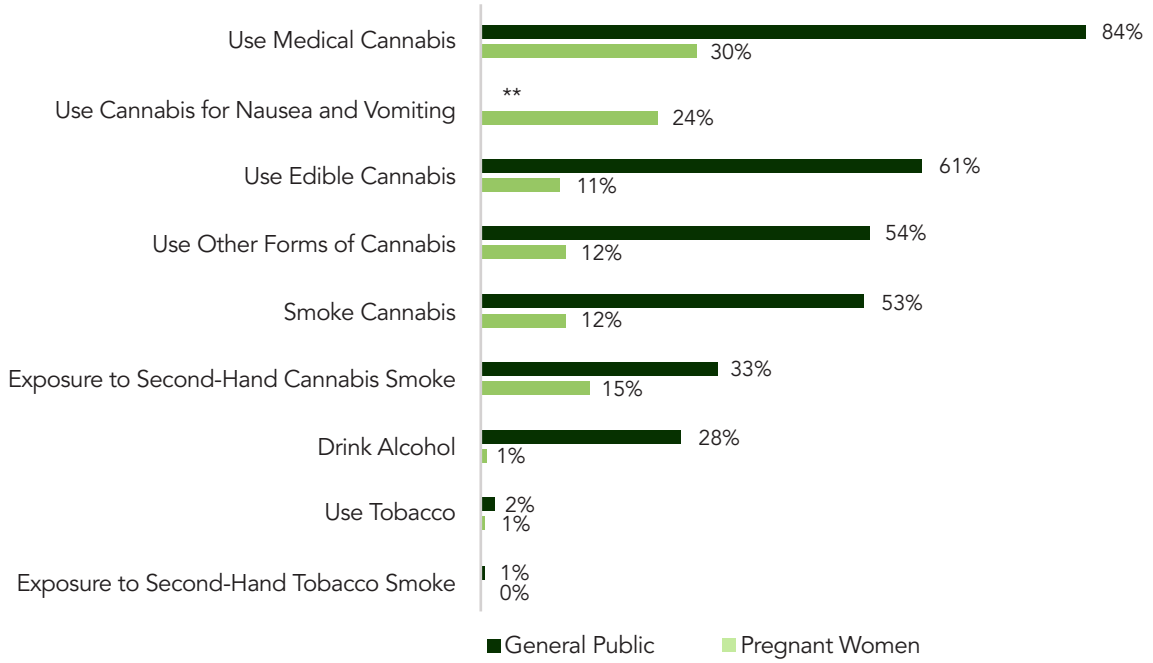
Analysis of the CPSCP results compared the perceived safety of cannabis use by the general public to the use of cannabis during pregnancy **(Figure 4)**. CPSCP respondents believed that cannabis use and exposure to cannabis SHS by both the general public and pregnant people, was safer than use or exposure to other substances such as tobacco, alcohol and tobacco SHS. A greater proportion of CPSCP respondents believed that cannabis use for medical reasons, as well as for nausea and vomiting during pregnancy, was safer than the general use of cannabis. A survey respondent commented, "Cannabis is a natural herb. Whereas many anti-nausea medications are concocted in a laboratory using synthetic substances." Another respondent questioned its safety for use for nausea in pregnancy: "There was a drug thalidomide that was used to alleviate nausea for pregnant women that was thought to be safe and it wasn't until the children were born that people realized potential harms."

Overall, about half of CPSCP respondents felt it was safe to smoke cannabis (53%), use edible cannabis (61%), or use other forms of cannabis (54%), while 84% felt it was safe to use cannabis for medical reasons. When asked about perception of safety when using other substances, only 2% of respondents felt it was safe to use tobacco and 28% of

respondents felt it was safe to drink alcohol. Less than 1% felt it was safe to be around tobacco SHS while 33% felt it was safe to be around cannabis SHS.

When the same questions were asked regarding cannabis use during pregnancy, 11% to 12% of respondents felt it was safe for pregnant women to smoke cannabis, use edible cannabis, or use other forms of cannabis, while 24% felt it was safe for pregnant women to use cannabis for nausea or for medical reasons. Regarding other substances, however, respondents definitively felt that it was not safe at all for a pregnant woman to use tobacco or drink alcohol (with 1% of respondents indicating it was safe for pregnant women). As for exposure to tobacco SHS, only <0.5% of respondents felt it was safe for pregnant women to be around, yet 15% of respondents felt it was safe for pregnant women to be exposed to cannabis SHS.

Figure 4. *Percentage of respondents who perceived cannabis, tobacco, and alcohol use for the* ***GENERAL PUBLIC*** *and* ***PREGNANT WOMEN*** *to be safe.*



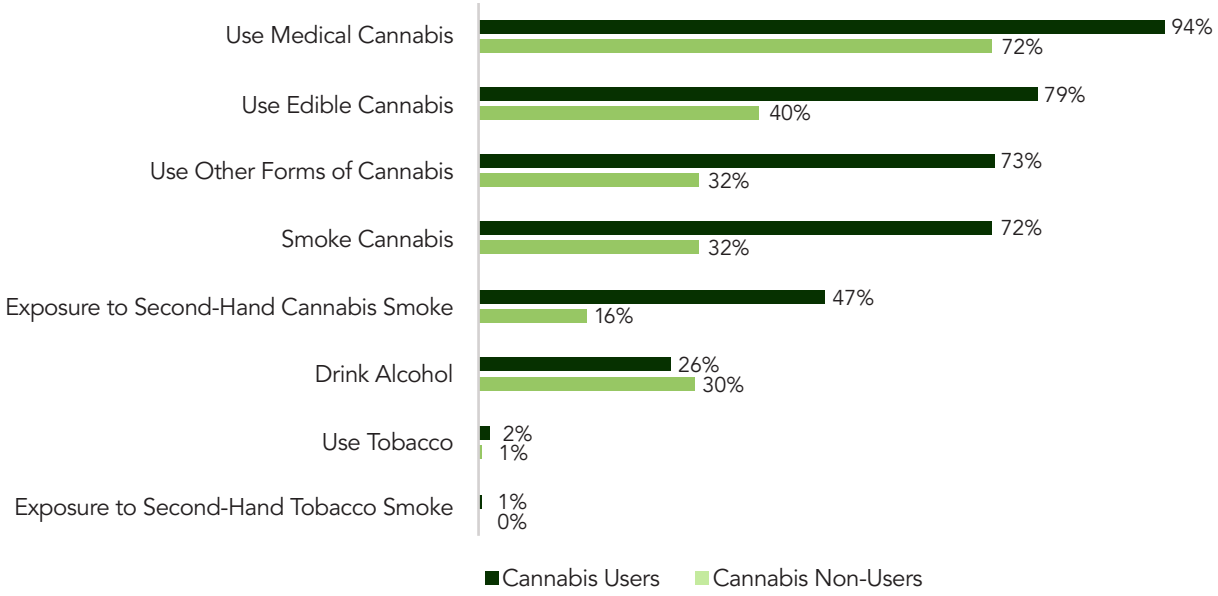
***In the survey, respondents were not asked how safe it was for the general public to use cannabis for Nausea and Vomiting.*

Perceived Safety - Cannabis Users vs Cannabis Non-Users

A greater proportion of CPSCP respondents who were cannabis users believed that the use of cannabis in all forms and exposure to cannabis SHS was safe for the general public, in comparison to cannabis non-users **(Figure 5)**. For example, 72% of cannabis users versus 32% of cannabis non-users felt that smoking cannabis was safe, and 79% of cannabis users versus 40% of cannabis non-users felt that using edible cannabis was safe. 47% percent of cannabis users, while only 16% of cannabis non-users, felt that exposure to cannabis SHS was safe. There was slightly less discrepancy between users (94%) and non-users (72%) who perceived that medical use of cannabis was safe. As well, only 2% or less of both cannabis users and cannabis non-users perceived that using tobacco and being

around tobacco SHS was safe. A slightly higher percentage of cannabis non-users (30%) than cannabis users (26%) felt that drinking alcohol was safe.

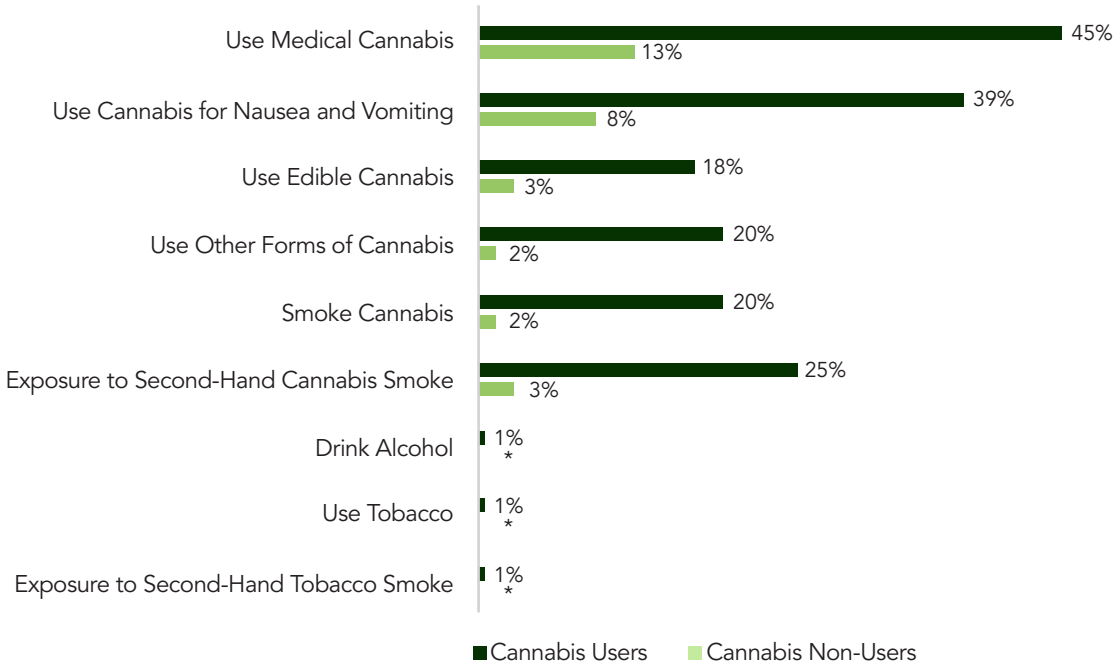
Figure 5. *Percentage of* ***CANNABIS USERS*** *and* ***CANNABIS NON-USERS*** *who perceived cannabis, tobacco, and alcohol use by the General Public to be safe.*



**Data supressed (n≤5) to protect anonymity of respondents.*

A much lower proportion of both cannabis users and cannabis non-users felt that the use of all forms of cannabis and exposure to cannabis SHS was safe by a pregnant woman than if cannabis was used by the general public **(Figure 6)**. However, cannabis users were much more likely than cannabis non-users to indicate that the use of cannabis and exposure to cannabis SHS by a pregnant person was safe. For example, 20% of users perceived smoking cannabis during pregnancy to be safe, compared to only 2% of non-users. Cannabis users were over four times more likely than cannabis non-users to perceive the use of cannabis for nausea and vomiting during pregnancy to be safe, and eight times more likely to perceive exposure to cannabis SHS during pregnancy to be safe. Yet both cannabis users and cannabis non-users definitively agreed that tobacco use, exposure to tobacco SHS and drinking alcohol were not safe during pregnancy (with ≤1% of either respondent group indicating that these substances were safe).

***Figure 6**. Percentage of **CANNABIS USERS** and **CANNABIS NON-USERS** who perceived cannabis, tobacco, and alcohol use by Pregnant Women to be safe.*



**Data supressed (n≤5) to protect anonymity of respondents.*

An additional number of both cannabis users (28% to 39%) and cannabis non-users (11% to 29%) were uncertain whether or not cannabis use and exposure to cannabis SHS was safe in general or when used by a pregnant woman.

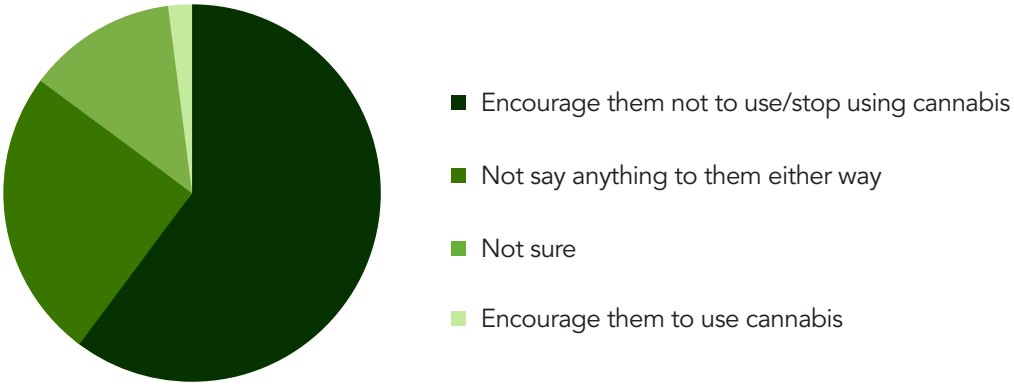
A greater proportion of CPSCP respondents with lower levels of formal education believed that use and exposure to cannabis was safe, in comparison to those with a higher level of formal education.

Feeling Pressured to Use Cannabis

The CPSCP asked respondents *how often they felt pressured by others to use cannabis:* 86% never felt pressured to use cannabis, 12% sometimes felt pressured, and 2% often felt pressured.

"If someone knew a person was pregnant:" **(Figure 7)** 60% of respondents would encourage the pregnant person not to use/to stop using cannabis, 25% would not say anything either way, and 2% would encourage the pregnant person to use cannabis while 13% indicated they were not sure what they would do.

***Figure 7**. If someone you knew was pregnant and using cannabis, would you:*



Key Considerations - Attitudes/Beliefs

Key considerations continue to highlight the need to understand patterns in women's perceptions of the risks of regular cannabis use with it being legal in Canada and in additional states in the U.S. (Jarlenski, Koma, et al., 2017). The CPSCP provides valuable information that will assist others to gain an understanding of cannabis use in pregnancy as it relates to use, frequency, perception of use, safety, PHCP relationship, knowledge of effects and community information needs.

Keeping abreast of trends with regards to attitudes on alcohol and cannabis will be an important area for consideration given there are assumptions from some experts that alcohol will be replaced by cannabis, where legalized (Hasin, 2018). A respondent from our CPSCP indicated that, "Cannabis use is safe all around. You cannot overdose, unlike alcohol it only calms you. I'd say that's something pregnant women could use!" According to Hasin (2018), "whether cannabis will actually be substituted for alcohol after [legalization] and whether the effects of any such substitution on PH will be positive, negative or neutral is currently unknown" (p.206).

The overwhelming advice of researchers in this field is that the safest course of action is to avoid cannabis exposure during pregnancy (Cook & Blake, 2018). A survey respondent commented, "I can't believe this is even a question. Smoking and alcohol is dangerous for pregnancy what makes pot any different?" There is a need to communicate to women, their family and friends and the general public that legal use does not equal safe use for pregnant women or infants (Krening & Hanson, 2018). A survey respondent commented that, "It took decades of use and damage to millions of people before we realized that tobacco was dangerous. Why would I be willing to risk harming my unborn child by using a product with no scientific evidence of risk vs benefit for pregnancy?"

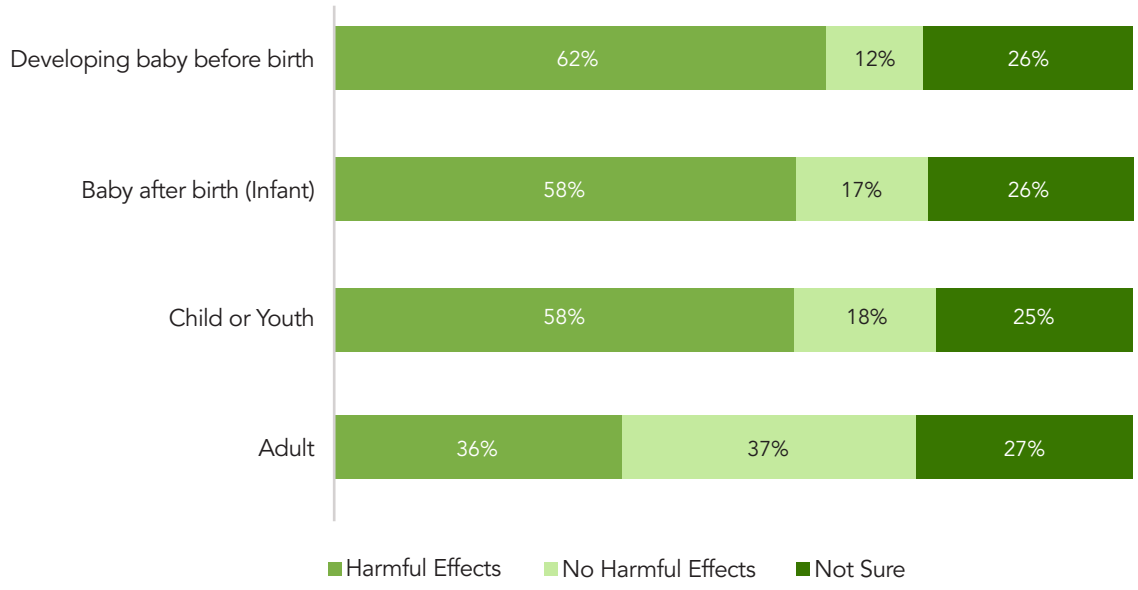
Recommendations from *Cannabis and Pregnancy: Getting Ahead of Policy* supported the importance of understanding the public perception on cannabis and pregnancy in order to plan and implement effective strategies and interventions for pregnant and preconception women. Thus, the findings from this phase about community perceptions from the CPSCP will help guide local direction as it relates to surveillance, awareness, education, screening and interventions, policy/regulations and research.

Raising Awareness

Despite the lack of evidence on risks and benefits, cannabis is becoming more available and strongly marketed to the public (Keyhani et al., 2018). Disagreement among experts poses challenges to PH and there is a need to communicate accurate information to the public and the media (Jarlenski et al., 2018). According to Coleman-Cowger, Pickworth et al., (2018), the general public is not well informed regarding the health effects of cannabis use in pregnancy. Regular conversations related to cannabis use in pregnancy are important in order help dispel the myths surrounding this issue even though research needs to expand in certain areas such as " blunt use (partially or entirely hollowed out cigar wrappers containing marijuana)" (Krening & Hanson, 2018, p. 1073).

Local CPSCP respondents were asked if they believed that cannabis use by a mother during pregnancy can have harmful effects on their exposed child at different developmental stages (developing baby before birth, after birth (infant), as a child or youth, or as an adult) **(Figure 8)**. Over half of respondents believed that cannabis use during pregnancy will have harmful effects on a developing baby before birth (62%), after birth (58%), and during childhood or youth (58%), while 36% felt that cannabis use during pregnancy would have harmful effects once the exposed child reaches adulthood. Approximately 25% of respondents were unsure if cannabis use during pregnancy can have harmful effects on a baby at any stage of development.

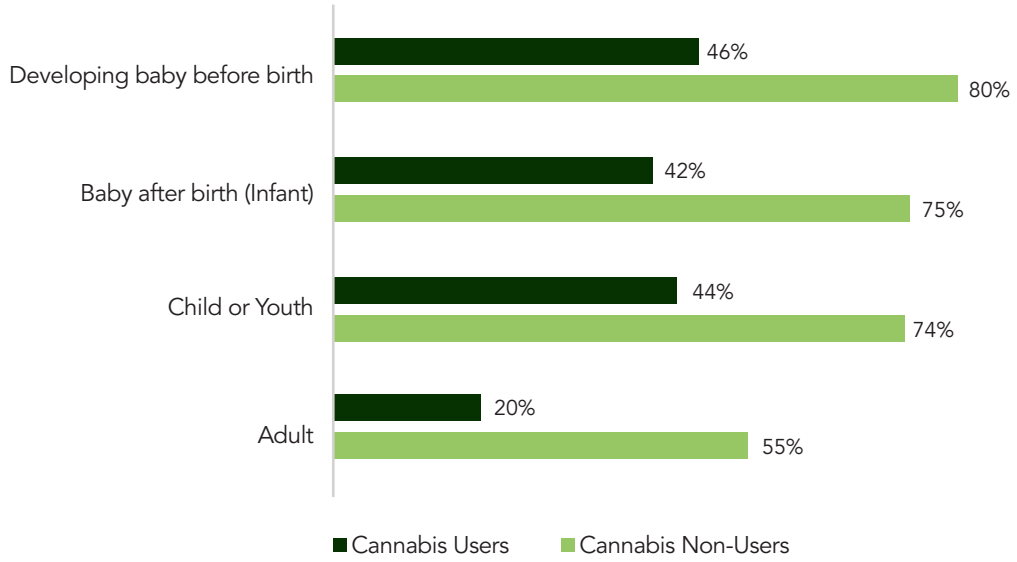
***Figure 8**. Proportion of respondents who believe cannabis use by a mother during pregnancy **CAUSES HARMFUL EFFECTS**, or **DOES NOT CAUSE HARMFUL EFFECTS**, to the exposed child from their early development to adulthood.*



Cannabis non-users were nearly two times more likely than cannabis users to believe that cannabis use during pregnancy can have a harmful effect on a baby before birth (80% of non-users vs 46% of users), baby after it is born (75% vs 42%), a child or youth (74% vs 44%) or once the exposed child becomes an adult (55% versus 20%) **(Figure 9)**.

A respondent commented that "I don't think there would be a lot of problems smoking cannabis while your pregnant. I know parents who have smoked while pregnant and nothing happened. The baby came out fine and didn't have any issues. Even now as they are older they are still fine."

***Figure 9**. Proportion of **CANNABIS USERS** and **CANNABIS NON-USERS** who believed that exposure to cannabis during pregnancy causes harmful effects to the exposed child, from their early development to adulthood.*



Marketing of Cannabis for Nausea and Vomiting in Pregnancy

A novel study by Jarlenski et al. (2018) investigated the content of online media focused on pregnant and postpartum cannabis use. Their findings indicate that health risk information disseminated online was consistent with evidence. However, information online related to cannabis use for nausea and vomiting was promoted as a health benefit which is not what is recommended based on the latest evidence.

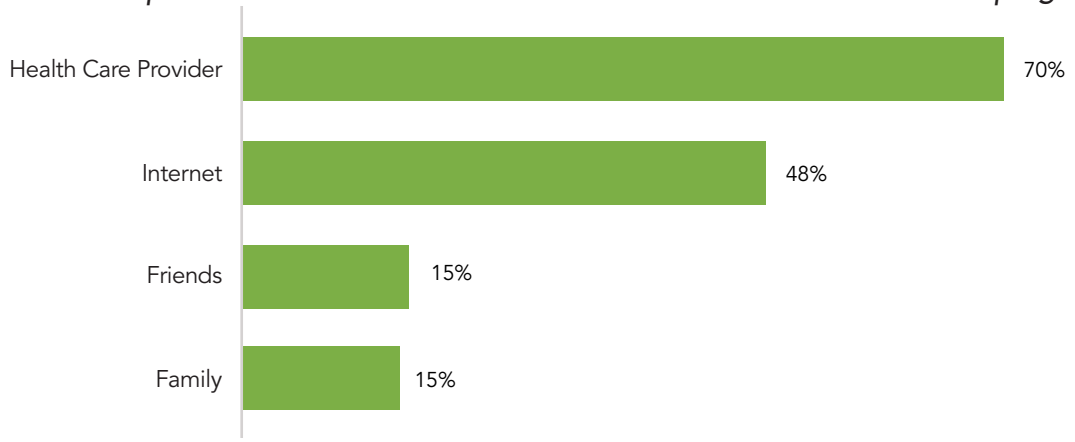
With cannabis being legalized, and in turn marketed online as a safe treatment of nausea and vomiting during pregnancy, current rates of use in pregnant women is a concern. It is important to convey that legal cannabis (recreational or medicinal) does not equal safe use of cannabis during pregnancy as women and cannabis dispensers are likely to believe it is safe (Cook & Blake, 2018; Fantasia, 2017; Krening & Hanson, 2018).

Where Do You Obtain Your Information?

Most CPSCP respondents indicated they would be comfortable getting information about cannabis and pregnancy from their health care provider (70%) and on the internet (48%) **(Figure 10)**. A small proportion of respondents would be comfortable getting information about cannabis and pregnancy from family (15%) and friends (15%). Other sources for information disclosed by respondents included: the TBDHU, counsellor, Drug Strategy committee, Early Years Centre, Facebook©, an app, dispensary growers, cannabis medical specialist, government ads, medical journals, TV and Radio ads, research not funded by tobacco or cannabis companies, college or university, and Health Canada. A

survey respondent commented: "I think Cannabis Use and the harmful effects should be advertised in the newspapers, online, pamphlets at doctors' office, in school programs, in nursing programs through the college of nurses in their magazines etc."

Figure 10. *Respondents' Preferred sources of information about cannabis and pregnancy.*



Findings from the phase one environmental scan of local SPs and PHCPs as well as provincial PH professionals indicated that 50% of respondents provided promotional, preventative or intervention activities to reduce and/or prevent cannabis-exposed pregnancies within their program and/or organization. However, there was a large percentage of these PHCPs and professionals that indicated they themselves required more information and education about cannabis and pregnancy.

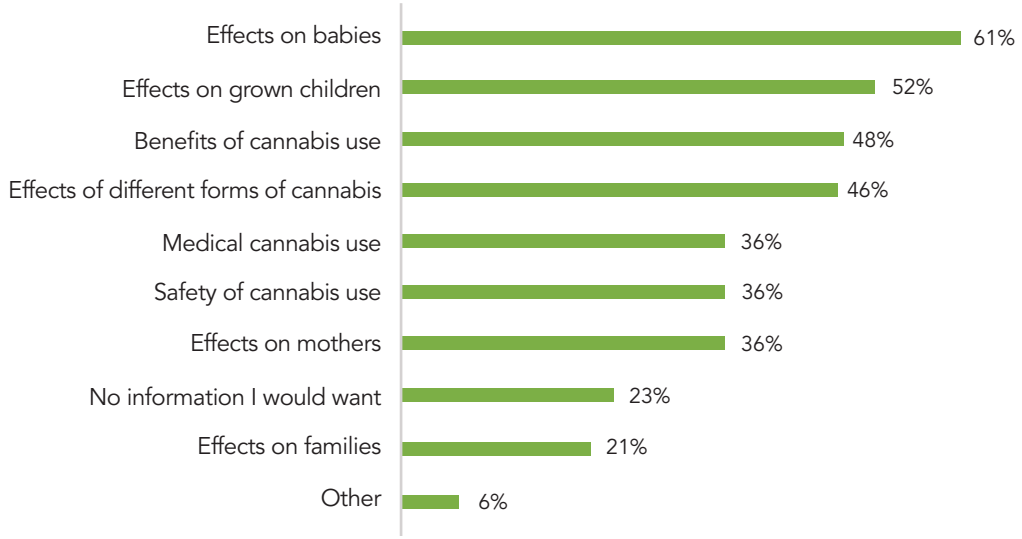
What Information Would You Like to Know About Cannabis Use and Pregnancy?

Participants in the CPSCP were asked to select all topics, if any, they would like to know about cannabis and pregnancy **(Figure 11)**. All respondents, regardless of pregnancy status, chose fairly consistent topics of interest. The proportion of respondents who were considering becoming pregnant in the next three months generally had a slightly higher interest in information on cannabis use and pregnancy than the other respondent categories.

Respondents were interested in learning more about how cannabis and pregnancy may impact: babies (61% of all respondents), grown children (52%), mothers (36%), and families (21%). The benefits of cannabis use (48%), effects of different forms of cannabis (46%), medical cannabis use (36%), and safety considerations for cannabis use (36%) were also topics of interest among many respondents. 23% of respondents chose the option that they would not want further information.

Other topics of interest mentioned by respondents included: breastfeeding and cannabis; does the level of tetrahydrocannabinol (THC) make a difference/what level is safe to use during pregnancy?; what effects does cannabidiol (CBD) have on baby; how to talk to family about the stigma of cannabis use while pregnant; the difference between cannabis use and dependency; and "all and any information as there is not much out there. Very vague information and reliable research."

***Figure 11**. Respondents' most preferred topics to learn more about cannabis and pregnancy.**



**Note: the above proportions will add to >100% as this question was a select all that apply question. Therefore respondents may have selected more than one option.*

Key Considerations - Raising Awareness

There is a greater need to relay clear messaging on effects of cannabis use during pregnancy as the cannabis legal landscape changes (Mark, Gryczynski, Axenfeld, Schwartz & Terplan, 2017). PH agencies need to promote and disseminate messages on the effects of cannabis use during pregnancy given that the public believes cannabis use is safe and beneficial. Ongoing client education on the effects of cannabis can remind women that there is no known safe amount of cannabis use during pregnancy (Krening & Hanson, 2018). In a U.S. study by Dickson et al. (2018) after contacting 400 dispensaries in Colorado (medical, retail or both medical and retail) the authors recommend to warn women against taking advice from dispensary employees given that the information provided may not be evidence-based. There was also new emerging research discussing the importance of informing pregnant and breastfeeding women about cannabis SHS (Ryan et al., 2018).

There is a need to develop easy access and user-friendly resources for all stakeholders on risks and benefits as well as culturally appropriate PH campaigns targeting women and their families related to effects of cannabis use on the mother and baby (AWHONN, 2018; Vadivelu, Kai, Kodumadi, Sramcik & Kaye, 2018). Targeted educational materials should also be developed for pregnant women (Washio, Mark, & Terplan, 2018). As commented by one of the CPSCP respondents, "There are tons of campaigns that stress not drinking while pregnant, there needs to be ones for cannabis now too."

Education For Primary Health Care Providers

Primary health care providers have a responsibility to keep current on evidence-based research on cannabis and pregnancy in order to provide their clients with quality care (Fantasia, 2017; Naik, Kolikonda, Prabhu, & Lippmann, 2018). Findings from the phase one environmental scan of SPs and PHCPs indicated there is a need for more education for all professionals surrounding the topic of cannabis use during pregnancy as 80% to 100% of respondents indicated they did not feel they had enough knowledge about the effects of cannabis-exposed pregnancies (TBDHU, 2018). With the CPSCP indicating that the majority of people feel that their PHCP is a reliable source for information on cannabis and pregnancy, and that the majority of people would be willing to discuss cannabis use with their PHCP, education for PHCP and SP is essential.

Educating Primary Health Care Providers on Medical Cannabis Use in Pregnancy

Although there is no estimate of the number of physicians who are prescribing cannabis to pregnant women, there has been an increasing recognition of the need to address the issue (Vadivelu et al., 2018). A CPSCP respondent also weighs in on the issue: "Cannabis has not undergone the rigorous clinical trials required of ALL other prescription medications and is not endorsed for use by the Canadian Medical Association."

Other respondent comments in the CPSCP eluded to the mixed messages indicating the need for additional education for service providers:

- "Followed by a [PHCP] and cleared with my team. Prescription medical marijuana only."
- "I'd like to know if vaporizing or eating cannabis is harmful. My fiancé completely stopped for our first child but a lot of our friends said their [PHCP] said it would be fine for occasional nausea relief if vaporized."
- "As a [PHCP] and speaking with my peers, THC during pregnancy is unsafe but using CBD has no harm."

Primary Health Care Providers' Comfort Level with Cannabis Use and Pregnancy Topic

Despite the legalization of cannabis, the literature indicates that globally most PHCPs lack knowledge and confidence talking to clients about cannabis and tend to "sidestep" discussions of cannabis use in pregnancy with their female clients (Brooks, Gundersen, Flynn, Brooks-Russell & Bull, 2017; Enos, 2017, p. 76). One study found that providers in Colorado were aware of state cannabis laws but were uncomfortable and not consistent discussing effects of cannabis, cannabis SHS exposure, safe storage and over consumption of edibles (Brooks et al., 2017). An Australian study (Gould et al., 2017) surveying general practitioners (GPs) and obstetricians (OBs) found that GPs and OBs in Australia tended to ask clients frequently about tobacco cigarette use but less about e-cigarettes, chewing tobacco, SHS exposure and cannabis which may be important information needed when it comes to determining exposure to maternal child health. According to Mark & Terplan (2017), there are a number of reasons why PHCPs may not discuss cannabis with their pregnant clients, such as: evidence is complicated to interpret and communicate with clients, there is a perception that clients may not understand the information, PHCPs may not understand the information and provider's belief that there is no harm to baby associated with cannabis exposure.

Type of Education Needed

Cannabis legalization will bring about various changes to a PHCPs' practice such as education and training regarding legislation; health and safety; revised clinical procedures; screening; child welfare legalities; literature and education materials regarding medical cannabis. Respondents who did not feel they had enough knowledge about cannabis use and pregnancy from the local/provincial baseline scan phase one report expressed a need for more information, access to evidence-based research, training via webinars, workshops and lunch and learns; additional resources that are culturally appropriate for Indigenous population locally and information on where to refer clients (Brooks et al., 2017; Mark & Terplan, 2017; TBDHU, 2018; Vadivelu et al., 2018)

Key Considerations - Education for Primary Health Care Providers

Educating PHCPs is not a "cookie cutter approach" for certain issues related to cannabis and pregnancy. "Because different types of medical professionals talk to [clients] about cannabis (eg: nurses, physicians, midwives, medical assistants) a variety of training programs should incorporate this information" (Brooks et al., 2017, p. 6). Interestingly, research found in this round of review is looking beyond educating PHCPs to include education for others such as school workers, criminal justice workers and clients themselves (Cook & Blake, 2018). The need for PHCPs to look at their own personal biases around cannabis and pregnancy was also highlighted in the literature (Wood, 2018).

It is important for nurses who work with pregnant women to stay updated on the topic of cannabis and pregnancy as there may be an increase in women using cannabis recreationally or medicinally due to legalization (AWHONN, 2018; Fantasia, 2017; Wood, 2018).

A greater understanding of the impacts of cannabis use during pregnancy would assist providers in providing more consistent, clear and up-to-date messaging to convey to clients regarding the harms of cannabis use (Mark et al., 2017). According to Hasin (2018), "despite a lack of risk for fatal overdose or transition to heroin, both of which are serious risks for use of prescription opioids, cannabis is not a harmless substance and use can involve impairments, addiction and risks of serious consequences," (p.206). Increasing confidence regarding knowledge of cannabis health effects in pregnancy among PHCPs could be supported by developing educational resources that include face-to-face training, webinars, guidelines, client educational materials, conversation scripts and referral information (Brooks et al., 2017).

Given the ever changing landscape in products and associated marketing regarding new products, physicians may need additional intervention training (smoking, nicotine, vaping and cannabis) to ensure women are able to get assistance to reduce potential risks in pregnancy (Gould et al., 2017). Even though some PHCPs beliefs' regarding safety and risks may not be in line with current recommendations around cannabis and pregnancy, the importance of educating physicians regarding both organic and synthetic cannabis use during pregnancy is emphasized (Northrup et al., 2017).

Going Beyond Educating Primary Health Care Providers

Washio et al. (2018) point out the need to go beyond educating PHCPs noting that the demographics of pregnant women using cannabis are younger and less educated. For these reasons, the authors recommend providing education to organizations and programs who may be involved with this particular target group such as school systems, criminal justice systems, pediatricians and also to the clients themselves.

As cannabis legalization expands it will be important to educate and involve dispensaries (medical, retail or both) (Dickson et al., 2018). Providing educational opportunities and information sharing with SPs and pharmacists will be an important educational piece (Cook & Blake, 2018; Dickson et al., 2018).

Screening and Intervention

Screening

It is important for PHCPs to screen regularly for cannabis use during pregnancy (Crume et al., 2018). Findings from the Phase One Local/Provincial Environmental Scan found that less than 1/5 of all professionals in public health units, local SP organizations and PHCPs asked clients at "every visit" about cannabis use.

The Phase Two LR also discussed the importance of screening for prenatal cannabis use as commonly as prenatal tobacco use is screened. There is a need for physicians to screen for cigarette use, alternative tobacco products and cannabis (Coleman-Cowger, Oga, et al., 2018; Coleman-Cowger, Pickworth, et al., 2018). Screening specifically for alcohol and cannabis co-use should also be an area of focus (Washio et al., 2017).

Settings like the ED can play an important role in providing education, screening and intervention with clients such as women who are using alcohol and drugs, including cannabis (Oga et al., 2018). A study by Moyer, Johnson, Klug, & Burd (2018) looking at whether EDs screened all women for substance abuse found that "pregnant women presenting to the ED were 75% less likely to be tested for drug or alcohol use than non-pregnant women" (p.579). Overall there needs to be more efforts focused on screening pregnant women for substance use (Washio et al., 2017). An additional study by Washio et al. (2018) looking at characteristics of pregnant women reporting cannabis use disorder at substance use treatment entry found that among pregnant women admitted for the first time, 40.6% reported any level of cannabis use and 40.8% reported cannabis use as the primary drug of choice.

Comfort Level with Primary Health Care Providers

Although legalization of cannabis may result in increased use during pregnancy, clients may be more honest in self-reporting their cannabis use with PHCPs at prenatal appointments which in turn may improve education, dialogue, increase screening, interventions and counselling (Brooks et al., 2017; Krening & Hanson, 2018; Mark & Terplan, 2017).

The majority of CPSCP respondents who were considering, currently, or recently pregnant were comfortable discussing cannabis use with their PHCP now that cannabis is legal. 64% of those considering becoming pregnant, 68% of those currently pregnant and 65% of those recently pregnant indicated they would tell their PHCP about their cannabis use on their own. An additional 30% of those women considering becoming pregnant, 26% of pregnant women and 30% of recently pregnant women would talk about their cannabis use only if asked by their PHCP.

Technology Brief Interventions and Tools

Screening and brief interventions using technological approaches including text messaging are being researched and have potential to be effective. Although there are studies involving general and pregnant samples, they have yet to be tested with cannabis

use in pregnancy (Gray et al., 2017; Wernette, Plegue, Kahler, Sen & Zlotnick, 2018). In this round of research there were a few notable and novel promising interventions:

- A small scale study by Gray et al. (2017) evaluated how pregnant women and prenatal care providers found an electronic brief intervention and text messaging program for cannabis use in pregnancy. The findings revealed that the participants were comfortable examining their cannabis use in pregnancy via a technological format. The authors felt that high risk groups may be reached easily via technology formats and RCTs should be conducted.
- A pilot RCT of a computer-delivered brief intervention (the Healthy Checkup for Expectant Moms-HCEM©) for substance use and risky sex during pregnancy by Wernette et al. (2018) studied participants' perceptions of the intervention and examined whether it would be effective in decreasing substance use and risky sex at 4-month follow up. The results of this study hold promise as an effective intervention in reducing alcohol/cannabis use and condom-less sex during pregnancy. The intervention will be tested in a larger sample in the future.
- A pilot study by Dublin et al. (2018) collected client-reported information via a mobile application (APP) to look at pregnancy exposures and outcomes and link the information with Electronic Health Record (EHR) data. EHR data are increasingly used to study medication safety in pregnancy, but these sources lack information about some exposures and risk factors. The mobile APP intervention shows promise as it allowed collection of data like cannabis use in pregnancy which is difficult to obtain through EHR alone. It is also "publicly available and designed to be adapted for future studies" (p. 746).

Cessation

According to Mark et al. (2017), "as cannabis use becomes increasingly socially acceptable and the legal environment … changes, overall motivations to quit may shift or decrease altogether, including during pregnancy" (p.215). Also concerning is the lack of evidence related to treatment of prenatal cannabis use (Washio et al., 2018). It may be interesting to note whether more research in Canada will be done regarding this or whether we will see similar trends.

In Mark et al. (2017) research with regards to motivations for quitting during and after pregnancy, findings suggest that those who quit were most motivated to do so because of potential harms to their baby whereas a physician advising them to quit was seen as the least motivational factor to quit. The reason for this finding needs more research as it may have been related to physicians' lack of knowledge and communication towards the particular topic and situation.

Interestingly in the same study, most "ever users" who quit before or during pregnancy intended to continue being cannabis free after pregnancy, thus Mark et al. (2017) point out that "pregnancy may be an ideal time for women to make longer term behavioral changes that could improve their health and the health of their families" (p. 215).

Key Considerations - Screening and Interventions

Universal Screening

Women of reproductive age who are pregnant or planning to become pregnant and are identified through universal screening as using cannabis should be encouraged to discontinue cannabis use and be provided with a brief intervention, counseling and referred to treatment (Crume et al., 2018; Jansson et al., 2018; Ryan et al., 2018; ACOG, 2017).

All pregnant women must be screened in a consistent manner regarding cannabis use and co-use early in pregnancy as many women continue to use substances throughout their pregnancy (Krening & Hanson, 2018; Northrup et al., 2017). During the initial prenatal visit and at each visit, all women should be asked about their use of cannabis, tobacco, alcohol and other drugs including medications used for nonmedical reasons. Interventions are needed to address concurrent use of many substances (Jarlenski, Barry, et al., 2017).

Educating Women

PHCPs working with women of reproductive age and pregnant women who disclose cannabis use should provide their clients with educational information and guidance in a non-judgemental manner on the following (ACOG, 2017):

- Current evidence-based information related to potential adverse health effects on their health, on future or current pregnancies and newborns. It is important to discuss what is known and not known (AWHONN, 2018; Brooks et al., 2017; Fantasia, 2017).
- Adverse effects of continued use during pregnancy (ACOG, 2017).
- Importance of cannabis and smoking cessation (preconception and prenatal) to prevent adverse health effects on baby (Campbell et al., 2018).
- Treatment options (AWHONN, 2018).
- Community resources (AWHONN, 2018).
- Co-use with other drugs and medications (Ryan et al., 2018).

Medical Cannabis

The administration of medical cannabis for people who are pregnant, breastfeeding, or adolescents should be considered with caution. There are a number of adverse side effects that PHCPs must be aware of (Vadivelu et al., 2018). According to the research, "pregnant women or women contemplating pregnancy should be encouraged to discontinue use of cannabis for medical purposes including for nausea and vomiting in favor of an alternative therapy for which there are better pregnancy-specific safety data" (Ryan et al., 2018; ACOG, 2017, p. 931). OBs should avoid prescribing and/or recommending medical cannabis during preconception, pregnancy and breastfeeding (Crume et al., 2018).

Other Screening and Education Areas to Target

In addition to providing screening in the traditional settings such as physician offices, prenatal visits, some of the research discusses other settings that use screening. Some notable recommendations include:

- Screening pregnant women in EDs for cannabis use provides an opportunity to reach higher risk women who may not attend prenatal visits and in turn can receive adequate care and intervention and be referred to counseling and treatment programs (Moyer, Johnson, Klug & Burd, 2018).
- During contraception counseling with adolescents and young women, clients should be provided with information about not using cannabis if they become pregnant (anticipatory guidance) (Ryan et al., 2018).

Counseling

Although there is an identified need for PHCPs to counsel pregnant clients about cannabis use, providers desire guidance on how to counsel in light of the limited information on health effects of cannabis exposed pregnancies (Crume et al., 2018). Physicians need to regularly provide guidance to their clients on cannabis use and its potential risks, particularly to youth and women who are pregnant or breastfeeding (Naik et al., 2018).

Policy/Regulations

There is a very real risk that cannabis legalization in Canada may be equated with "safe" in the minds of the public (Cook & Blake, 2018). According to Mark & Terplan (2017) "In medicine equating the legal status of a substance with its safety is not only inaccurate, it can be dangerous as we have seen with the prescription opioid epidemic" (p.47). Thus, there is a growing PH concern that legalization will increase use of cannabis in both women of childbearing age and pregnant women (Petrangelo, Czuzoj-Schulman & Abenhaim, 2018; Mark & Terplan, 2017; Wood, 2018; Young-Wolff et al., 2017).

A study in Washington State (Grant, Graham, Carlini, Ernst, & Brown, 2018) examined how legalization of cannabis affects alcohol and drug use in a sample of pregnant and parenting women with substance use disorders. The authors concluded that: cannabis use increased after cannabis (nonmedical) legalization and an association that cannabis use leads to other substance use in certain populations.

According to Crume et al. (2018), "The combination of: increasing trends in prenatal cannabis use, the perceived need of cannabis for medical use; cannabis potency and increased access all pose an important PH and clinical practice challenge" (p.90). The implications of legalizing cannabis remain unclear, but research suggests that this may contribute to greater cannabis availability and the enhanced perception that cannabis use is harmless. This in turn makes it difficult to interpret how it affects priority populations such as pregnant women (Grant et al., 2018). Jarlenski et al. (2018) point out that there is a "renewed scientific debate" with regards to effects of cannabis exposure in the prenatal and postpartum period (p.119). A respondent from the CPSCP shared their thoughts: "Will it become a future practice that all pregnant women will be encouraged to use cannabis during pregnancy? Where are we headed with all of this and who really benefits?"

Warnings on Cannabis Products

As American states continue to legalize cannabis, Colorado is developing warning information about cannabis use in the childbearing years. The [Code of Colorado] regulations require that cannabis product containers include the following message: "There may be additional health risks associated with the consumption of this product for women who are pregnant, breastfeeding or planning on becoming pregnant," (Dickson et al., 2018, p. 1036).

Prior to legalization, Canada had not developed cannabis warning messages for product packaging or point of purchase messages related to cannabis in pregnancy, and thus was not included in the LR. Following cannabis legalization in Canada (October 17, 2018 – October 17, 2019) two mandatory health labels for cannabis products relating to use during pregnancy and use while breastfeeding were included in the Cannabis Regulations. These product labelling warnings were to be rotated among 12-13 other warnings (Government of Canada, 2019). As of October 17, 2019, the [Regulations Amending the Cannabis Regulations (New Classes of Cannabis)] came into effect with one warning message about cannabis use during pregnancy or while breastfeeding being required to be rotated among seven to eight other health warning labelling for cannabis products (Government of Canada, 2019). This may be a topic of discussion for the phase three LR as it will focus on one-year post-legalization research.

Cannabis Dispensaries

A new area of focus in the literature has been the need to target cannabis dispensaries and regulation on what cannabis dispensaries can recommend or advise to customers (Dickson et al., 2018). Although there are no regulations for Colorado dispensaries, Oregon State has legislated a point of sale warning to dispensaries for women who are pregnant or breastfeeding (Dickson et al., 2018; Ryan et al., 2018). In addition, pregnant women who consume cannabis may be worried about legal issues and may seek advice from cannabis retailers versus PHCPs (Dickson et al., 2018). In a study looking at information given to pregnant women by Colorado cannabis dispensaries regarding use of cannabis products, it was determined that nearly 70% of the dispensaries contacted recommended cannabis products in the first trimester for nausea without suggesting that the client discuss with a PHCP unless they were prompted by the caller (Dickson et al., 2018). This same study also mentioned that "the majority of cannabis dispensaries [medical, retail or both] in Colorado recommended cannabis products for morning sickness and their recommendation for use was based primarily on personal opinion….[thus] …as cannabis legalization becomes more common women should be cautioned that advice from dispensary employees might not necessarily be informed by medical evidence," (p. 1038). The Ontario Cannabis Store (OCS), Ontario's only online retailer and wholesaler of legal recreational cannabis, specifically states on their website: "OCS does not give medical advice or fill medical prescriptions." The OCS also warns "there is no known safe amount of cannabis to use during pregnancy or when breastfeeding. Cannabis use during pregnancy has been linked to low birth weight, and can harm a child's brain development. Pregnant and breastfeeding women should not consume cannabis, as it could harm the fetus or baby" (Ontario Cannabis Retail Corporation, 2019). However, with physical retail outlets opening in Ontario this may be a future area of discussion as there currently were no regulations found regarding the monitoring and enforcement of advice provided by cannabis retailers.

Implications for Practice

As public attitudes and the legalization status of cannabis shift, the implications for medical practice are unclear (Brooks et al., 2017). In the U.S, for example, cannabis is not regulated by the U.S. Food and Drug Administration (FDA). As a result there are no approved indications, contraindications, safety precautions or recommendations in terms of its use during pregnancy and breastfeeding. There are also no standardized formulations, dosages or delivery systems (ACOG, 2017; Vadivelu et al., 2018). In Canada, Health Canada (2016) has published information for consumers and for prescribers regarding the medical use of cannabis. A disclaimer mentions "Cannabis is not an approved therapeutic product, unless a specific cannabis product has been issued a drug identification number (DIN) and a notice of compliance (NOC). The provision of this information should not be interpreted as an endorsement of the use of this product, or cannabis and cannabinoids generally, by Health Canada," (p. 1). Health Canada (2016) also states that "cannabis should not be used if you are pregnant, are planning to get pregnant, or are breastfeeding," (p. 2).

Key Considerations - Policy/Regulations

Pregnancy is an important moment in a person's life and efforts to optimize preconception health behaviors while decreasing risk of unplanned pregnancy are needed (Grant et al., 2018; Lundsberg et al., 2018). Developing policies that can enhance maternal health and in turn child health are needed (Enos, 2017). One such policy idea identified (AWHONN, 2018) in the U.S. involves the addition of health insurance coverage for cannabis screening as well as treatment.

It is important to gain an understanding of the impacts that cannabis legalization will have on patterns of use in other substances like tobacco, alcohol and nonmedical opioid use in pregnant women and at-risk populations (Grant et al., 2018; Jarlenski, Barry, et al., 2017; Washio et al., 2018). In order to develop policies related to cannabis use in pregnancy, it is important to understand how legalizing cannabis will affect pregnant women and their providers in terms of perception, behaviors and practices (Krening & Hanson, 2018).

Practice Guidelines

Standards of advice disseminated to pregnant women with regards to cannabis use in pregnancy need to be consistent and clear in order to avoid false health claims (Cook & Blake, 2018; Dickson et al., 2018). As cannabis legalization expands, it will be important to involve PHCPs, pharmacists, dispensary owners and key stakeholders in policy and clinical practice guideline development (Cook & Blake, 2018; Dickson et al., 2018). Integrating information on more specific exposures like e-cigarettes, cannabis, chewing tobacco and cannabis SHS exposure within college and policy guidelines are needed (Gould et al., 2017).

Research

Canadian research will be important as we transition into legalization. Until this point our understanding of cannabis has been researched in the context of studies conducted using low potency cannabis and studies primarily from the U.S. and a few other countries (Vadivelu et al., 2018). With the recent legalization of recreational cannabis in Canada research with regards to prevalence of cannabis use during pregnancy and effects on maternal and child health may be less restrictive, unlike in the U.S. where cannabis remains on the federal list of controlled substances (AWHONN, 2018). According to a U.S review done by Hasin (2018) "the need for further research on cannabis use and pregnancy outcomes is clear" (P.196).

Adverse effects of prenatal exposure to cannabis in current pregnant women may be more common than what has been reported in the research (Ryan et al., 2018). This is compounded most often with co-use of tobacco, alcohol or illicit drugs or other type of exposure (ACOG, 2017). Research reviewed in Phase Two highlighted the need to focus on co-use of cannabis and tobacco. Coleman-Cowger, Oga et al., (2018) and Coleman-Cowger, Pickworth et al., (2018) point out evidence on health issues of smoking tobacco during pregnancy is much more established than evidence related to health issues of smoking cannabis during pregnancy or co-use of tobacco and cannabis. Modes of smoking also usually focus primarily on cigarettes and don't research impacts using other modes such as cigars or blunts. According to Ryan et al., (2018) "these higher potencies as well as new practices of cannabis use, including dabbing or vaping, can significantly increase the concentration of THC being consumed," (p.10). In addition, there are many other substances contained in the cannabis plant in addition to THC and CBD, about which little is known, and cannabis is often grown with use of pesticides, and fertilizers, many of which are toxic (Ryan et al., 2018).

It is important that the Canadian Government establish strict guidelines, regulations and messaging to pregnant women to clearly reinforce that all forms of cannabis use are potentially harmful to an unborn child and infant until more research can be conducted (Wood, 2018).

Key Considerations - Areas of Research

Research on Surveillance

- Epidemiological research on cannabis use during pregnancy and postpartum relapse (Mark et al., 2017).
- Development of mechanisms to support clinical and population health research with long-term follow-up (Cook & Blake, 2018).
- Research looking at long-term effects of medical cannabis use (Vadivelu et al., 2018).

Research on Attitudes and Beliefs

- Qualitative studies to help determine why pregnant women use cannabis and tobacco alone or in combination (Coleman-Cowger et al., 2017).
- Research on determining why women continue to use cannabis during pregnancy to self-medicate, particularly for pregnancy-induced nausea (Mark et al., 2017).

Research Related to Awareness

- Research on how impacts of legalization and development of new cannabis products on the market have affected cannabis use behaviors during pregnancy. This research will assist with developing evidence-based PH campaigns (Mark & Terplan, 2017).

Research on Clinician Knowledge and Practices

- Research to understand and address clinician knowledge and practices in addressing cannabis use among pregnant women and women of reproductive age (Coleman-Cowger et al., 2017).

Research on Effective Interventions

- Research on PHCP promising practice interventions to assist pregnant women to reduce use or quit cannabis (Coleman-Cowger et al., 2017).

Research Related to Policy

- Research on impacts of cannabis legalization on substance use treatment admissions among pregnant women (Washio et al., 2018).

Research Related to Effects

There are a number of research areas of importance related to effects that were recommended. Some notable ones include:

- Studies focusing on the effects of maternal cannabis use on maternal and neonatal outcomes in order to educate women and health care providers and determine guidelines on how to care for pregnant women (Dickson et al., 2018; Metz et al., 2017).

Substances and Co-Use

- Determine the independent effects of cannabis as well as tobacco and other drugs (Oga et al., 2018).
- Determine if co-use of substances like tobacco and alcohol has additive effects (Coleman-Cowger et al., 2017; Washio et al., 2018).
- Determine if co-use of substances increases risk greater than a substance alone (Oga et al., 2018).
- Examine patterns of cigar products and blunt use during pregnancy (Coleman-Cowger, Pickworth, et al., 2018).

Potency and Mode of Use

- Data collection to examine the potency of cannabis used and mode of use (eg: combusted versus vaporized for tobacco and combusted versus vaporized versus edible for cannabis) to understand how these affect health outcomes (Coleman-Cowger, Oga, et al., 2018).

Quantity and Timing

- Determine common patterns of cannabis use during stages of pregnancy to identify effects on fetal neural development (Jansson et al., 2018).
- Robust studies that include confounding factors for different neonatal outcomes while accurately measuring quantity and timing of exposure to cannabis (Merlob, Stahl, & Klinger, 2017).
- Future research should also collect data on detailed use patterns such as frequency and quantity using standardized measures to investigate whether there may be a dose-dependent relation between substance use frequency and birth outcomes. Trimester of substance exposure should also be considered in future research in this area (Coleman-Cowger, Oga, et al., 2018).

Cannabis and Neurodevelopmental Safety

- Research looking at the neurodevelopmental safety of cannabis to determine the teratogenic effects (a substance that can harm baby during prenatal development) on maternal and child health outcomes (Cook & Blake, 2018; Jansson et al., 2018).

Next Steps

The information obtained from Phase One (TBDHU, 2018) and Phase Two reports will determine next steps to help inform program planning as well as provide baseline information as we move into Phase Three, *Cannabis and Pregnancy: One Year Post-Legalization*. We will continue to monitor the impact of legalization while gaining an understanding of the changing landscape and how this could impact perceptions and needs related to cannabis and pregnancy. Other community partners (local and provincial) looking to prevent and/or reduce cannabis-exposed pregnancies may find these next steps useful as the local insight from the environmental scan in phase one and the CPSCP in Phase Two was congruent to the research obtained through both phases of the LR.

Surveillance

Surveillance of cannabis use during pregnancy in order to inform effective interventions and strategies to reduce cannabis-exposed pregnancies and ultimately prevent adverse maternal and fetal outcomes is needed. Monitoring and surveillance of cannabis as a licit drug along with co-use of other substances, and particularly other licit substances like tobacco and alcohol, will be important to help determine next steps for attitudes and beliefs, raising awareness, education of PHCPs, screening and intervention, policy and research. As cannabis use continues to be under reported, incorporating biologic sampling such as cord blood into future protocols to confirm cannabis exposure could be explored (Metz et al., 2017).

Attitudes and Beliefs

A greater understanding of trends and issues related to attitudes and beliefs is needed to help understand and guide next steps related to surveillance, raising awareness, education, screening and interventions, policy/regulations and research (Hasin, 2018). Communication strategies to women, their family and friends and the general public that legal use does not equal safe use for a pregnant person or infants is necessary (Krening & Hanson, 2018).

Raising Awareness

Accurate messages on cannabis use in pregnancy need to be promoted and disseminated by PH agencies in an ongoing manner (Mark et al., 2017). Such messages include effects of cannabis use during pregnancy and effects of cannabis SHS. In addition to focusing on the general public, targeted campaigns must also be developed to tailor messages to priority populations such as women, those who are able to become pregnant, and their family, friends, and PHCPs (AWHONN, 2018; Vadivelu et al., 2018; Washio et al., 2018). These target groups should be advised about where to obtain evidence-informed, credible information, as dispensary employees may lack current or reliable evidence (Dickson et al., 2018).

Education for Primary Health Care Providers (PHCP)

Education and training opportunities for PHCPs and SPs are needed in a number of areas of practice and settings in order to increase the level of comfort necessary to discuss cannabis use with women of reproductive age and pregnant people in an unbiased manner (Brooks

et al., 2017; Cook & Blake, 2018; Wood, 2018). The broadening of education and training beyond PHCPs to organizations and industries such as cannabis dispensaries (medical and retail outlets), justice and school system workers to convey accurate information and consistent messaging as it relates to cannabis use in pregnancy is essential (Cook & Blake, 2018; Dickson et al., 2018; Washio et al., 2018). Face-to-face training, webinars, client educational materials, talking points and referral information may help increase PHCP knowledge and confidence in discussing cannabis use with women of reproductive age, those who are pregnant or planning to become pregnant (Brooks et al., 2017).

Screening/Interventions

Screening for cannabis use in women of reproductive age, those who are pregnant, or planning to become pregnant requires PHCPs to screen consistently, and ask about co-use with other substances like tobacco, alcohol, and other drugs including medications used for nonmedical reasons (Jarlenski, Barry, et al., 2017; Krening & Hanson, 2018; Northrup et al., 2017). PHCPs should refrain from prescribing cannabis during pregnancy (Crume et al., 2018). Identifying novel settings on where to screen those who are able to become pregnant for cannabis use and in turn provide information on cannabis and pregnancy (eg: ED and sexual health contraception counseling offices) is needed (Moyer et al., 2018; Ryan et al., 2018). Keeping abreast of novel technological interventions being researched with regards to cannabis use in pregnancies is also important.

Policy/Regulations

Gaining an understanding of the impacts cannabis legalization will have on patterns of use in other substances like tobacco, alcohol and nonmedical opioid use in pregnant people and at-risk populations will be important (Grant et al., 2018; Jarlenski, Barry, et al., 2017; Washio et al., 2018). There is a need to understand how legalizing cannabis will affect pregnant people and their providers in terms of attitudes, beliefs, behaviors and practices in order to develop policies (Krening & Hanson, 2018). Key stakeholders need to be involved in policy and clinical practice guideline development (Cook & Blake, 2018).

Research

Canadian research on cannabis use in women of reproductive age who are pregnant or planning to become pregnant is needed as the changing landscape with cannabis now being licit may bring about new sets of challenges. There is an urgent need for research within all themes discussed given the low levels of evidence found on the topic of cannabis-exposed pregnancies. A number of research areas related to effects are needed particularly with regards to co-use of cannabis with other substances to determine synergistic effects, potency and mode of use, quantity and timing and teratogenic effects on maternal and child health outcomes. Future studies are needed on the effects of maternal cannabis use on maternal and neonatal outcomes in order to educate those who are able to become pregnant and PHCPs and develop practice guidelines (Dickson et al., 2018; Metz et al., 2017). Additional areas of research are needed with regards to surveillance, attitudes and beliefs, awareness, clinician knowledge and practice and effective interventions for clinicians and policy.

TBDHU will disseminate and share results of this report internally and externally with other PHCPs, SPs and community partners utilizing opportunities for knowledge exchanges on line and in-person.

Conclusion

The findings from the CPSCP were congruent with the findings from the LR conducted regarding effective strategies and interventions during preconception and pregnancy to prevent or reduce cannabis-exposed pregnancies as it relates to transitioning into legalization. In the City and District of Thunder Bay, there is a higher proportion of people using cannabis than previous data had indicated, including those who are considering, currently or recently pregnant. The community perception data shows that many believe that cannabis use during pregnancy is safe or safer than use and exposure to other substances such as tobacco, alcohol and tobacco SHS, especially by those who use cannabis. There is uncertainty within the community about the immediate and long-term effects of cannabis use during pregnancy on the exposed baby.

Thus, as we continue to transition through cannabis legalization, PH will play an important role in the surveillance of prevalence rates and fetal outcomes of cannabis-exposed pregnancies. With current perceptions about cannabis being safe to use during pregnancy, an understanding of these perceptions, attitudes and beliefs regarding the risks of cannabis use during pregnancy will be important to raise awareness and inform programming, interventions and education.

Community partners and professional bodies are critical to effectively develop tailored training programs based on PHCP needs and their discipline. Novel technological interventions being studied are showing promise with identifying and intervening with regards to cannabis use in pregnancy. Policies and regulations will need to acknowledge risk of cannabis use during pregnancy and include: point of sale warnings regarding effects of cannabis use during pregnancy; institutional policies that take into consideration the population of people who use cannabis; clinical practice guidelines and testing for cannabis use among pregnant people that does not discourage a person from continuing to seek care if cannabis use is disclosed.

Additional research on effective screening, interventions and strategies relating to cannabis-exposed pregnancy prevention is needed as there were limited studies available. Emerging evidence will continue to be reviewed as TBDHU conducts Phase Three of the project. Phase Three work for this project will look at a post-environmental scan of local SP and PHCP as well as provincial PH professionals and a post CPSCP comparing results with the baseline information obtained in the first two phases. New or promising promotion, prevention, interventions and screening practices will be researched. Recommendations provided in this report may be taken into consideration by community partners at all levels (locally, provincially and federally) including government initiatives that accompany the new legislation on cannabis.

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APPENDIX 1

TBDHU Cannabis and Pregnancy Project Phases

	PHASE 1	PHASE 2	PHASE 3
Legalization Time Point	**Pre-Legalization**	**Transition**	**Post-Legalization**
Drug Type	**Cannabis** "illicit drug"	**Cannabis** "illicit/licit drug"	**Cannabis** "licit drug"
Ontario Public Health Standards	2008 Ontario Public Health Standards- Reproductive Health 2018 Ontario Public Health Standards- Healthy Growth and Development	2018 Ontario Public Health Standards- Healthy Growth and Development	2018 Ontario Public Health Standards- Healthy Growth and Development
Report Launch	**October 2018**	**Beginning 2020**	**Fall/Winter 2020**
Literature Search Review period	Prior to May 2017	May 2017 - Oct. 2018	Nov. 2018 – March 2020
Report Components	- Environmental scan (baseline) 2017 - Literature review	- Community perception survey (baseline) 2019 - Literature review	Repeat in 2020: - Environmental scan - Community perception survey - Literature review

Revised January 30, 2020

APPENDIX 2

2019 Community Perception Survey on Cannabis and Pregnancy (CPSCP) Methodology

Background

The overarching research question for the CPSCP was:

Within four months after cannabis becoming legalized, what are the community's perceptions, attitudes, beliefs and stigma towards the use of cannabis during pregnancy?

The objectives of the survey were:

- To gain an understanding of the perception of prevalence of cannabis use by the general public and by pregnant women.
- To gain an understanding and compare public perception of safety of cannabis use in general vs safety of cannabis use during pregnancy.
- To gain an understanding of who/where would be considered credible or influential for pregnant women to receive information about cannabis use and pregnancy as well as information seeking preferences.
- To determine how comfortable pregnant women are discussing cannabis use with their primary health care provider.
- To determine intentions of pregnant women to use or not use cannabis while breastfeeding.
- To gain an understanding of the public's perceived effects of cannabis use during pregnancy on developing baby, baby after born and later in life.

Format. The first ten questions of the CPSCP asked respondents about demographic information. The demographic questions allowed for analyses by pregnancy status, self-identified gender, level of formal education, etc. The remaining 17 questions asked respondents about their cannabis use, perceptions about cannabis, and perceptions about cannabis and pregnancy.

Methodology. The survey was anonymous and cross-sectional and used convenience sampling. The survey was open from January 30, 2019 to March 1, 2019. Surveys were available in hard copy or online, in English only, through the TBDHU website, Facebook© and Twitter©. The survey was open to anyone 16 years of age and older living in the City and District of Thunder Bay. A gift card incentive was offered to increase response rates. A total of 1,939 surveys were completed.

Data Management and Analysis. A total of 81 responses (4%) were excluded from analysis due to ineligibility. Therefore, a total of 1,860 responses were included in analyses. The following additional analyses were completed for select questions:

- Perception of current cannabis users vs non-users

- Perception of those currently pregnant, or recently pregnant (within the last 6 months,) or considering becoming pregnant (within the next 3 months) vs the general public (all other respondents)
- Perception by self-identified gender
- Perception by age range
- Perception by education level - Lower level of formal education (some high school, grade 12 diploma, some college, some university, or trade school education) vs. higher level of education (completed college diploma, university degree, or graduate degree).

For all data shared in this report, respondents who did not answer the related survey question were removed when calculating the proportions.

Limitations. The survey was a convenience sample, meaning only those most accessible and willing to participate at the time of data collection were surveyed. This means representativeness to the general population is not ensured. The survey was cross-sectional and only represents a single point in time at the time of data collection. The data likely contains a level of response bias, meaning respondents may have intentionally or unintentionally answered questions inaccurately based on what they felt was socially desirable. For example, respondents who use cannabis may have been hesitant to disclose use. The anonymity of this survey may reduce some response bias. The survey was available in English only, so people who could not read English likely did not participate. Therefore, the data cannot be used to determine causal relationships nor can it be generalized and should therefore be interpreted with caution.

Demographics of Respondents.

- 13% of respondents indicated that they lived in the District of Thunder Bay
- 87% lived in the City of Thunder Bay.
- 89% of respondents thought of themselves as female, 1% thought of themselves in another way and 10% thought of themselves as male:
    - 10% of female/in another way respondents indicated they were considering becoming pregnant in the next three months
    - 9% of female/in another way respondents indicated they were currently pregnant
    - 7% of female/in another way respondents had a child under six months of age (recently pregnant).
    - Only those who indicated they were born female, or prefer not to say (i.e. potential to have reproductive parts to become pregnant) were directed to answer questions if they were currently or considering becoming pregnant.
    - When pregnancy status was stratified by respondents who indicated "they were born female" (i.e. those who have the reproductive parts to become pregnant), the percentages for considering, currently and recently pregnant were consistent with the percentages reported from those who thought of themselves as female and in another way.
- The average age of all eligible survey respondents was 34 years.

APPENDIX 3
2019 Community Perception Survey on Cannabis and Pregnancy (CPSCP) Questionnaire

Cannabis and Pregnancy: What Are Your Thoughts?

Thank you for taking the time to provide your thoughts around cannabis as well as cannabis use during pregnancy. This survey takes about 5-10 minutes to complete and has about 20-25 questions. This survey will be open until Friday, March 1, 2019 @ 11:59 pm EST.

Your participation is voluntary. By completing this survey you are agreeing to have your answers used by the Thunder Bay District Health Unit to research and report on public perceptions about cannabis in general as well as cannabis use during pregnancy.

All information will be held in the strictest confidence. No personal names or identifying information will be used in any analysis, publication or presentation. If you have any questions about this survey, you can contact Lyne Soramaki, RN, HBScN at the Thunder Bay District Health Unit at (807) 625-8823 or lyne.soramaki@tbdhu.com.

By completing this survey you are consenting to participate in this research.

Questions for Everyone:

1. I currently live in:

O Thunder Bay
O District of Thunder Bay
O Elsewhere

2. Age: _____

3. I have completed:

O Some high school
O Grade 12 diploma
O Some university
O Some college
O University degree
O College diploma
O Masters or Doctorate Degree
O Trade School
O Other (please specify) _____

4. Which of the following describes how you think of yourself:

O Male
O Female
O In another way
O I prefer not to respond

5. When you were born you were:

O Male
O Female
O I prefer not to respond

6. Are you currently pregnant?

O Yes
O No

7. Are you considering becoming pregnant in the next 3 months?

O Yes
O No

8. Is your partner currently pregnant?

O Yes
O No

9. Is your partner considering becoming pregnant in the next 3 months?

O Yes
O No

10. Do you have a child under the age of 6 months?

O Yes
O No

11. Have you ever used cannabis in the last 3 months?

O Yes
O No (if 'No" please skip to question #13)

12. How often have you used cannabis in the last 3 months?

O Less than once per month
O About once per month
O A few times per month
O At least once per week
O Several times per week
O At least once per day

Complete Question #13: If you or your partner is pregnant, considering becoming pregnant or have a child under 6 months of age.

13. During the time you are/were considering becoming pregnant, would you:

O Use cannabis
O Not use cannabis at all/Stop using cannabis
O Not sure what I would do

Complete Questions #14, 15 and 16: If you are pregnant, considering becoming pregnant or have a child under 6 months of age.

14. While pregnant, would you:

O Use cannabis
O Not use cannabis at all/Stop using cannabis
O Not sure what I would do

15. After your baby was born, would you:

O Use cannabis
O Not use cannabis at all/Stop using cannabis
O Not sure what I would do

16. While breastfeeding, would you:

O Use cannabis
O Not use cannabis at all/Stop using cannabis
O Not sure what I would do
O I have no intention of breastfeeding

Questions for Everyone:

17. What percentage of people do you think use cannabis?

_____%

18. What percentage of pregnant women do you think use cannabis?

_____%

19. How often do you feel pressured by others to use cannabis?

O Often
O Sometimes
O Never

20. If someone you knew was pregnant, would you:

O Encourage them to use cannabis
O Encourage them not to use/stop using cannabis
O Not say anything to them either way
O Not sure what I would do

21. In your opinion, how safe is it for a person to:

(Please check each item below either "Safe," "Unsafe" or "Not Sure")

	Safe	Unsafe	Not Sure
Smoke cannabis	O	O	O
Use edible cannabis	O	O	O
Use other forms of cannabis	O	O	O
Use cannabis for medical reasons	O	O	O
Be around cannabis second hand smoke	O	O	O
Use tobacco	O	O	O
Be around tobacco second hand smoke	O	O	O
Drink alcohol	O	O	O

22. In your opinion, how safe is it for a pregnant woman to:

(Please check each item below either "Safe," "Unsafe" or "Not Sure")

	Safe	Unsafe	Not Sure
Smoke cannabis	O	O	O
Use edible cannabis	O	O	O
Use other forms of cannabis	O	O	O
Use cannabis for medical reasons	O	O	O
Be around cannabis second hand smoke	O	O	O
Use tobacco	O	O	O
Be around tobacco second hand smoke	O	O	O
Drink alcohol	O	O	O

23. Do you believe that cannabis use during pregnancy can have harmful effects on a:

(Please check each item below either "Yes," "No" or "Not Sure")

	Yes	No	Not Sure
Developing baby before it's born?	O	O	O
Baby after it's born (infant)?	O	O	O
Child or Youth?	O	O	O
Adult?	O	O	O

24. Now that cannabis is legal, would you be comfortable talking about cannabis use to your health care provider?

O Yes, I would tell my health care provider about my cannabis use on my own

O Yes, I would talk about my cannabis use only if asked by my health care provider

O No, I would not tell my provider that I use cannabis at all

O I do not use cannabis at all

25. What information would you like to know about cannabis use during pregnancy? (Please check all that apply)

O There is no information I would want

O Are there effects on baby?

O Are there effects after the child grows up?

O Are there effects on the mother?

O Are there effects on the family?

O Are there benefits of cannabis use?

O Should you use medical cannabis?

O Is cannabis safe to use?

O Is there a difference in effects depending on form in which you use cannabis?

O Other (please specify) _____

_____

26. Where would you be comfortable getting information about cannabis and pregnancy from? (Please check all that apply)

O There is no information I would want

O Internet

O Health Care Provider (eg: Doctor, Nurse Practitioner, Midwife, etc.)

O Family

O Friends

O Other (please specify) _____

_____

27. Are there any other comments about cannabis and/or cannabis use during pregnancy you would like to provide?

_____

_____

_____

_____

_____

_____

Thank you for taking the time to complete this survey.

Enter a Draw for a Chance to Win:

1 - $50 Intercity Gift Card

1- $50 Farmer's Market Gift Card

If you would like to be entered into the draw,

Please **fill out this ballot**

and separate page from the survey.

Your draw information will be kept confidential and will NOT be linked to your survey answers in any way.

Name: _____

Email: _____

Phone: _____

APPENDIX 4
Literature Review Methodology

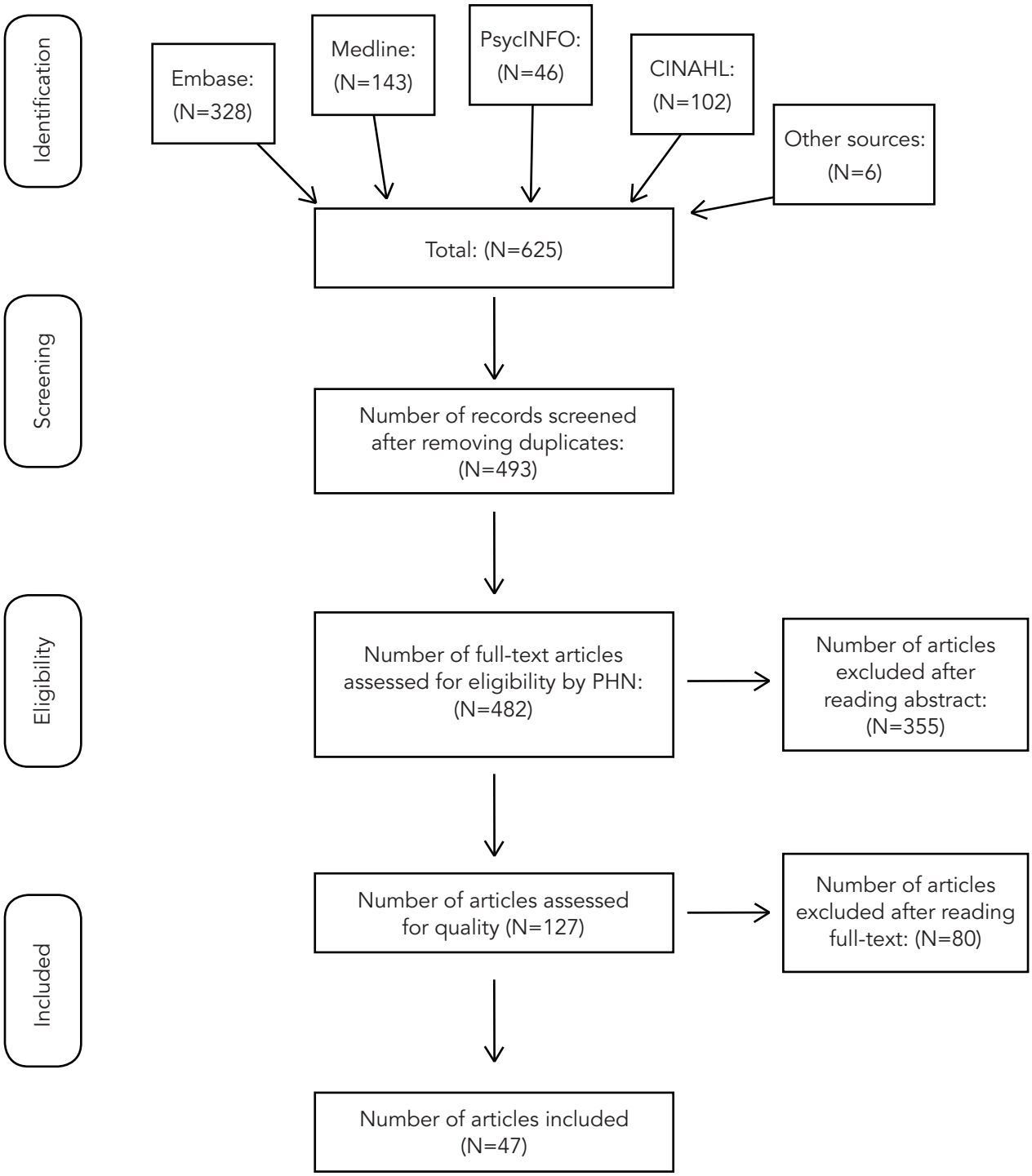
Another LR was completed in phase 2 continuing to look at articles published after the time frame from which the first report was researched. The same research question from phase 1 was once again explored:

"What are effective interventions and strategies during preconception and pregnancy to reduce and/or prevent cannabis-exposed pregnancies? Exclusion=after pregnancy"

POPULATION	INTERVENTION	OUTCOME
Preconception & Pregnant Women	Intervention or Strategy	Reduced or Lack of Cannabis Exposure in Pregnancy

The LR was conducted using Embase, Medline, PsychINFO, and CINAHL databases to look at the changing landscape of interventions to prevent cannabis-exposed pregnancies between May 2017 and October 2018. Other sources were investigated to discover relevant grey literature. Duplicates were removed and an assessment for relevance was completed by title and abstract. Full documents were assessed for quality and eligibility. Hand theming was used to determine any continuity, variance in the research themes since the last LR. Inductive theming was used to determine if any new themes had arisen.

APPENDIX 5
PRISMA Literature Review Diagram



Reference: *https://joannabriggs.org/.../CReMS_Review_Report_Template_2015_CURRENT.docx*