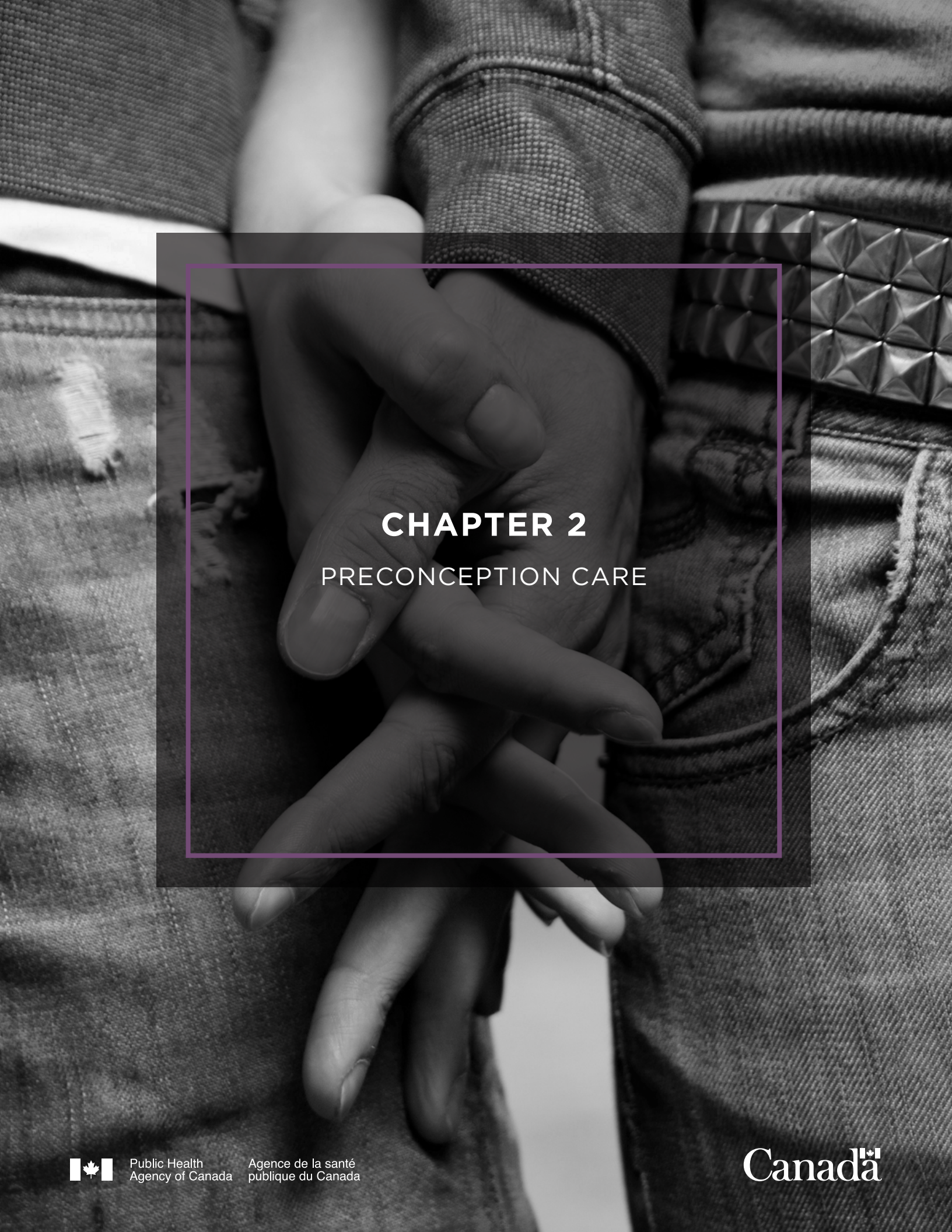

CHAPTER 2

PRECONCEPTION CARE

Public Health Agency of Canada
Agence de la santé publique du Canada

Canada

TO PROMOTE AND PROTECT THE HEALTH OF CANADIANS THROUGH LEADERSHIP, PARTNERSHIP, INNOVATION AND ACTION IN PUBLIC HEALTH.

—Public Health Agency of Canada

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Chapitre 2 : Soins préconception

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CHAPTER 2

PRECONCEPTION CARE

PRECONCEPTION HEALTH

The health of parents prior to conception establishes the foundation for their new child's health throughout his or her life. The goals for preconception care are to **improve the health status of women and men before conception** and to **reduce those behaviours and individual and environmental factors** that could contribute to poor maternal and child health outcomes.

Estimated that **50%** of pregnancies are **unplanned**

23% of women aged 20 to 34 **smoke**

73% of women aged 15 years and older consume **alcohol**

8% of women aged 3 to 79 have **low serum ferritin** concentrations

16% of women aged 20 to 29 **smoke marijuana**

58% of women take folic acid prior to pregnancy

RECOMMENDATIONS

- **150 minutes per week** of moderate to vigorous **physical activity** for **adults aged 64 and under**.
- No more than **2 drinks per day** on most days, with no more than 10 drinks per week for **non-pregnant women** to reduce long term health risks.
- All **women** who *could* become pregnant should take a daily **multivitamin** containing 400 mcg (0.4 mg) of **folic acid**.

Obesity rates have more than **DOUBLED** in the past 10 years;
16% of women aged 25 to 34 years are **obese** and **22%** are **overweight**

FOLIC ACID

Folic acid **reduces the risk of neural tube defects**, including anencephaly and spina bifida. Evidence also suggests that supplementation with folic acid is associated with lower risk for other birth defects including cleft palate anomalies, cardiovascular and urinary anomalies, and some pediatric cancers.

HEALTHY BODY WEIGHT

Both low and high preconception Body Mass Index (BMI) can **negatively affect pregnancy** outcomes. The preconception period is the ideal time to achieve (or progress towards) an optimal weight.

IMMUNIZATIONS

Immunization prior to pregnancy can **prevent adverse pregnancy outcomes**, prevent infections from being transmitted to the fetus and provide protection during early infancy.

NUTRITION

Healthy eating is a **key component to overall health**, and the preconception period is an ideal time for women to improve their diet. Nutritional needs change in pregnancy, and a pre-existing pattern of healthy eating helps to optimize maternal and fetal health.

MENTAL HEALTH

Maternal depression and anxiety has **adverse effects** on outcomes such as premature birth, birth-weight, breastfeeding initiation, and cognitive and emotional development of infants and young children.

PHYSICAL ACTIVITY

Exercise **contributes to overall health**, decreasing the risk of chronic conditions, important for weight reduction and maintenance, and has a positive effect on mental health and well-being.

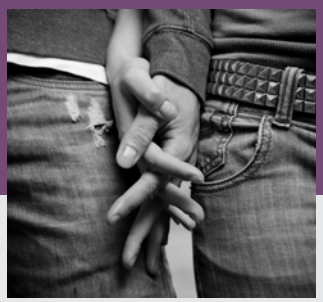
SMOKING

Quitting smoking during the preconception period can **eliminate** most of the **negative impacts on future pregnancies**, in addition to providing health benefits for the woman.

ENVIRONMENTAL HAZARDS

A person's environment includes their home, community, workplace, and other places where **exposure to potential chemical and physical hazards** may occur. The health impacts of preconception exposure to toxins are complex and difficult to verify.

For references consult **Chapter 2: Preconception Care** in: Public Health Agency of Canada. Family-Centred Maternity and Newborn Care: National Guidelines. Ottawa (ON): PHAC; 2017.



OPTIMIZING PRECONCEPTION HEALTH

INFORMATION FOR HEALTH CARE PROVIDERS

- Encourage women considering pregnancy to schedule a visit to discuss preconception health and the optimization of maternal and fetal outcomes.
- Take advantage of episodic visits to identify health risks, offer related interventions and encourage positive health behaviours *prior* to conception.
- Encourage all women and men of reproductive age to develop a reproductive-life plan, whether they intend to have children or not.
- Recommend a daily multivitamin containing 400 mcg (0.4 mg) of folic acid for all women of reproductive age who *could* become pregnant, and discuss risk factors that may warrant a higher dose.
- Ensure that immunizations are complete and up-to-date, using immunization history or serological testing for routinely recommended adult vaccines and those for which pregnancy requires specific screening.
- Review all medications for their potential teratogenicity and counsel women about the potential impact on a pregnancy, regardless of their plans to conceive.
- Discuss the effects of alcohol in pregnancy and encourage abstinence leading up to and during pregnancy.
- Promote smoking cessation. Prepregnancy is the ideal time to stop smoking in order to prevent adverse perinatal outcomes associated with maternal smoking.
- Encourage progress towards healthier weights in women who are underweight, overweight or obese. Adverse perinatal and maternal outcomes can be reduced with appropriate preconception weight gain or loss.
- Screen for elevated sexually transmitted infection (STI) risk factors. Identifying an infection before conception allows for timely treatment and prevention of transmission during pregnancy and birth.
- Optimize chronic medical conditions prior to conception to improve perinatal and maternal outcomes.
- For women who have previously given birth, discuss interpregnancy interval (IPI)—the time between a live birth and the beginning of the following pregnancy. Both short and long IPIs have been associated with an increased risk of adverse maternal and newborn outcomes.

For references consult **Chapter 2: Preconception Care** in: Public Health Agency of Canada. Family-Centred Maternity and Newborn Care: National Guidelines. Ottawa (ON): PHAC; 2017.

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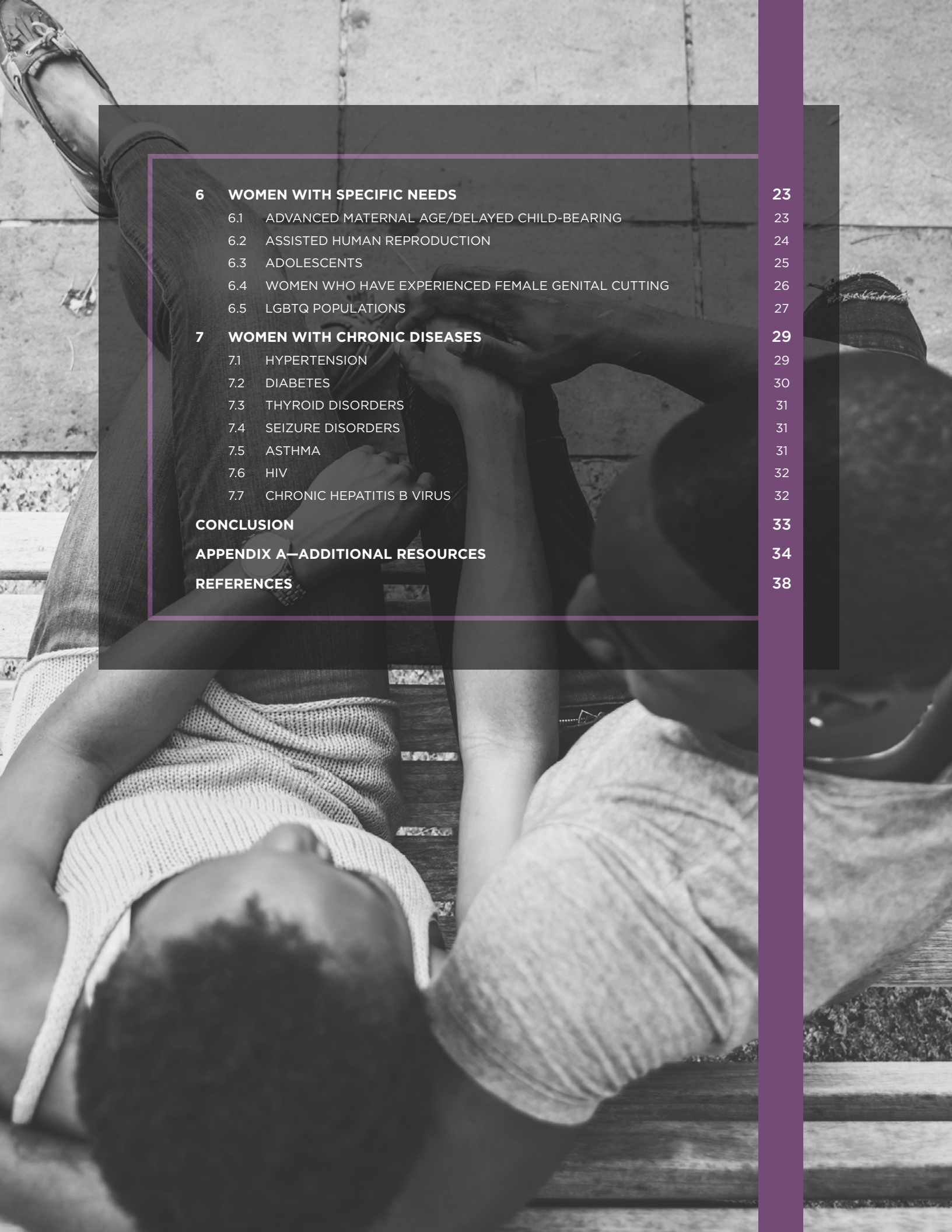
TABLE OF CONTENTS



The health of parents prior to conception establishes the foundation for their new child's health throughout his or her life. Ultimately, healthy parents promote a healthy society. The goals of the World Health Organization (WHO) for preconception care are to improve the health status of women and couples before conception and to reduce those behaviours and individual and environmental factors that could contribute to poor maternal and child health outcomes.[1]

Preconception care involves any intervention that can identify and modify medical, psychosocial, behavioural or environmental risks to female or male reproductive health and future pregnancies. Preconception care is based on the principles of Family-Centred Maternity and Newborn Care (FCMNC), as defined in Chapter 1 of these guidelines, and includes all women and men of reproductive age. Preconception care is part of a continuum of care that promotes an overall commitment to health during the reproductive years, including the interconception period.

Pregnancy and childbirth are transformational events within a family, however that unit is defined. As such, the concept of preconception care also includes preparing for pregnancy and offering women and their partners the knowledge and skills required to effectively care for themselves, their family, and their new family member(s).

1 FAMILY-CENTRED PRECONCEPTION CARE

When based on FCMNC principles, preconception care:[2,3]

- Begins with attitudes and practices that value pregnant women, as well as their partners, children, and families;
- Encourages women and men to prepare actively for pregnancy;
- Focuses on the many environments influencing the family, including social, psychological, spiritual, and physical;
- Respects the diversity of people's lives and experiences;
- Incorporates informed decision-making, thereby helping women and their partners to understand health issues that may affect conception and pregnancy;
- Empowers both women and men to be as healthy as possible, helping them to recognize actual and potential challenges.

> ADDITIONAL RESOURCES ON PRECONCEPTION CARE: SEE APPENDIX A

2 DETERMINANTS OF HEALTH

Successful promotion of healthy pregnancies requires more than simply encouraging women and their partners or families to adopt healthy behaviours and informing them of available interventions. Many women and their families continue to face multiple barriers to optimal health and pregnancy outcomes related to social determinants of health such as poverty, food insecurity, unsafe neighbourhoods, lack of access to education, and inadequate social support.[4] Health care providers (HCPs) have a responsibility to identify those factors that are modifiable and to encourage healthy public policy and an effective social safety net.

According to Statistics Canada, about 9% of the Canadian population were living in households with low income in 2011. About one-quarter of female lone-parent families experience poverty and associated food insecurity (23% and 25%, respectively).[4,5] Poverty is one of the strongest determinants of health and has a significant negative influence on maternal and infant outcomes.[4] Women living in poverty have increased rates of smoking, recreational drug use, and obesity, as well as poor nutrition and food insecurity. They also experience increased exposure to environmental hazards and violence.[6] Women living in poverty are also less likely to initiate prenatal care and are at higher risk of poor pregnancy outcomes, including preterm birth and intrauterine growth restriction.[7] Indigenous women in particular have higher average rates of poverty and food insecurity, and lower rates of high school completion and employment. They are more likely to be living in crowded housing conditions. Each of these factors has a negative impact on pregnancy outcomes.[4]

HCPs can play a critical role in identifying those with inadequate income and assist them to access the resources for which they qualify. In addition, they can connect women and their families with community networks that provide not just financial, but also social support.

International migration is another key consideration. By 2020, the foreign-born proportion of the total Canadian population is projected to increase to 25%.[8] This population may be less aware of the health care system, have limited social networks, and may have precarious health status or limited access to or eligibility for services. Identifying and overcoming the institutional barriers to caring for this population is vital.

Providers who are attuned to the diversity that has now become the norm in Canadian society will be best positioned to plan preconception programs that respond to the needs of their patients and communities. Engaging women and men from diverse backgrounds in all aspects of preconception care, including determining priorities, developing and delivering programs, and participating on institutional/agency committees, will further ensure the success of initiatives.

3 DECISION-MAKING AROUND PREGNANCY

Often, HCPs have conversations about preconception care only with those women and men who self-identify their interest in becoming pregnant. However, while no national data exists for Canada, the most recent US data show that 49% of pregnancies are, in fact, unplanned.[9] The *Maternity Experiences Survey* (*MES*) found that 7.1% of Canadian women did not want to be pregnant at all and that 20% would have preferred to become pregnant later.[10]

> **Providers are encouraged to see each encounter as an opportunity to promote preconception health and effective pregnancy prevention for those not currently choosing to conceive.**

Many women and their partners are not aware of the need for preconception care and do not tell their HCP that they intend to get pregnant.[11,12] In light of this, discussions between providers and women and men of reproductive age would ideally integrate counselling around contraception, fertility, and sexual and reproductive health, irrespective of whether a pregnancy is planned. In addition, engaging a woman in a commitment to optimize her overall health will have a positive effect on her fetus and newborn, should she become pregnant.[13]

In essence, "[s]upporting the health of women before, between, and beyond pregnancy enhances her trajectory toward lifelong wellness."[14, p7]

Although many women identify HCPs as their primary and preferred source of preconception information and women support proactive counselling related to this type of care, most providers do not routinely counsel on preconception.[11,12,15,16] For example, fewer than 60% of family physicians and obstetricians discuss specific issues such as folic acid supplementation before conception.[17] Given that most women and men of reproductive age seek care at some point in any given year, providers are encouraged to see each encounter as an opportunity to promote preconception health and effective pregnancy prevention for those not currently choosing to conceive. In particular, visits related to contraception may provide an ideal opportunity to ask about short- or long-term needs and about reproductive-life plans. Helping women to develop an early understanding of the importance of both preconception and prenatal care may increase their likelihood of engaging in proactive self-care. Although the evidence base is not robust, the results of both randomized controlled trials and prospective cohort studies suggest that promoting routine preconception health care increases rates of folic acid supplementation and physical activity, and reduces alcohol consumption prior to pregnancy.[11,18,19]

HCPs will generate the most positive results if they are prepared to initiate conversations about future pregnancy and preconception health, as well as to recognize and accept diversity of choice—from the adolescent who sees pregnancy as an option, to the adult woman or man who has decided not to have children at any point. Of course, not every woman or man will be open to, or requires, the same degree of preconception care. An exploration of the individual's reproductive and health goals can guide this conversation. This is an opportunity to engage in a clear and transparent discussion about individual preferences, expectations and preparation plans.

3.1 REPRODUCTIVE-LIFE PLAN

Everyone of reproductive age can benefit from having a reproductive-life plan (whether or not they intend to have children), as well as ready access to information and counselling on sexual health. Women who are not planning to become pregnant should know their options with regard to effective contraception (including emergency contraception) and abortion. Engaging in such conversations can provide opportunities to introduce the concept of overall reproductive-life planning. Effective family planning allows women to plan and space their pregnancies according to their circumstances, needs and preferences. Planning has significant implications for the well-being of the mother, her child, and her subsequent children. HCPs can refer to the Society of Obstetricians and Gynaecologists of Canada's (SOGC) *Medical Abortion Guideline* and *Canadian Contraception Consensus*.[20,21]

Women who have recently arrived to Canada may have views on planning a family that differ from that of mainstream Canadian culture. The acceptance of contraceptive methods by partners may take on added importance in discussions with women from some cultures.

Effective preconception counselling includes helping women to plan their post-birth contraceptive practices so they do not become pregnant sooner than they want or anticipate. A short interpregnancy interval (IPI), defined as the time between a live birth and the beginning of the following pregnancy, is associated with an increased risk of adverse pregnancy, maternal and newborn outcomes, including small-for-gestational age, preterm birth, third-trimester bleeding, and maternal death.[22,23] A recent US population-based study showed a 20% increased risk of birth defects if the IPI was less than 6 months, compared to 18 to 23 months.[24] The WHO recommends waiting at least 2 years between birth and subsequent conception.[25]

A long IPI (> 60 months) has also been associated with adverse outcomes such as an increased risk of labour dystocia, preeclampsia and birth defects.[24,26–28] Overall, the literature suggests an optimal IPI of at least 18 to 24 months.[29] Although data are still inconclusive, a minimum 6-month interval following a miscarriage or stillbirth is recommended by the WHO. Other research has found no evidence to support this recommendation, and new research suggests an interval of less than 6 months may actually increase the chances of a healthy pregnancy outcome.[30]

Similarly, women who want to experience a trial of labour within 18 months of a previous Caesarean birth (interdelivery interval—distinct from IPI) should be counselled about the increased risk of uterine rupture.[31]

3.2 LANGUAGE AND DECISION-MAKING

A significant proportion of women in Canada (14% in 2011) speak a language other than English or French most often at home.[32] Some are unable to communicate with HCPs in a common language. Language discordance, that is, the lack of a common language or understanding between the provider and the woman receiving their care, can be a challenge. Family members are often used as translators, but there is no way of confirming that the translation is accurate. Professional interpreters have been found to have a positive impact on clinical care, as they are able to translate more reliably. However, they are more costly and can be difficult to access.[33] Cultural brokers are another option for translation. No research studies have directly compared the use of professional interpreters vs. cultural brokers to respond to language discordance between women and their HCPs.[34]

3.3 INDIGENOUS WOMEN AND DECISION-MAKING

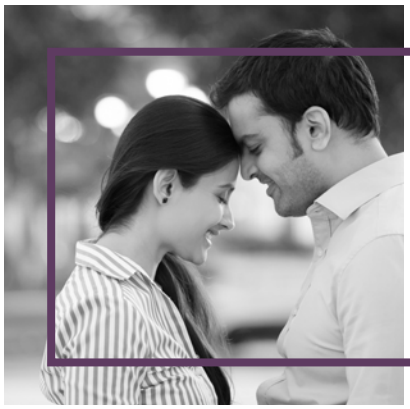
Successful health care strategies for Indigenous women, families, and communities take into account the history of colonization and residential schools and the associated social determinants of health—poverty, limited access to nutritional foods, unsafe and crowded housing, poor literacy levels, etc.—that contribute to negative health outcomes such as addiction, mental illness and sexually transmitted infections (STIs). In addition, such approaches seek to address the poor community infrastructure and inequitable access to culturally appropriate health care services and education that create barriers to successful health promotion and prevention.[35]

Indigenous women and men need access to culturally relevant sexual health information and preconception services. Many may even need guidance to assist them in knowing what to ask about sexual health. These needs are best met with preconception care that is designed and delivered within the Indigenous community in collaboration with elders and counsellors, community agencies, and HCPs. In this collaborative context, the health care team is able to focus on emotional, spiritual, and physical wellness while applying a culturally safe approach to care that fully recognizes and respects the diversity and uniqueness of Indigenous cultures and languages.[35,36]

Examples of activities that have proven beneficial within Indigenous communities include:

- Promoting comprehensive sexual health education in schools;
- Forming peer-support groups of young mothers/fathers who talk to young people about the importance of finishing their education before starting a family;
- Educating young people within schools about Fetal Alcohol Spectrum Disorder (FASD);
- Having female elders speak with young women about sexual health, body image and taking care of and respecting their bodies.

When HCPs who provide preconception care for Indigenous women and men are able to develop an understanding of their patients' culture, traditions and support systems, the results can be dramatic. Other factors that contribute to improved outcomes include an approachable and welcoming HCP; clear and concise communications; and allowing sufficient time to ask and respond to specific questions on issues.[37–39] When requested by the patient, allowing a spokesperson (such as a community worker) to be present during medical visits to provide support and to ask questions can also be helpful.



4 THE PLACE OF PRECONCEPTION CARE

It is important to implement preconception education with a focus on a healthy lifestyle that supports optimal maternal–child outcomes in the school, the workplace and in other settings. Although specific screening and interventions often occur in primary care settings, a collaborative approach inclusive of family, community, the school system, and all HCPs can broaden the reach of preconception care.

4.1 SCHOOL AND HOME

Schools remain one of the major sources of sexual health education for children and youth, but school-based curricula vary across Canada.[40] Effective school-based sexual health education is important for promoting self-esteem, healthy relationships and informed decision-making and for avoiding STIs and unintended pregnancy.[41] Ideally, teachers, parents and HCPs collaborate to plan effective sexual health education programs for children and youth.

While studies demonstrate that 85% of parents believe that sexual health education should take place at school, parents remain a primary source of information.[42] Parents should be encouraged to provide early, honest, open and age-appropriate communication. Such conversations promote a positive body image and facilitate communication about other topics when the child reaches adolescence, such as mental health and substance use.[43–45] Print or online resources from HCPs, health agencies, and community organizations can inform parents and help them talk with their children.[46]

4.2 THE WORKPLACE

Balancing the demands of work and family can be stressful for both women and men.[4] Potential workplace hazards can compound that stress. Workplace health promotion strategies that encourage a work–life balance and healthy parenting are commendable. Such strategies include flexible work hours, extended parental leave and in-house childcare. Ideally, employers also work with occupational health and safety professionals to make employees aware of workplace exposures that may adversely affect their health, including their reproductive health. As reliable data on minimum acceptable exposures are sparse, adopting the *precautionary principle* is advised. This principle states that "when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."[47, no pagination] These precautionary measures include adopting the lowest risk exposure or the use of safer alternatives wherever possible for women and men of reproductive age.[48,49]

4.3 COMMUNITY SETTINGS

Community health centres, cultural centres and local pharmacies also distribute preconception information, identify resources and help women, men and families to access services. Such centres may be well-positioned to meet the needs of groups who do not necessarily access traditional sources of health care.[48] Trained peers, professionals, and community health workers involved in outreach programs (such as public health nurses) could integrate preconception information within many of their community programs and group activities.

4.4 MEDIA

News media (television, radio, print) and social media (including Twitter, Facebook, Instagram, YouTube, etc.) have the potential to affect, both positively and negatively, health-related behaviours that impact preconception and maternal–fetal health. Media sometimes depict sexuality, pregnancy and parenting in unrealistic and potentially dangerous ways, and promote the use of alcohol, tobacco and drugs as socially acceptable and desirable. Certain media also tend to promote the attainment of unrealistic body shapes and sizes.

However, various media can also disseminate well-defined risk reduction messages to large audiences over an extended period.[50] Two comprehensive reviews of the impact of mass media campaigns showed reduced health-risk behaviours, including lower rates of smoking initiation and increased smoking cessation, increased physical activity, healthier food choices and more abuse-preventive behaviours.[50,51] Mass media messages have also been shown to improve condom use to prevent human immunodeficiency virus (HIV) infection and to improve uptake of cervical cancer screening and immunization. This success has also translated to campaigns targeting vulnerable populations.[52]

More health organizations are making use of social media. The Public Health Agency of Canada (PHAC) and Health Canada are leveraging the wide reach of Facebook and Twitter—and their potential to engage populations that are traditionally more difficult to serve—through the *Healthy Canadians* initiative. Although only a minority of Canadians currently favour social media as sources of health information, this trend is on the rise and these channels are particularly effective at reaching adolescents and young adults. Another benefit of social media is the ability to use pictures to overcome language and health literacy barriers. Studies suggest that differences between users and non-users of social media based on socioeconomic status and ethnicity appear to be diminishing. Although there is a deficit of peer-reviewed literature on the effectiveness of health-related social media, one meta-analysis showed a small, but significant effect of online interventions in improving rates of nutrition, physical activity, smoking and drug-related activity.[50]

In general, media campaigns are more likely to succeed when messages are delivered in multiple formats and when individuals have access to the services being promoted, including those related to health care. Media campaigns also appear to be more effective when supplemented by some form of environmental or community support.[50]

Given the potential impact of media messages on preconception and overall maternal health behaviours, HCPs will want to keep up-to-date with these exposures on their patients. Within their own practices, HCPs can repurpose existing appropriate media messages to emphasize important positive health behaviours and encourage the use of credible online information sources by patients. The effectiveness of electronic media, in particular, to meet the needs of vulnerable and harder-to-reach populations, requires further exploration.

4.5 PRIMARY CARE SETTINGS

While providers frequently counsel their patients of reproductive age about contraception, this interaction also provides an ideal opportunity to raise awareness about the importance of preconception care—for example, the benefits to both mother and child of supplementing with folic acid and adopting a healthy lifestyle before conceiving. Individuals with no source of primary care or those who are new immigrants without health care coverage might be accessing most of their health information via walk-in clinics or hospital emergency departments. These locations could also serve as effective distribution points for preconception health information.

5 PREPARING FOR A HEALTHY PREGNANCY

Although some women will declare their intention to conceive or present for preconception care, many will not be so proactive. Furthermore, almost half of pregnancies are unplanned. Regularly reviewing the following list for each of their patients of reproductive age, will best position HCPs to optimize preconception health and to offer counselling at the most opportune times:[53]

- Encourage women considering pregnancy to schedule a visit to discuss preconception health and the optimization of maternal and fetal outcomes.
- Episodic visits present an opportunity to identify health risks, offer related interventions and encourage positive health behaviours *prior* to conception.
- Encourage all women and men of reproductive age to develop a reproductive-life plan, whether they intend to have children or not.
- Ensure that immunizations are complete and up-to-date, using immunization history or serological testing for routinely recommended adult vaccines and those for which pregnancy requires specific screening, including (but not limited to) tetanus, diphtheria, and pertussis (TdaP); measles, mumps, and rubella (MMR); hepatitis B; influenza; and varicella.
- Recommend a daily multivitamin containing 400 mcg (0.4 mg) of folic acid for all women who *could* become pregnant, and discuss risk factors that may warrant a higher dose. At a minimum, women should start taking a supplement 3 months before conception to reduce the risk of neural tube defects (NTDs) in infants.
- Review all medications for their potential teratogenicity and counsel women about the potential impact on a pregnancy, regardless of their plans to conceive.
- Counsel women about the effects of alcohol in pregnancy and encourage abstinence leading up to and during pregnancy. There is no safe *amount* or *time* to consume alcohol during a pregnancy.

- Promote smoking cessation. Prepregnancy is the ideal time to stop smoking in order to prevent adverse perinatal outcomes associated with maternal smoking.
- Encourage progress towards healthier weights in women who are underweight, overweight or obese. Adverse perinatal and maternal outcomes can be reduced with appropriate preconception weight gain or loss.
- Screen for elevated STI risk factors during routine visits. In particular, all women should be evaluated for these prior to pregnancy. At-risk women and men, and those planning a pregnancy, should be screened for STIs (including gonorrhea, chlamydia, syphilis and HIV). Identifying infection before conception allows for timely treatment and prevention of transmission during pregnancy and birth.
- Optimize chronic medical conditions prior to conception. Doing so can reduce the risk of birth defects (e.g., from diabetes) and optimize neurological development (e.g., from hypothyroidism).
- Encourage 18 to 24 month intervals between completed pregnancies. Both shorter and longer IPIs have been associated with an increased risk of adverse maternal and newborn outcomes.

5.1 REPRODUCTIVE HISTORY

Establishing a detailed reproductive history may provide clues to potential difficulties with fertility. Items to consider include:[54]

- Menstrual history, contraception use, past or current STIs, and pap smears;
- Recurrent spontaneous abortions[i] (which may signify either a genetic anomaly or other significant morbidity such as APLA syndrome or an endocrinological morbidity such as hypothyroidism and type 1 diabetes);
- Previous pregnancy conditions such as pregnancy-related hypertension or gestational diabetes;
- Previous pregnancy outcomes such as preterm birth, pre-eclampsia, preterm labour, and fetal growth restriction;
  - The greatest risk factor for preterm birth is a prior preterm birth. Although a detailed discussion of management is beyond the scope of this chapter, certain risk factors, such as smoking and other substance use, may be amenable to intervention.
  - Women with an increased risk or a history of severe pre-eclampsia should be encouraged to seek expert care prior to their next pregnancy.
  - Fetal growth restriction, which among other factors is associated with low maternal body mass index (BMI), has been shown to decrease when women increase their weight between pregnancies.
  - Women with a history of preterm labour or who have given birth to growth-restricted infants should be encouraged to seek expert care early in their next pregnancy.

5.2 GENETIC AND FAMILY HISTORY

Obtaining an accurate 3-generation family genetic and ethnic history of both parents-to-be is the initial genetic screening test of choice during preconception. This can easily be undertaken early on, in the course of general care.[54,55]

Families from the following ethnic backgrounds require specific screening:

- Ashkenazi Jewish, who have an elevated risk of multiple genetic conditions, including Tay–Sachs;
- African, who have an elevated risk of sickle cell anemia and thalassemia;
- Mediterranean and Asian, who have an elevated risk of thalassemia.

[i] Commonly known as *miscarriages*.

Identification of known genetic disorders (such as cystic fibrosis), congenital malformations (such as congenital heart disease and NTDs) or developmental delays would prompt the need for a more detailed history and/or referral for genetic counselling. If a condition has a genetic cause, testing prior to pregnancy may identify the risk of giving birth to an affected infant, allowing parents to consider their options, including the use of assisted reproductive technology. For women with an increased risk of NTD, a male partner with a personal history of NTD, or a previous pregnancy of either partner with a NTD, the SOGC guideline *Pre-conception Folic Acid and Multivitamin Supplementation for the Primary and Secondary Prevention of Neural Tube Defects and Other Folic Acid-Sensitive Congenital Anomalies* recommends a diet rich in folate and a daily 4.0 mg supplement 3 months prior to pregnancy and through the first trimester, then a multivitamin containing 0.4 mg/day folic acid for the remainder of pregnancy and continued for 4–6 weeks postpartum or as long as breastfeeding continues.[56]

Parental age at conception is also a consideration. The prevalence of chromosomal abnormalities increases with maternal age. There is also some evidence that paternal age over 40 may decrease sperm quality and slightly increase the risk of autosomal dominant conditions. Given the increasing trend towards an older age at first pregnancy, HCPs will want to integrate discussion about the consequences of delaying child bearing as it relates to both male and female fertility and the risk of age-related congenital and chromosomal abnormalities into their conversations about overall reproductive goals with the woman, man, or the couple.[57]

5.3 ENVIRONMENTAL HAZARDS AND TOXINS

A woman's environment includes her home, community, and workplace, as well as other places where exposure to potential chemical and physical hazards may occur. The health impacts of preconception and prenatal exposure to toxins are inherently complex and difficult to verify with certainty. Overall, adopting the *precautionary principle* is advised. The principle acknowledges that the knowledge base around some environmental hazards is uncertain and incomplete, and therefore it is prudent to promote activities that reduce potential harm even in the absence of full scientific certainty that the harm exists.[47] Participatory decision-making with the woman is central. Ideally, risks would be identified and mitigated (where possible) prior to pregnancy.[49]

All those of reproductive age can benefit by being better informed about general environmental hazards and specifically about any teratogenic agents to which they are exposed. Due to conflicting evidence, assessing the impact of environmental exposures is challenging.[58] Nevertheless, HCPs can inquire about known potential toxic exposures in the workplace and home and during leisure activities, as well as about any potential previous exposure. If this initial screening identifies any exposures of concern, consultation with a specialist is advised.[49] Work modifications, extra precautions, or protective reassignment of women at risk of exposure to potential teratogens may be warranted.

Women and men who are new immigrants are more likely to be in high-risk employment settings and less likely to understand their rights as these relate to conditions of employment. As a result, HCPs may need to determine their working conditions in more detail, to assess chemical and physical exposure risk and to counsel accordingly. In addition, individuals who are new to Canada may require guidance on when to inform employers of a pregnancy and on their legal rights during pregnancy.

Some of the more common environmental toxins known or strongly suspected to be associated with adverse neurodevelopmental and reproductive effects include:

- **Mercury:** Exposure to this central nervous system toxin occurs primarily through eating fish that is high in mercury content, such as shark, swordfish, king mackerel, tilefish and fresh tuna. However, consumption of fish that is low in mercury (including salmon, light canned tuna, and sole) is encouraged, as these contain omega fatty acids beneficial for fetal neurocognitive development.[59] In contrast to mercury (which can accumulate in some food sources), thimerosal (incorporated into some vaccines as a preservative) contains ethyl mercury. The amount potentially found in vaccines is well below established safety limits. Ethyl mercury is rapidly eliminated from the body and does not accumulate, even in premature infants.[60]
- **Lead:** Adverse health effects associated with this central nervous system toxin have been found to occur at blood levels below 5 µg/dL and even as low as 1–2 µg/dL (with some degree of uncertainty as to effects observed at these levels). There is strong evidence that maternal lead levels as low as 10 µg/dL can impair fetal growth and child neurodevelopment.[61]

  As this heavy metal is commonly found in lead-based paints applied within older homes and workplaces, caution should be taken during renovations of older buildings to avoid inhaling or ingesting particles.[62] Lead may also be found in certain pottery glazes. Exposure is most likely to occur, however, through occupations such as mining, smelting, and battery manufacture, and via drinking water that passes through the lead pipes of homes built before the 1950s. Any lead residue from pipes can be flushed from the water after night- or day-long lack of use by running taps for a full minute.[49]

  In situations of potential exposure, HPCs will want to establish the blood lead level, which should be less than 0.10 µmol/L. Women with higher readings should be advised of the potential risk to the central nervous system of the fetus and ways in which exposure can be minimized or eliminated.[63]

- **Soil and water contaminants:** Well water can sometimes be contaminated with levels of lead, arsenic, nitrates, or biological pathogens (such as *Escherichia coli*) that can pose a health risk to the woman and her fetus.[64] For women living in rural areas, HCPs will want to determine if well water is being used and how recently it has been tested.
- **Organic solvents:** These compounds found in paint strippers, non-latex paints, plastic adhesives and some dry cleaning chemicals may have adverse effects on fertility and fetal neurodevelopment. Exposure should be avoided at the home and the workplace when planning a pregnancy.[65]
- **Pesticides:** The active ingredients of some herbicides, insecticides and fungicides used in and around the home to control weeds, insects, and plant diseases could potentially present a risk of neurotoxicity to the developing fetus. Some have also been shown to cause intrauterine growth restriction and low birth-weight, and affect female and male reproductive health.[66] As a precaution, women and men should minimize (e.g., via protective clothing) or avoid pesticide use or exposure when planning a pregnancy.[64]
- **Anesthetic gases:** Exposure to these gases, which slightly increases the risk of spontaneous abortion, can occur in medical, dental and veterinary operating room environments. This risk can be minimized through the use of good gas-scavenging systems and proper anesthetic technique (testing for leaks, using cuffed endotracheal tubes, etc.).

- **Radiation:** Exposure to X-ray radiation may occur in medical, veterinary, dental and electronic environments, and can have negative effects on female and male reproductive health. This is a dose-dependent teratogen—the US Centers for Disease Control recommends that women receive a maximum cumulative dose of 5000 mrad during their entire pregnancy (fetal exposure from abdominal computerized tomography is about 3000 mrad).[67] Pregnant women exposed to less than 5000 mrad have similar pregnancy outcomes to controls who received only background radiation.[68]

5.4 NUTRITION

Healthy eating is a key component to overall health, and the preconception period is an ideal time for a woman to improve her diet. Nutritional needs change in pregnancy, and a pre-existing pattern of healthy eating helps to optimize maternal and fetal health. Overall, the evidence supports the benefits of a healthy diet that includes adequate calcium, vitamin D, folic acid and iron in the preconception period.[69] As with other preconception counselling topics, HCPs are in a position to leverage opportunities to discuss nutrition with women of reproductive age, regardless of the reason for their visit. Everyone should be encouraged to consume vegetables, fruit, whole grains, meat or meat alternatives, low fat milk, fish, and unsaturated oils, and to limit salt, sugar and processed foods.[70] Dietary fads are common and often promoted in the popular media. Caution women who are contemplating a pregnancy to avoid diets that severely restrict one or more food groups. Additional calories are not required in the preconception period (unless deemed underweight).

It is important for providers to be aware of any barriers, real or perceived, that women face in eating healthily. Food security is not ubiquitous across Canada. Particularly at risk of food insecurity are those living in households with low income, Indigenous people, and families who are new immigrants. Statistics also show that people living in the Atlantic provinces and the territories are, on average, more at risk than in other regions of the country.[71] Dietary restrictions also vary based on personal choice, personal or religious beliefs, cultural practices or medical conditions. HCPs can help women maximize their nutrition within their budgets, health needs and beliefs by referring them to supportive programs and services.[72]

> **Healthy eating is a key component to overall health, and the preconception period is an ideal time for a woman to improve her diet.**

Many women discontinue vitamin supplementation because of nausea or constipation or the size of the vitamin pill. By monitoring their female patients' use of nutritional supplements, providers can suggest adjustments or means to deal with any side effects—as well as ensure that recommended doses are not being exceeded, since the effects of higher doses may be either teratogenic or unclear (as with vitamin A).

Calcium and Vitamin D

Inadequate calcium and vitamin D intake is prevalent in Canadian women, according to *The Canadian Community Health Survey* (2004).[73] Intake should be assessed for all women of reproductive age so that HCPs can advise on the best sources of these nutrients. Supplementation may be necessary if requirements cannot be met through diet.

Calcium: is essential for bone health and important for neurological and muscular functions and some endocrine functions. Although there is no research examining the role of preconception calcium supplementation, supplementation *during* pregnancy in women at risk of low calcium intake reduces the risk of preeclampsia.[74] Identification and correction of dietary deficiency would ideally take place prior to pregnancy. Over the long term, inadequate calcium intake can lead to osteoporosis.[69]

Calcium is found in a variety of foods, including milk, milk alternatives (e.g., yogurt, cheese, and fortified plant-based beverages, such as soy), fish with edible soft bones (e.g., canned salmon and sardines), and dark green vegetables (e.g., broccoli, kale, and spinach).

Dietary Reference Intakes for calcium are based on evidence related to bone health. The Recommended Dietary Allowance (RDA) for women, 19 to 50 years of age (pregnant or not), is 1000 mg of calcium per day. The RDA for adolescents, 14 to 18 years of age, is 1300 mg calcium per day.[75]

If a woman's diet does not provide the required amount of calcium, she may require supplementation. Calcium is typically included in multivitamins formulated for women, and calcium supplements are also readily available. Calcium carbonate is common and inexpensive, but must be taken with food because proper absorption depends on stomach acid. Calcium citrate, on the other hand, can be taken without food. Some antacids contain a significant amount of calcium.

Vitamin D: is essential for proper absorption of calcium. It can also help the body use calcium and phosphorus to build and maintain strong bones and teeth. Vitamin D deficiency can lead to rickets in children and osteomalacia in adults.

Natural food sources of vitamin D are fatty fish and egg yolks. By law, cow's milk, margarine, fortified plant-based beverage (e.g., soy), infant formula, and foods for special uses (such as nutritional supplements and meal replacements) must be fortified with vitamin D in Canada.

Other vitamin D-fortified foods, such as some goat's milk and calcium-fortified orange, apple and tangerine juices, are also available, and some cheeses and yogurts are made with vitamin D-fortified milk.

The RDA for vitamin D for women of reproductive age is 600 IU (15 mcg).[75] Vitamin D is typically included in multivitamins. Although routine supplementation is generally unnecessary, people who do not get enough vitamin D through their diet because of restricted intake of fortified foods, who have dark pigmentation or certain medical conditions, or who limit their exposure to the sun may require a supplement.[76]

Iron

Iron is an essential nutrient at every stage of life. It is a critical component of many enzymes and of hemoglobin. The preconception period is an ideal time to optimize iron stores, as the requirements will change during pregnancy. Iron deficiency, especially in the second and third trimesters, is the most common nutritional deficiency in pregnancy worldwide.[77] In Canada, around 8% of Canadian women have low serum ferritin concentrations, suggesting low iron stores. Females aged 12 to 19 have the highest prevalence of insufficient serum ferritin concentrations (13%), suggesting that this group is most at risk of deficiency.[78] Women who are immigrants and refugees are at high risk of iron deficiency anemia and should be screened and treated as appropriate prior to pregnancy.[79]

The recommended daily intake of iron for a non-pregnant woman with normal iron stores is 18 mg. This increases to 27 mg once she is pregnant.[80] Women should be encouraged to incorporate iron-rich foods, such as red meat, poultry and fish, into their diets. Vegetarians can get iron from dark green leafy vegetables, iron-enriched cereals and grains, beans, lentils and chickpeas. Note that certain nutrients, such as calcium, can inhibit iron absorption. Soy and tannin-containing teas may also inhibit absorption. When taken at the same time, vitamin C can enhance iron absorption.

Folic Acid

Folic acid reduces the risk of NTDs, including anencephaly and spina bifida. Evidence also suggests that supplementation with folic acid is associated with lower risk for other birth defects including cleft palate anomalies, cardiovascular and urinary anomalies, and some pediatric cancers including leukemia, brain tumours and neuroblastoma.[81] Canada has experienced a 50% decline in NTDs since 1998, which saw the mandatory fortification of white flour with folic acid. However, women who exclude folic acid–fortified grain products (e.g., gluten-free diets) do not benefit from this mandatory fortification.[82] According to the *MES*, 77.6% of women knew that taking folic acid prior to pregnancy aids in protecting against NTDs, however only 57.7% reported doing so.[10]

Because many pregnancies are unplanned, all women who *could* become pregnant should consider taking a daily multivitamin containing 400 mcg (0.4 mg) of folic acid.[9] At a minimum, women should start taking a supplement 3 months before conception.[59] The preconception period is the ideal time to start taking a multivitamin that contains folic acid, as the neural tube closes during the first 3–4 weeks post-conception, often before a woman knows that she is pregnant.

When an HCP determines that a woman has characteristics or health conditions associated with an elevated risk of having a baby with an NTD, a higher dose of folic acid supplementation may be warranted. The provider would then establish whether the elevated risk is due to low dietary intake of folate or elevated folate requirement, or whether the disease etiology is uncertain because the role of altered folate metabolism is unclear.[56]

HCPs can refer to the SOGC guideline *Pre-conception Folic Acid and Multivitamin Supplementation for the Primary and Secondary Prevention of Neural Tube Defects and Other Folic Acid-Sensitive Congenital Anomalies* for additional guidance on high dose folic acid.[56]

5.5 HEALTHY BODY WEIGHT

Both low and high preconception BMI can negatively affect pregnancy outcomes, and the preconception period is the ideal time to achieve (or progress towards) an optimal weight.[83] Even though less than 6% of Canadian women are underweight (BMI < 18.5 kg/m^2) when they become pregnant, low preconception weight is a concern because it is associated with preterm birth and small-for-gestational-age infants.[84–87] Women with a low BMI may reduce these risks by gaining the recommended amount of weight before pregnancy.[83]

Obesity rates have more than doubled in the past 10 years; 15.6 % of women aged 25 to 34 years are obese (BMI ≥ 30 kg/m^2) and 21.5% are overweight (BMI 25.0–29.9 kg/m^2).[73] According to the *MES*, prior to pregnancy, 20.9% of women were overweight and 13.3% were obese.[10] Obesity rates for off-reserve Indigenous people are 1.6 times the national average.[88] Excessive weight gain in pregnancy can further exacerbate obesity rates if women keep this extra weight postpartum.[86]

Maternal obesity is associated with an increased risk of infertility, spontaneous abortion, congenital anomalies such as NTDs and heart defects, preterm birth, unexplained stillbirth, diabetes, labour dystocia, Caesarean birth, and hypertensive and thromboembolic disease.[89,90] However, a recent study suggests that otherwise healthy multiparous obese women may have a lower intrapartum risk than previously thought.[91] Accumulated evidence suggests that obese women have approximately a two-fold increase in the risk of having a baby with a NTD. Some evidence suggests that obese women benefit from a high dose of folate supplementation (containing B_{12}), at least 3 months before conception and during the first trimester.[92] HCPs can refer to the SOGC guideline *Pre-conception Folic Acid and Multivitamin Supplementation for the Primary and Secondary Prevention of Neural Tube Defects and Other Folic Acid-Sensitive Congenital Anomalies* to determine the most appropriate dose of folic acid for obese women.[56]

Obese women should be made aware that a weight loss of as little as 5% to 10% of their current weight can improve their chances of conceiving.[93] In addition, becoming pregnant when at, or as close as possible to, normal BMI (18.5–24.9 kg/m^2) optimizes obstetrical outcomes and reduces obstetrical risks. Although energy and protein restriction during pregnancy has not shown benefits and may even be harmful, research supports the use of behavioural and cognitive behavioural strategies to enhance weight reduction in non-pregnant adults, particularly when combined with diet and exercise.[94–96] Along with exercise, weight loss also benefits cardiovascular, physical and mental health.[97] HCPs can recommend strategies to achieve (or progress towards) a healthy weight during the preconception period and provide encouragement. Even if no significant weight loss is achieved, eating a healthy diet and being more active will benefit the women's health and future pregnancy.

Perceptions of healthy body weight, of beauty, and of how body size reflects economic status may vary considerably in the different socio-cultural groups in Canada. As such, the strategies that HCPs use to work with women may need to include family members and community groups to help emphasize the link between excess body weight and adverse reproductive health.

5.6 PHYSICAL ACTIVITY

Exercise contributes to overall health, decreasing the risk of chronic conditions including heart disease, stroke, hypertension, certain cancers, type 2 diabetes and osteoporosis. Exercise is also important for weight reduction and weight maintenance, and it has a positive effect on mental health and well-being. The Canadian Physical Activity Guidelines suggest 150 minutes per week of moderate to vigorous physical activity for adults aged 64 and under.[98] Since moderate intensity exercise does not negatively affect fertility or pregnancy, or influence the risk of spontaneous abortion, women can safely continue to be moderately physically active at any stage.

Although frequent strenuous exercise can affect menstrual function, no evidence currently exists to indicate that exercise is a cause of infertility, with the possible exception of oligomenorrhea and anovulation.[99] Nevertheless, women should be made aware that hyperthermic environments (e.g., hot yoga studios) may have teratogenic effects and are particularly associated with risk of NTDs; this potential risk is greatest in the early weeks of pregnancy.[100]

5.7 SUBSTANCE USE

Women may have a variety of reasons for substance use; they may have an active addiction, use substances to cope with trauma or stress, have a concurrent mental health issue, or use substances recreationally or for social reasons.

Women who are considering pregnancy may be more motivated to change lifestyle habits that could adversely affect their fetus.[101,102] HCPs are well-positioned to encourage positive health behaviours and work with women to reduce potentially harmful substance use. A harm-reduction philosophy that provides a humanistic, compassionate and woman-centred approach to care may help many to set realistic goals that can reduce the negative impact of substances while they work towards possible abstinence.

> **Alcohol, a known teratogen, can cause birth defects by affecting the growth and formation of the fetus's body and brain.**

Similarly, men's tobacco, alcohol or street drug use can negatively affect sperm DNA. As sperm is regenerated approximately every 3 months, preconception counselling may also mitigate the negative impact of these factors.[103] Motivational interviewing has shown to be an effective counselling technique to reduce harmful substance use in both men and women.[104]

As such, encouraging partners to support positive lifestyle changes during pregnancy is an important strategy.

Vulnerable populations, including some Indigenous people and individuals coping with a mental health disorder, are at a greater risk of problematic substance use. Vulnerable women and men require specialized care, including collaboration between care providers and culturally safe prevention strategies, when addressing drug and alcohol use and mental health needs.[102,105]

Tobacco

Although smoking rates have declined in recent years, 17.5% of Canadian females aged 12 and over were current smokers in 2011. This rate increases to 23.2% among 20 to 34 year old women, which is the age group with the highest pregnancy rate.[106] Higher smoking rates in pregnancy are found among women who have depression or who live in poverty, with low educational attainment, or with poor social support.[107,108] Rates are also higher among Indigenous women.[109,110]

In 2010, 6.2% of infants in Canada were identified as low birth-weight, defined as weighing less than 2500 g at birth. Cigarette smoking during pregnancy, the single largest modifiable risk factor, accounts for 30% to 40% of cases of low birth-weight.[48,107] Tobacco smoking has also been linked with congenital anomalies of the heart and the musculoskeletal and gastrointestinal systems, as well as with orofacial clefts. It also decreases both male and female fertility, increases risk of spontaneous abortions, prematurity, placental complications and stillbirth, and decreases breastfeeding duration. Sudden infant death syndrome (SIDS) appears to be twice as prevalent in infants whose mothers smoked during pregnancy.[111]

Aside from the health benefits to the woman herself, stopping smoking before pregnancy can eliminate most if not all of the negative impacts of smoking on reproductive health. As there is also evidence of negative perinatal outcomes with second-hand smoke, HCPs will want to encourage women who are considering pregnancy to live in a smoke-free home.[112,113]

The following recommendations targeting women of reproductive age are sourced from the Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-Informed Tobacco Treatment:[114,115]

- Regularly update tobacco use status in the medical records of all women.
- Clearly advise women of the reproductive consequences of smoking, in addition to the other health hazards.
- Provide clear advice on how to quit smoking. Offer both medication and counselling: the best abstinence rates seem to occur when these are combined. Nevertheless, most people make 4 or 5 attempts before they finally quit.
- Offer interventions beyond simple office-based counselling, such as referral to additional community resources for women actively planning a pregnancy.
- Counselling can be delivered in a variety of formats (in person, in groups, or web-based). Practical problem-solving and supportive counselling appear to be the most effective.
- Evidence supports the effectiveness of nicotine replacement therapies (NRT) in smoking cessation, both in non-pregnant and pregnant women. However, as current evidence can neither support nor exclude an increase in congenital defects associated with the use of NRT, these therapies are best undertaken before pregnancy.
- Connection with community members and elders is important in delivering smoking cessation interventions among Indigenous people. The protocol for ceremonial use of tobacco, which differs from tobacco misuse, is different for each area and culture and should be discussed with the individual.
- Although women with a smoking partner have decreased abstinence and increased relapse rates, there are no data to support involvement of the partner in interventions. However, in the interests of health and creating a smoke-free environment for the woman and the fetus, the partner should also be encouraged to quit.

Alcohol

The majority of women in Canada consume alcohol—73% based on 2015 statistics.[116] Canada's Low-Risk Alcohol Drinking Guidelines recommends no more than 2 drinks per day on most days, with no more than 10 drinks per week for non-pregnant women to reduce long term health risks.[117] The *MES* reported that 62.4% of the women surveyed drank alcohol during the 3 months prior to pregnancy or before realizing they were pregnant; 10.5% reported consuming alcohol during pregnancy. In addition, women aged 15 to 24 years—the age group with the highest rate of unintended pregnancy—are the same group with the highest risk of binge drinking.[10]

Alcohol, a known teratogen, can cause birth defects by affecting the growth and formation of the fetus's body and brain. Fetal Alcohol Spectrum Disorder (FASD) is a term that describes a range of lifelong physical and neurodevelopmental disabilities that may affect people whose mothers drank alcohol during pregnancy.[118] It is estimated that FASD affects at least 1% of the Canadian population; however, a recent US study indicates that a more representative rate may be 2.4% to 4.8%.[119,120]

Although the impact of low-level alcohol consumption on fetal outcomes remains under study, the 2010 SOGC guidelines suggest that abstinence is the safest choice for women considering pregnancy, as there is no known safe threshold.[102] Given the uncertainty of the research results, it is important for HCPs to discuss this issue with women who consumed alcohol before knowing they were pregnant.

As previously mentioned, women at higher risk of problematic alcohol use include those who are single, younger, of lower socioeconomic and educational status, and those women who use tobacco or illicit substances. Conversely, pregnant women living above the low-income cutoff (LICO) drink more than women living below the LICO, and alcohol consumption during pregnancy increases with maternal age.[10]

However, regardless of risk factors, every woman of reproductive age should have the frequency and amount of her alcohol consumption assessed.

Simple questions can be effective at starting a conversation about drinking behaviour. Second-level screening can involve the use of structured questionnaires such as the Timeline Followback (TLFB), the CRAFFT, the T-ACE, or the TWEAK, which are recommended for women of reproductive age. It is important that all women are made aware of the risks of alcohol use during pregnancy and the recommendation for abstinence. There is strong evidence that brief interventions, supportive counselling and motivational interviewing can reduce alcohol use or encourage abstinence.[102]

Drug Use

While much is known about tobacco and alcohol use in women and pregnancy, the national data on street or illicit drug use is both sparse and unreliable. In the *MES*, 6.7% of Canadian women reported using street drugs in the 3 months prior to becoming pregnant. This rate dropped to 1.0% once they realized they were pregnant. Rates of use prior to pregnancy were highest among those aged 15 to 19 years (25%) and 20 to 24 years (16.2%), dropping to 3.4% in both age groups during pregnancy.[10]

Drug use poses a substantial risk to maternal and child health and well-being. In addition to complications such as preterm birth, placenta-associated syndrome (mainly placental abruption) and intrauterine growth restriction, concerns for the newborn are significant in the immediate neonatal period and for long-term development, due in part to the impairment of maternal–child attachment.[121,122] Given the correlation between drug use and other negative social determinants of health such as poverty, violence, and poor mental health, the direct impact of drug use remains unclear. These additional factors remain critically important in addressing the care of women who have problematic substance use.

Marijuana, often used recreationally, was the street drug most commonly used in 2010 by Canadian women over the age of 15 years. Women aged 15 to 19 years and 20 to 29 years, at 21.3% and 16.0%, respectively, reported the highest rates of use. Although there is no evidence that marijuana is a teratogen, studies suggest that children exposed to one or more marijuana joints in the first trimester were more likely to experience reduced fetal growth, emotional and behavioural difficulties and other negative outcomes.[123,124]

Although there is little to guide the providers in counselling women who are low-level users of recreational street drugs, avoiding all of these substances as well as alcohol during the preconception period is highly advisable. The SOGC practice guideline, *Substance Use in Pregnancy*, offers guidance on perinatal substance use that may be applicable or adaptable to the preconception period.[125]

As with all women, it is important to encourage those with a history of problematic substance use to formulate a reproductive-life plan, and to discuss contraception choices. It is also important to offer counselling on the impact of problematic substance use on a pregnancy and on a newborn's outcomes as well as the impact of the pregnancy itself on their own lives, including the potential for the involvement of child welfare services. Women with problematic substance use should be encouraged to seek treatment and referred to appropriate services. Woman-centred addiction care integrated with both mental health care and primary health care is known to be the most effective model of care.[126] For the woman who is not yet ready to modify her substance use behaviour, each contact provides an opportunity to engage her in ongoing care that focuses on harm reduction.

5.8 MEDICATIONS

Since it is estimated that almost half of pregnancies are unplanned,[9] discussing the safety profile of the medications of *all* women of reproductive age is extremely important. HCPs will want to advise women of the possible effects on their fetus of medications that are teratogenic. Doing so could launch a conversation about formulating a reproductive-life plan and present an opportunity to either review contraception or modify medications if a pregnancy is planned.

Medication use in pregnancy is very common, with up to 70% of women prescribed a drug at some point during pregnancy and women with chronic conditions very likely taking medications regularly. Different medications have different effects on the fetus at different times during pregnancy. Assessing the exact time of the exposure can be helpful, as the first 2 weeks following conception (i.e., the third and fourth week after the last menstrual period) is considered the *all or none* period. During this pre-embryonic stage, exposure to an agent is either so harmful to the zygote that it doesn't implant or else it recovers completely and the agent has no further effect on the pregnancy.[127] Exposures to some medications in the first trimester can cause concern as this is the most critical time of organ development. Other medications can impact fetal growth in the second and third trimesters.[128]

Not all medications are harmful to the developing fetus. Similarly, not all birth defects are caused by medications. There is a *baseline risk* of malformations in the general population of 1% to 3% of all pregnancies.[128]

Keeping up-to-date with the safety profile of all medications as they relate to pregnancy can be very challenging. HCPs can refer to the MotherToBaby program and Info-Médicaments en Allaitement et Grossesse for information on drugs and medications and their associated maternal and fetal risks.[129,130]

5.9 ORAL HEALTH

Oral health plays an important role in overall health and well-being.[131] In Canada, periodontal disease affects 21% of the adult population and 96% of adults have already experienced tooth decay with a disproportionate burden among vulnerable populations.[132] An increasing number of studies are confirming an association between periodontal disease and long-term chronic illnesses such as type 2 diabetes, cardiovascular disease and congestive obstructive pulmonary disease.[133–137]

Periodontal disease affects up to 40% of pregnant women and studies have shown that maternal oral health has implications for birth outcomes, such as preterm birth, development of preeclampsia, and delivery of a small-for-gestational age infant.[138] Moreover, maternal cariogenic flora that is transmitted to the newborn can increase the infant's risk of caries. Improving a woman's oral health before pregnancy maximizes the potential for a healthy pregnancy outcome.[131]

Regular dental care is a key component to good oral and general health. While dental care may be inaccessible to some Canadians, easy and inexpensive practices such as tooth brushing, flossing, and the use of fluoride products (including community water fluoridation), have been shown to prevent tooth decay and gingivitis/periodontal disease.[139] All women and men should be counselled on proper oral hygiene, and women most of all in order to prevent periodontal disease during pregnancy.

In addition, some recent immigrants to Canada may not have the same standards of oral health and will require more focused counseling on proper oral hygiene.[79]

5.10 IMMUNIZATIONS AND INFECTIOUS DISEASES

Many infectious diseases that have serious adverse effects on maternal and fetal health are preventable through vaccination, making immunization an essential component of preconception care. For example, first trimester maternal infection with rubella can cause congenital rubella syndrome in as many as 85% of infants, which can result in deafness, cardiac defects, and damage to the central nervous system, liver and bones. Varicella infection in pregnancy can cause spontaneous abortion, stillbirth, and congenital anomalies. Maternal varicella infection carries a high risk of severe pneumonia for the mother, and infection from 5 days prior to 2 days after birth can cause severe neonatal varicella in 17% to 31% of infants.[140]

Adult immunization is a critical component of an overall health promotion and disease prevention strategy for women and men. Immunization can also protect those at risk from vaccine-preventable diseases who are too young to be immunized or cannot be vaccinated due to a contraindication.[141] Immunization prior to pregnancy can prevent adverse pregnancy outcomes, prevent infections from being transmitted to the fetus and, because maternal antibodies can be transferred across the placenta, provide protection during early infancy.[142] Routine clinical encounters provide an ideal opportunity for HCPs to assess vaccination status.[141]

Because live vaccines such as MMR and varicella-containing vaccines should not be administered during pregnancy, it is particularly important for women of reproductive age to be up-to-date for these vaccines, in addition to delaying pregnancy for 28 days following immunization with live vaccines.

Infants too young to be immunized are at the greatest risk for serious complications related to pertussis (whooping cough). While all adults should be vaccinated for pertussis, this is especially crucial for those who anticipate having regular contact with an infant. A dose of pertussis-containing vaccine (i.e., Tdap) should be administered at least 2 weeks prior to first contact. Assessment of pertussis vaccination is important for women planning to become pregnant. For those who have not been immunized prior to pregnancy, vaccination with Tdap is considered safe and allows for high levels of antibody to be transferred to newborns during the first 2 months of life when the morbidity and mortality from pertussis infection is the highest. For further details on immunization with Tdap during pregnancy, HCPs can refer to the *Canadian Immunization Guide*.[141]

Annual influenza vaccination is recommended for women who are pregnant or who may become pregnant during the influenza season (October to as late as May) because of their increased risk of morbidity and to provide passive protection to the infant who is too young to be vaccinated.[141]

Individuals born outside of Canada may have different susceptibilities to vaccine-preventable diseases compared with Canadian-born individuals. For example, studies have shown that more than one-third of people who were new immigrants and refugees, particularly women, were susceptible to measles, mumps or rubella and those from tropical countries were more likely to be susceptible to varicella. Providers can address this by assessing and updating the immunizations of those who have recently arrived to Canada, on a priority basis.[143]

The National Advisory Committee on Immunization (NACI) recommends that all adults in Canada without contraindications be routinely immunized against vaccine-preventable diseases. Specific recommendations for infants, children, adults and during pregnancy and breastfeeding can be found in the *Canadian Immunization Guide,* based on guidance from NACI.[141] Although this advisory committee makes recommendations at the national level, specific programs and schedules are determined by provinces and territories. As such, HCPs will want to refer to the immunization schedules of their respective jurisdictions. Additional guidance and resources are available through the SOGC.

5.11 NON-VACCINE-PREVENTABLE INFECTIOUS DISEASES

Non-vaccine-preventable infectious diseases can affect women's fertility and pregnancy outcomes. Some of this impact can be mitigated or prevented through preconception health education, screening, and treatment. As a general recommendation, universal hand washing can reduce the spread of many infectious diseases.[138]

Across the lifespan of their female and male patients, routine visits provide an opportunity for HCPs to screen for elevated STI risk factors. In particular, all women should be evaluated for these prior to pregnancy, with follow-up testing based on the result of the evaluation, in accord with PHAC's *Canadian Guidelines on Sexually Transmitted Infections*.[144] All patients should be encouraged to adopt safe sex practices in order to reduce the risk of transmitting or acquiring STIs and to prevent pregnancies.

> **All patients should be encouraged to adopt safe sex practices in order to reduce the risk of transmitting or acquiring STIs and to prevent pregnancies.**

Both gonorrhea and chlamydia can cause pelvic inflammatory disease that can negatively impact fertility. The incidence of syphilis, which can cause significant maternal and fetal illness, is increasing. Syphilis is often asymptomatic, but the disease can be detected through screening and treated in its early stages.[144] Aside from the impact on the woman's overall health status, HIV can be transmitted from an infected woman to her fetus. Knowledge of a woman's HIV status prior to pregnancy allows for treatment and reduction of viral load, reducing the risk of fetal transmission should a pregnancy occur.

For women and men who are new immigrants and refugees, additional screening may be required based on their risk assessment and their country of origin. See the *Canadian Guidelines on Sexually Transmitted Infections*, Section 6—Special Populations: Immigrants and Refugees for specific information on screening, diagnosis, management and treatment of STIs in this population.[144]

Women planning a pregnancy also require counselling around proper food handling, in order to prevent both toxoplasmosis and listeriosis. Prevention of both diseases involves thorough washing of fruits and vegetables prior to eating, and sanitizing cooking surfaces with either a commercial sanitizer or a diluted solution of bleach (5 ml in 750 ml of water) after contact with unwashed produce, raw meat, or seafood. Toxoplasmosis can also be avoided by cooking meat to a temperature higher than 67 °C (153° F) and wearing gloves while changing cat litter or handling potentially contaminated soil.[138,145] Properly refrigerating food and avoiding raw milk, soft cheeses, and ready-to-eat meats such as hotdogs, pâté, and deli meats can reduce the risk of Listeriosis. This is particularly important once women become pregnant.[146]

5.12 INTIMATE PARTNER VIOLENCE

Beyond the immediate physical and emotional impacts, intimate partner violence can lead to lifelong consequences such as physical and psychological trauma and chronic health issues. Such acts can directly affect reproductive health, with associations to gynecologic issues, pregnancy complications, unintended pregnancy, and sexually transmitted infections.[147]

According to the *MES*, about 11% of women experienced violence within the 2-year period before giving birth; with 31% of these women reporting that the violence had occurred during their pregnancy. Women living in a household at or below the low-income cut-off, younger women, and women with lower levels of education were more likely to experience violence.[10]

There is, however, no evidence to support routine, formal preconception screening for intimate partner violence.[148] Although both health professionals and patients have found several tools, including the Antenatal Psychosocial Health Assessment (ALPHA) and the Antenatal Risk Questionnaire (ANRQ), to be acceptable, these have been assessed only in already pregnant women.[149]

Given the negative impacts on maternal and newborn health, the following are all considered legitimate avenues to help HCPs decipher signs and symptoms that suggest possible exposure to violence:[150]

- Exploring the social and instrumental support (including housing and finances) provided by the partner, family and friends;
- Discussing fear of (or actual) physical, psychological or financial harm by a current or past partner;
- If appropriate, asking questions about safety and providing information on shelters and available services.

As the woman's safety is always of primary concern, it is important to be cautious if family members are present during such discussions.

For women new to Canada, intimate partner violence or violence perpetrated by another family member can pose additional challenges. The women may incorrectly believe that disclosing this information could result in her partner or his family having her deported, or that this disclosure will be shared with her partner or family. Using an interpreter or cultural broker who has a reputation for confidentiality may help to allay these fears. It may also be useful to identify women with the same or similar cultural background and experience, who are willing to serve as a contact for those who are (or may be) currently experiencing violence.

> **About 11% of women experienced violence within the 2-year period before giving birth; with 31% of these women reporting that the violence had occurred during their pregnancy.**

Some refugee women may be trying to make sense of the violence they experienced before arriving in Canada. Resolving the consequences of past violent experiences is important to ensure women's future positive mental health and that of their children. As this process is often lengthy, it is best begun prior to pregnancy. HCPs who have identified a woman as a refugee may wish to focus their inquiries further, offer reassurance, and provide information on available services.

5.13 MENTAL HEALTH AND ILLNESS

There is significant association between maternal depression and anxiety and such poor maternal, fetal and infant outcomes as premature birth, low birth-weight and lower rates of breastfeeding initiation, as well as adverse cognitive, emotional and developmental outcomes in infants and young children.[151,152]

Perinatal mental illness is a major public health issue. According to the *MES*, 15.5% of women were diagnosed with depression or treated with antidepressants prior to pregnancy.[10] Depression affects about 10% of women at some point during their pregnancy, and between 20% and 40% of women with a prior history of depression will suffer a relapse in the postpartum period.[149] Rates of depression are even higher among First Nations women.[153]

While routine screening for depression is not recommended, HCPs can remain alert for signs of mental illness by exploring the following general areas:[154]

- Social and instrumental support (including housing and finances) provided by the partner, family and friends;
- Past or current history of personal or close family psychological problems (e.g., diagnosed mental illness or poor mental health) including bipolar disorder, depression or anxiety or other psychological problems;
- Current or past tobacco, alcohol and substance use pattern.

Evidence *does* support screening women who are new immigrants and refugees for depression if an integrated treatment program is available. However, routine screening for post-traumatic stress is not recommended in this population, as doing so may cause more harm than good.[79]

Antidepressant Therapy

Women who require pharmacotherapy to treat a major depressive disorder and who are contemplating a pregnancy must balance the small risk of fetal or neonatal exposure against the benefits of the treatment. Research results on the safety of antidepressants in pregnancy is still emerging; however, compared to women who continue their antidepressants, those who discontinue their medication at conception appear to have a higher rate of relapse during pregnancy, with a possible correlation in maternal and infant morbidities.[155]

Approximately 7% of Canadian women are prescribed an antidepressant during pregnancy.[156] In some studies, this use has shown to be associated with a very small increased risk of cardiovascular malformation. However, other studies have not confirmed this risk. There is also significant association between antidepressant use during pregnancy and poor neonatal adaptation syndrome and tremors, although there is no increase in neonatal mortality.[152]

Fluoxetine and other selective serotonin reuptake inhibitors (SSRIs) remain first-line antidepressant choices during pregnancy.[157] As with any medication taken by a woman during the preconception period, use of antidepressants should be reviewed, with counseling provided on their implications during pregnancy.

5.14 PHYSICAL EXAMINATION

The majority of preconception care involves taking a careful history and providing specific counselling. There is little evidence to support routine physical examination in healthy women of reproductive age. However, HCPs will want to measure blood pressure, perform cervical cancer screening based on provincial recommendations, and screen for STIs. Women's height and weight would also be measured in order to calculate their BMI.

The need for additional physical examinations would be based on the woman's past and present health history. A conversation about a history of breast surgery or inverted nipples would provide an opportunity to identify any potential breastfeeding concerns and educate on breastfeeding.

6 WOMEN WITH SPECIFIC NEEDS

6.1 ADVANCED MATERNAL AGE/ DELAYED CHILD-BEARING

A growing number of women in Canada are choosing to delay pregnancy until they are well into their 30s. Between 1987 and 2005, the proportion of first births among women who were *late maternal age* (≥ 35 years) increased from 4% to 11%. The reasons are multifactorial, including later marriage, access to contraception, desire for career and financial stability, changes in values and the absence of supportive family policies.[57,158]

Biologically, the optimal time for pregnancy is between the ages of 20 and 35 years. Fertility begins to decline significantly in a woman's early 30s, primarily because a woman has fewer oocytes and these are of lower quality. This decreases the probability of conception and increases spontaneous abortion rates.

In addition to her declining fertility and increased risk of miscarriage, obstetrical and perinatal complications such as preterm birth, low birth-weight, stillbirth, placenta previa, gestational diabetes, preeclampsia, and Caesarean birth increase after age 35.

Chromosomal anomalies, accounting for the majority of spontaneous abortions and congenital malformations, increase with age: the risk of total chromosomal abnormalities is 1 in 385 at age 30 and 1 in 63 at age 40.[159–161]

Due to their reduced fertility, women aged over 35 are more likely to use assisted reproductive technology.[57,162] However, most women and men underestimate the impact of age on fertility and overestimate the ability of assisted human reproduction (AHR) to compensate. Counselling patients about the consequences of delaying childbearing can help those who are considering starting a family at some point in their future to reach an informed reproductive-life plan decision.

6.2 ASSISTED HUMAN REPRODUCTION

Up to 1 in 7 Canadian couples experience infertility.[163] AHR refers to all the activities used to aid human reproduction. In contrast, assisted reproductive technology (ART) is commonly defined as any procedure that involves handling eggs, sperm or both outside of the human body (in vitro). Such interventions are important in assisting family building among Canadians experiencing reduced fertility and for single parents and same-sex couples requiring donated gametes or a gestational carrier.[164] Between 1.7% and 4.0% of live births occur as a result of ART.[162]

Individuals and couples who need help in conceiving may experience significant emotional and financial stress. Such stress can impact the mental health of the parent(s), affecting the relationship between them and with any other children. Families may require added support from their HCP as well as counselling to help them make informed choices around the use of ART.[165]

In addition to the psychological impacts, some medical interventions may involve risks to the potential parent(s). Some fertility drugs for egg stimulation and ovulation are associated with a risk of ovarian hyperstimulation syndrome (OHSS), which can be serious or even fatal in rare cases. Complications such as OHSS, ectopic or heterotopic pregnancy or procedure-related adverse events that may require hospitalization occur in about 2% of AHR cycles.[166] Adverse maternal outcomes include anemia, hypertensive disease, gestational diabetes and operative risks from a Caesarean birth.

Although the majority of children conceived with ART are healthy, couples and individuals considering the use of ART need to be aware of the risks associated with these interventions. Multiple pregnancy is the most significant outcome associated with this technology, with its attendant increased rates of preterm birth, growth restriction, cerebral palsy, congenital anomalies and perinatal mortality.[162] A trend towards transferring fewer embryos has reduced the overall risk of multiple pregnancy associated with ART, but the rates remain significantly higher than in non-ART pregnancies.[167,168]

Women who have singleton pregnancies conceived through ART have increased rates of preterm birth and low birth-weight babies, although this is also influenced by factors such as ART techniques, maternal age and the underlying medical issues including infertility itself.[169] The rate of congenital abnormalities in infants conceived through ART is 30% to 70% higher than the background rate, estimated at 4% of all newborn infants in Canada, regardless of whether the pregnancy is singleton or multiple or whether intracytoplasmic sperm injection (ICSI) was used.[170]

Again, this increase may be attributable to ART or to a number of other factors. Pregnancies conceived after transfer of frozen-thawed embryos may have decreased risks of preterm birth, small-for-gestational age and congenital abnormalities as compared to conceptions after fresh embryo transfer, but risks remain higher than the background rate.[171]

Women who undergo ART experience more breastfeeding challenges, due to delayed lactogenesis or insufficient milk supply.[172] HCPs will want to discuss these implications with patients undergoing fertility treatments, so they are prepared.

Providers can refer to the clinical practice guidelines from the Canadian Fertility and Andrology Society for standard of care with respect to AHR.[173]

6.3 ADOLESCENTS

Pregnancy during adolescence has been associated with an increased risk of adverse perinatal outcomes such as prematurity and intrauterine growth restriction.[174,175] These risks are higher in the younger than in the older adolescent mother. Psychosocial outcomes for both the adolescent mothers and their infants are poorer than those of adult mothers and their infants, although the relative contributions of biological immaturity and socioeconomic factors are under discussion.[176] However, adequate prenatal care and intensive pre- and postnatal psychosocial support can help alleviate these negative effects.[177]

Pregnancy and parenting among adolescent women is common in Indigenous communities. A 2009 study noted that while the fertility rate of Status Indian females aged 15 to 19 years had decreased from 1992/93 to 2006/07, this rate remained more than 4 times higher than that of their counterparts in the overall Canadian population.[178]

Proactive health care of adolescent patients includes having conversations about current sexual activity and plans to become sexually active. Initiation of contraception should precede, not follow, the onset of sexual activity. Adolescents often fall under the radar for preconception counselling, since pregnancy in this population is widely viewed as accidental. However, studies show that a substantial number of pregnancies among adolescents are wanted or at least not actively avoided.[179–181] An examination of adolescent mothers' attitude towards the timing of their pregnancy found that 27.5% of those aged 15 to 19 years wanted to be pregnant either then or sooner.[182] Concern about adults' negative views regarding teenage pregnancy may lead some adolescents to conceal their desire to be pregnant or their ambivalence about avoiding pregnancy.

Ambivalence about childbearing (or possibly concealed intent to become pregnant) may explain why an adolescent declines contraception, uses contraception inconsistently, or presents for repeated pregnancy tests. Openly discussing this possible ambivalence provides an opportunity for the adolescent to reflect on their feelings and beliefs in a safe, neutral environment that acknowledges their agency, respects their competence and equips them with useful information for self-care. Ineffective contraception use should prompt a conversation about preconception preparation. In particular, folate supplementation has no adverse effects and may prevent the birth of an infant with an NTD.

A young woman presenting for pregnancy testing offers a rich, teachable opportunity to hold an open, non-judgmental conversation, including hopes for the outcome, prior to doing the test. For those who clearly prefer not to be pregnant, the HCP can bring up current contraception use and work with the patient to enhance contraceptive effectiveness (including the option of emergency contraception). For adolescents who are clearly hoping to be pregnant, the provider can then follow up on ways to optimize pregnancy outcomes.

6.4 WOMEN WHO HAVE EXPERIENCED FEMALE GENITAL CUTTING

Female genital cutting (FGC), also referred to as female genital mutilation or circumcision, refers to all procedures involving partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reasons. There are 4 types of FGC categorized by the extent of the procedure: [183,184]

- Type 1, called clitoridectomy, usually involves removal of part, or all, of the clitoris and/or the prepuce.
- Type 2, excision, refers to the removal of most, or all, of the clitoris and the labia minora with or without excision of the labia majora.
- Type 3, infibulation, is the most extensive form. It involves not only excision but also the removal of the medial parts of the labia majora and/or labia minora with or without infibulation, and the joining of the 2 sides of the vulva preserving a match-head size opening over the vaginal area allowing for the slow passage of urine and menstrual blood.
- Type 4 is a relatively unspecified category that includes pricking, piercing, incision or stretching of the clitoris and or labia; cauterization by burning of the clitoris and surrounding tissues; scraping or cutting the vagina; and introduction of corrosive substances or herbs into the vagina to cause bleeding or to cause tightening or narrowing.

FGC is practised in 29 African countries, the Middle East, parts of Arabia, Yemen, Oman, the United Arab Emirates and a few Asian countries such as Indonesia, Malaysia and India. Women who have had FGC are increasingly seen in Europe, Canada, Australia and the USA as a result of immigration. Infibulation occurs in about 10% to 15% of implicated women with excision accounting for approximately 80%.[183,184]

Health consequences of the practice include difficulties with menstrual flow, intercourse and sexual responsivity, and with using contraception. Sexual dysfunction—including increased pain during intercourse and reduced sexual desire—often occurs, particularly with the most severe form of infibulation. Any contraceptives that involve vaginal insertions may not be acceptable or feasible. Procedures involving penetration of the vaginal canal may be difficult, if not impossible, and may cause excessive pain.

> **Care should be approached in a manner that allays the woman's fears and builds trust during the preconception period, making her more open to accepting advice on the importance of first trimester prenatal care.**

HCPs tend to lack education about this procedure, its health consequences and its cultural implications. As such, it is difficult for them to provide appropriate care before and during pregnancy and birth. Women with FGC fear censure from caregivers and may avoid maternity care.[184] Providers who make the effort to educate themselves about FGC are in a much better position to provide respectful support. Care should be approached in a manner that allays the woman's fears and builds trust during the preconception period, making her more open to accepting advice on the importance of first trimester prenatal care.

During perineal examinations of women with FGC, extra care is required in two equally important areas:

- Increased physical sensitivity of the perineal area;
- Avoiding any hurtful or insensitive comments during the examination.

Canadian research revealed that 88% of maternity caregivers have expressed some kind of hurtful comments.[184] A sensitive and non-judgmental exploration of the existence, type and experience of FGC is important before a woman receives a vaginal/gynecological examination. A variety of small narrow specula should be available, and the need for any testing explained and performed in a careful and respectful manner. The SOGC *Clinical Practice Guideline on Female Genital Cutting* offers additional recommendations on the care of women who have experienced FGC.[183]

During vaginal birth, the infibulation must be opened (defibulation) to allow for passage of the baby. It is far better to undertake this procedure, with appropriate anesthesia, before conception or during pregnancy at the latest. If performed only at birth, the risk of haemorrhage increases significantly, since the clitoral area is vascular. By discussing the need for defibulation and the illegality in Canada of FGC and infibulating again with the woman before conception—preferably with her partner present—the HCP may help deter the couple from seeking traditional providers to infibulate again after a birth.[183,184]

6.5 LGBTQ POPULATIONS

FCMNC is based on a mutually respectful and trusting relationship, and individual need. While important progress has been made in providing equitable health care to the LGBTQ[ii] community, these populations often still face barriers to accessing health care that is culturally safe and that meets their needs. For example, lesbians and bisexual women may:

- Have concerns about confidentiality;
- Encounter providers who do not understand their health needs/risks;
- Continue to face discriminatory attitudes and treatment.

Within the LGBTQ community, transgender individuals face particular challenges in accessing individualized and culturally safe health care, due to a lack of knowledge about their specific needs coupled with frequent discrimination and/or lack of sensitivity.

The World Professional Association for Transgender Health recommends that health care for transgendered people be situated within the primary health care system, including hormone therapy and assessment for surgery, if the primary HCP has received proper training. The need for effective communication and coordination between HCPs is intensified when providing family-centred care for transgendered people.[186] Providers who are not comfortable with treating this population risk alienating them and generating reluctance to seek/access care. When caring for transgender individuals, providers should inquire about preferences for name and pronouns (she/he/neutral alternative) and use gender-inclusive language.

[ii] The acronym *LGBTQ* is a phrase commonly used to include people who identify their sexual orientation as lesbian, gay, bisexual, queer or questioning, and/or who identify their gender identity as transgender. These guidelines recognize that sexual orientation and gender identity exist along a continuum that may change over time, and that the LGBTQ community is diverse, as are all Canadian communities.[185]

It is important to note that transgendered people have all the same care needs as others, such as preventative healthcare, and treatment for acute and chronic illnesses. Care should be provided that is congruent with the person's anatomy, but also respectful of their gender identity. Optimal care requires not only cultural competency, but also clinical competency in caring for the sex-specific needs of this population. Transgendered people may also seek trans-specific care, such as access to hormone replacement therapy and gender confirmation surgery.

All LGTBQ individuals should be encouraged to develop an appropriate and inclusive reproductive-life plan. Those who want children will likely rely on their HCP for information and options on becoming a parent safely and efficiently.[187] Research suggests that some LGTBQ people may be at higher risk of certain reproductive health concerns, such as increased rates of polycystic ovary syndrome in those with ovaries and a uterus. One should never presuppose a patient's family plan or history of pregnancy, based solely on sexual orientation or gender identity. Discussions regarding options for conception and pregnancy are valid for everyone.

LGTBQ people may have difficulty accessing fertility services. Both the American College of Obstetricians and Gynecologists and the SOGC affirm the responsibility to offer quality care to all—regardless of sexual orientation or gender identity—and that, in the case of the SOGC, "No medical service should be restricted to an individual because of sexual orientation (artificial insemination with tested anonymous donor sperm or any other profertility technology)."[188,189,190,p3] HCPs can refer to the Canadian Fertility and Andrology Society clinical practice guidelines, which offer guidance on fertility care.

Approaches that can be readily integrated into routine care and office/program policies and procedures in order to help create a welcoming, non-judgemental environment, include:

- Posting a nondiscrimination policy—communicating an environment of respect;
- Framing questions so that they do not make assumptions about gender identity, sexual orientation or behaviour;
- Using inclusive language—taking direction from patients.

Education is the first step towards improving care for the LGTBQ community, and training is available to help increase the knowledge and sensitivity of HPCs in this area.

7 WOMEN WITH CHRONIC DISEASES

About 27% of pregnancies are affected by a chronic illness. The most common conditions are asthma, hypertension, diabetes, epilepsy and mental health disorders.[191] Canadian data is sparse—one study provides an estimate of the incidence of major pre-existing chronic diseases among pregnant women as 3.67 per 1000 births.[192] Recommended general principles include:

- Provide care and support according to the individual needs of the woman and her family. In order to make informed choices, women and families require knowledge about their condition and care, as well as the options, risks and benefits of treatment approaches;
- Ensure the medical condition is stable and under control prior to conception;
- Ensure the medications used to treat the condition have been evaluated for safety in pregnancy and dosages adjusted accordingly;
- Consider referring patients to specialists with expertise in managing medical disorders in pregnancy.

> **About 27% of pregnancies are affected by a chronic illness. The most common conditions are asthma, hypertension, diabetes, epilepsy and mental health disorders.**

7.1 HYPERTENSION

Approximately 6% of pregnancies—roughly equal numbers of cases of preconception chronic hypertension and gestational hypertension/preeclampsia—are complicated by hypertensive disorders.[193] Women with chronic hypertension require encouragement in order to modify their lifestyles—dietary improvements, exercise, and maintaining or progressing towards a healthy body weight—in addition to using medication to optimize their blood pressure and to improve their general health before they conceive.

The preconception period is also a good time to rule out underlying secondary causes of hypertension and to assess for end-organ effects of hypertension with an ECG, electrolytes, creatinine and urinalysis. If the ECG is abnormal, proceed with an echocardiogram. Assess baseline urinary protein excretion with a microalbumin/creatinine ratio or urinary dipstick. If the results are abnormal, proceed with 24-hour urine collection for confirmation, plus consider referring the woman to a specialist to rule out co-existing renal disease.[194] Women with co-existing cardiac or renal disease may require additional evaluation of the maternal and fetal risks of a pregnancy.[192]

Antihypertensive medications should be evaluated with respect to risks and benefits for the mother and fetus.[128] HCPs can refer to the SOGC guideline *Diagnosis, Evaluation, and Management of the Hypertensive Disorders of Pregnancy* for specific advice on medication.[195]

7.2 DIABETES

Rates of type 1, type 2, and gestational diabetes are all increasing in Canada.[196] The age-standardized prevalence of diagnosed diabetes among Canadians aged 1 year and older increased by 70%, from 3.3% in 1998/99 to 5.6% in 2008/09.[197] Unrecognized or uncontrolled diabetes is associated with higher rates of both early and late pregnancy complications (including recurrent miscarriage; birth and particularly cardiac defects; either growth restriction or large-for-gestational-age; obstructed labour; stillbirth; and neonatal hypoglycemia). Hyperglycemia at the time of conception is associated with a 6% to 10% risk of major malformations, with the risk increasing as the level of hyperglycemia rises. For instance, women with HbA1c greater than 10% have an overall risk of 22% of congenital malformations, particularly neurological and complex congenital heart disease.[198] Improving glycemic control prior to conception improves outcomes.[199] The Canadian Task Force on Preventive Health Care recommends diabetes screening of those who are at high risk (≥ 33% 10-year risk, based on the FINDRISC calculator) with a HbA1c. Screening is also recommended for women and men who are immigrants and refugees from South Asia, Latin America, and Africa who are older than 35 years.[200]

“ Unrecognized or uncontrolled diabetes is associated with higher rates of both early and late pregnancy complications (including recurrent miscarriage; birth and particularly cardiac defects; either growth restriction or large-for-gestational-age; obstructed labour; stillbirth; and neonatal hypoglycemia).

Women with pregestational diabetes require evaluation for complications. Specifically, proliferative retinopathy may worsen as a result of pregnancy, particularly if diabetes and hypertension are not controlled (note that pregnancy does not affect mild–moderate stable retinopathy).[201] Women with chronic renal failure are at increased risk of developing preeclampsia and may suffer irreversible deterioration in kidney function as a result of pregnancy.[202] Hypertension, common in women with diabetes, also requires control and referrals to specialists are encouraged.[203] Care delivered by an interprofessional team of diabetes educators, dieticians, obstetricians and endocrinologists/internists will produce the best outcomes for both mother and baby.

Traditionally, diabetes in pregnancy was managed with insulin to achieve as normal an HbA1c as possible without inducing hypoglycemia. Recent research has demonstrated that some oral hypoglycemic agents may be safe during pregnancy, potentially negating the need to switch to insulin if a pregnancy is planned.[204] Both the American College of Obstetrics and Gynecology and the UK National Institute of Health and Care Excellence recommend metformin or glibenclamide during pregnancy.[205,206] Women with pregestational diabetes planning a pregnancy need to review their medications with an HCP.

In addition, because of their higher risk of NTDs, these women are advised to take a higher dose of folic acid for 3 months prior to conception.[207] For women with type 1 or type 2 diabetes, the SOGC guideline *Preconception Folic Acid and Multivitamin Supplementation for the Primary and Secondary Prevention of Neural Tube Defects and other Folic Acid-sensitive Congenital Anomalies* recommends a diet of folate rich-foods and a daily multivitamin containing 1 mg/day folic acid 3 months prior to pregnancy and through the first trimester, then a multivitamin containing 0.4 mg/day folic acid for the remainder of pregnancy and continued for 4–6 weeks postpartum or as long as breastfeeding continues.[56]

7.3 THYROID DISORDERS

Thyroid disorders are estimated to occur in about 10% of the Canadian population, with a large number going undiagnosed.[208] Hypothyroidism is common in pregnancy, occurring in about 3% of pregnant women, while hyperthyroidism occurs in less than 1% of pregnant women.[209] Untreated thyroid disorders are associated with several maternal and fetal complications, including an increased risk of infertility, miscarriage, preterm birth, pre-eclampsia, and developmental delays.

Thyroid requirements increase significantly in pregnancy, with most of the change occurring in the first trimester and as early as 4 to 6 weeks gestation.[210] This is important information for women with thyroid disorders to receive before they conceive, in order to prepare them for the additional medical management and testing that will be required, and encourage them to access prenatal care early on.[211] HCPs will want to work with these women to ensure their thyroid disorder is well controlled and to review their mode of therapy, prior to conception to improve outcomes.

7.4 SEIZURE DISORDERS

Up to 1% of pregnant women have seizure disorders.[212] Controlling these is very important for the well-being of the mother and fetus. However, many anticonvulsant medications are associated with possible congenital malformations. This risk increases with multiple medications.[213]

The preconception period is important for evaluating whether medications can or should be modified. Medications with a higher risk of organogenesis and cognitive development include valproic acid and phenytoin. If possible, a switch to carbamazepine, lamotrigine or levetiracetam is recommended prior to pregnancy, taking into consideration the time required for the taper and overlap of medications.[214]

As anti-convulsant agents are associated with increased risk of NTDs, the SOGC guideline *Preconception Folic Acid and Multivitamin Supplementation for the Primary and Secondary Prevention of Neural Tube Defects and other Folic Acid-sensitive Congenital Anomalies* recommends a daily multivitamin containing 1 mg/day folic acid 3 months prior to pregnancy and through the first trimester, then a multivitamin containing 0.4 mg/day folic acid for the remainder of pregnancy and continued for 4–6 weeks postpartum or as long as breastfeeding continues.[56]

7.5 ASTHMA

Women with asthma that is sub-optimally treated have higher rates of pregnancy complications, including preeclampsia, and low birth-weight infants.[215] The treatment of asthma does not generally change, as inhaled bronchodilators and inhaled steroids are considered safe in pregnancy and during the preconception period.[216] The management of acute exacerbations is identical to the general population, with systemic steroids and hospital admission as indicated.

7.6 HIV

In 2014, there were 494 new cases of HIV in Canadian women and 233 cases of perinatally exposed infants by maternal exposure.[217] Most women with HIV will already be taking highly active antiviral therapy (HAART) prior to conception. As antiviral therapy reduces the perinatal transmission rates to less than 2%, women who are HAART-naïve will likely choose to start active antiviral therapy during pregnancy to reduce the risk of transmitting HIV to their child.[218] Most medications are safe, with the possible exception of efavirenz, which may be associated with neurological effects.[219] As some antiretroviral therapies may lower the effectiveness of hormonal contraception, HCPs will want to reinforce the need for barrier contraception to not only stop the transmission of HIV but also to prevent pregnancy. [220]

All HIV-positive individuals, or those with an HIV-positive partner, should be offered counselling (including contraception and reproductive planning) that focuses on their specific health needs. Depending on their reproductive plan, this would include counselling on pregnancy prevention or attaining a healthy pregnancy. HCPs can refer to the *Canadian Guidelines on Sexually Transmitted Infections* and the SOGC *Canadian HIV Pregnancy Planning Guidelines* for recommendations on counselling people with HIV on sexual health considerations.[144,221]

7.7 CHRONIC HEPATITIS B VIRUS

Chronic or acute hepatitis B virus (HBV) infection affects approximately 1% of Canadians.[222] The prevalence is not uniform across the country as the rates are higher among those who are immigrants and Inuit populations.[223,224] Although it is recommended that all pregnant women be offered screening, providers should consider testing higher-risk women *prior* to pregnancy. Women with a positive hepatitis B surface antigen (HBsAg) that persists for at least 6 months after the initial test have chronic HBV infection. Further testing is required at that point to help guide management decisions, including the need for treatment. HCPs can refer to PHAC's *Primary Care Management of Hepatitis B—Quick Reference* (HBV QR) for further information on testing and management of HBV.[225]

Preconception is the ideal time to establish a diagnosis of chronic hepatitis, as family planning may have implications for the choice of therapy.[226] For example, women are advised to defer pregnancy if taking interferon, as its safety has not been established in pregnancy. In contrast, oral antivirals such as tenofovir, telbivudine or lamivudine offer a good safety profile for fetal development, lower risk of developing viral resistance, and efficacy in reducing viral load.[227] Women with cirrhosis face a higher risk, during pregnancy, of such complications as esophageal varices and splenomegaly with thrombocytopenia. Additional counselling is required for these patients.[228]

> **Although it is recommended that all pregnant women be offered screening, providers should consider testing higher-risk women *prior* to pregnancy.**

CONCLUSION

This chapter supports the many ways in which the initial health of parents, prior to pregnancy, is vital to the subsequent health of the baby. As such, promoting the overall health and wellness of women, men, and families before pregnancy forms an important component of FCMNC.

Preparing for a healthy pregnancy is not the sole responsibility of either the mother-to-be or the partner/family unit. Individual life patterns, social support networks, and social determinants of health are all important factors in conceiving, giving birth to, and raising healthy children. Because Canadian women and families are so diverse in nature, it will be programs, clinical care, and supports based on individual characteristics, experiences, and needs that prove to be truly successful. Effective preconception care is delivered through a wide range of clinical and community settings and cuts across many sectors, including health, education and social.

HCPs are ideally positioned to offer preconception care and to serve as advocates for the creation of healthy, supportive communities for women and men throughout the childbearing phase of their lives. Providers involved in preconception care enter into a collaborative partnership that enables women and men to examine their own health and its influence on the health of their baby. The HCP's role is to communicate clear, accurate, and timely information; screen for, and act upon, any potential impediments to a successful outcome; support the decision-making process; and offer and refer patients to relevant services when appropriate. The information provided and techniques used to encourage effective discussion and communication will allow women and men to make an informed decision about having a baby. All choices, of course, ultimately rest with them.

APPENDIX A—ADDITIONAL RESOURCES

CLINICAL PRACTICE GUIDELINES RELATING TO PRECONCEPTION CARE

Canadian Fertility and Andrology Society
https://cfas.ca/clinical-practice-guidelines

Canadian Paediatric Society
www.cps.ca/en/documents/authors-auteurs/adolescent-health-committee

Perinatal Services BC—Maternity Care Pathway
www.perinatalservicesbc.ca/Documents/Guidelines-Standards/MaternalMaternityCarePathway.pdf

Society of Obstetricians and Gynaecologists
http://sogc.org/clinical-practice-guidelines.html

ADOLESCENT HEALTH

Best Start—My Life My Plan
www.beststart.org/resources/preconception/MLMP_14MY01_Final.pdf

Society of Obstetricians and Gynaecologists of Canada—Sexuality and U
www.sexualityandu.ca

ALCOHOL

Portico—Primary Care Addiction Toolkit: Dealing with alcohol problems
www.porticonetwork.ca/web/alcohol-toolkit

ENVIRONMENTAL HEALTH

Best Start—Environmental Health Resources
www.beststart.org/resources/env_action/index.html

Health Canada—Our Health, Our Environment: A Snapshot of Environmental Health in Canada
http://publications.gc.ca/collections/collection_2013/sc-hc/H129-18-2012-eng.pdf

HEALTHY WEIGHT/NUTRITION/PHYSICAL ACTIVITY

Best Start—Obesity in Preconception and Pregnancy: Report
www.beststart.org/cgi-bin/commerce.cgi?preadd=action&key=F07-E

Canadian Society for Exercise Physiology—Guidelines
www.csep.ca/en/guidelines/guidelines-for-other-age-groups

Health Canada—Canada's Food Guide: Educators and Communicators
www.canada.ca/en/health-canada/services/food-nutrition/canada-food-guide/educators-communicators.html

Health Canada—Canadian Nutrient File
https://food-nutrition.canada.ca/cnf-fce/index-eng.jsp

INDIGENOUS HEALTH

Anishnawbe Health Toronto—Aboriginal Cultural Safety Initiative
www.aht.ca/aboriginal-culture-safety

Best Start—Open Hearts Open Minds
www.beststart.org/resources/howto/pdf/OHOM.pdf

Best Start—Supporting the Sacred Journey: From Preconception to Parenting for First Nations Families in Ontario
www.beststart.org/resources/rep_health/pdf/SupportingtheSacredJourney.pdf

Provincial Health Services Authority of British Columbia—Indigenous Cultural Safety Training
www.culturalcompetency.ca

Society of Obstetricians and Gynaecologists of Canada—Aboriginal Sexual Health
www.aboriginalsexualhealth.ca

LGBTQ

Best Start—Welcoming and Celebrating Sexual Orientation and Gender Diversity in Families, From Preconception to Preschool
www.beststart.org/resources/howto/pdf/LGBTQ_Resource_fnl_online.pdf

College of Family Physicians of Canada—Gay and Lesbian Health
www.cfpc.ca/ProjectAssets/Templates/Resource.aspx?id=1615&langType=4105

Gay and Lesbian Medical Association—Guidelines for Care of Lesbian, Gay, Bisexual and Transgender Patients
https://npin.cdc.gov/publication/guidelines-care-lesbian-gay-bisexual-and-transgender-patients

Health Canada—Technical Requirements for Therapeutic Donor Insemination
www.canada.ca/en/health-canada/services/drugs-health-products/biologics-radiopharmaceuticals-genetic-therapies/applications-submissions/guidance-documents/semen-special-access-program/technical-requirements-therapeutic-donor-insemination.html

LGBTQ Parenting Network—A Guidebook for Lesbian, Gay, Bisexual, Trans and Queer People on Assisted Human Reproduction in Canada
http://lgbtqpn.ca/wp-content/uploads/woocommerce_uploads/2014/08/AHRC_BOOKLET_ENGLISH.pdf

LGBTQ Parenting Network—Meeting the Assisted Human Reproduction (AHR) Needs of Lesbian, Gay, Bisexual, Trans and Queer (LGBTQ) People in Canada: A Fact Sheet for AHR Service Providers
https://cfas.ca/wp-content/uploads/2014/12/factsheet_lgbtq_english.pdf

The Joint Commission—Advancing Effective Communication, Cultural Competence, and Patient- and Family-Centered Care for the Lesbian, Gay, Bisexual, and Transgender (LGBT) Community: A Field Guide
www.jointcommission.org/lgbt

MEDICATIONS

Centers for Disease Control and Prevention—Treating for Two
www.cdc.gov/pregnancy/meds/treatingfortwo

Health Canada—Drug Product Database
www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/drug-product-database.html

Merck Manual—Professional Version
www.merckmanuals.com/professional

ORAL HEALTH

Canadian Dental Association—Oral Health: Good for Life
www.cda-adc.ca/en/oral_health/cfyt/good_for_life/

REPRODUCTIVE HEALTH/FAMILY PLANNING

BC Centre of Excellence for Women's Health—Publications
http://bccewh.bc.ca/publicationsresources/publications/

Best Start—Preconception Health Resources
www.beststart.org/cgi-bin/commercegi?search=action&category=F00E&advanced=yes&sortkey=sku&sortorder=descending

Centers for Disease Control and Prevention—Preconception Health and Healthcare
www.cdc.gov/preconception/hcp/index.html

Centers for Disease Control and Prevention—Reproductive Life Plan Tool for Health Professionals
www.cdc.gov/preconception/rlptool.html

Centre for Effective Practice—Preconception Health Care Tool
https://thewellhealth.ca/preconception

Society of Obstetricians and Gynaecologists of Canada—Sexuality and U
www.sexualityandu.ca

SUBSTANCE USE

Portico—Primary Care Addiction Toolkit: Opioids misuse and addiction
www.porticonetwork.ca/web/opioid-toolkit

TOBACCO

Best Start—Tobacco Misuse Resources
www.beststart.org/cgi-bin/commerce gi?search=action&category=N00E&advanced=yes&sortkey=sku&sortorder=descending

CAN-ADAPTT: Guidelines and Resources
www.nicotinedependenceclinic.com/English/CANADAPTT/Pages/Home.aspx

Canadian Public Health Association—Stop Smoking
https://www.cpha.ca/stop-smoking-smoking-cessation-resource-those-who-work-women

Portico—Primary Care Addiction Toolkit: Smoking cessation
www.porticonetwork.ca/web/smoking-toolkit

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