

## Prevention in Focus

Spotlight on programming and research



### Pregnancy and infant feeding: Can we say U=U about the risk of passing HIV to an infant?

By [Camille Arkell](#)

Improvements in HIV treatment and prenatal HIV care have led to dramatic reductions in the transmission of HIV from a person with HIV to their baby (perinatal transmission). This has resulted in more people with HIV in Canada having children. The U=U (undetectable = untransmittable) campaign has contributed to increasing awareness that people who take HIV treatment and maintain an undetectable viral load are not at risk of passing HIV to their sex partners. As a result, some people are questioning whether this is also the case for perinatal transmission. Can an undetectable viral load eliminate the risk of passing HIV to an infant? This article will examine what we know about the risk of passing HIV through pregnancy, childbirth and infant feeding.

#### How often are infants born with HIV in Canada?

In Canada, as well as globally, we have seen dramatic decreases in the number of babies born with HIV, despite a growing number of babies born to women with HIV. Prior to the introduction of HIV treatment during pregnancy in 1994, the proportion of at-risk infants born with HIV in Canada was over 25%.<sup>1</sup> This has dropped to 0.4% (one of 263 infants) in 2016.<sup>2</sup> The only pregnancy that resulted in an infant with HIV in 2016 was from a woman with HIV who was not receiving any HIV treatment during pregnancy.

#### What is the risk of transmission during pregnancy and delivery?

HIV transmission from a woman or trans person with HIV to their baby can take place during pregnancy, childbirth and after birth through infant feeding. For this reason, preventing perinatal transmission is more complicated than sexual transmission and requires multiple interventions directed at pregnant people and their infants.

Without treatment, between 15% and 30% of infants born to HIV-positive people acquire HIV during pregnancy or delivery.<sup>3</sup> However, research shows that taking HIV treatment is the most effective way to reduce transmission to the baby.<sup>4,5,6,7,8,9,10</sup> This is because successful HIV treatment lowers the viral load (a measure of the amount of HIV in the body) to undetectable levels. Having an undetectable viral load is good for the health of the pregnant person and it also reduces the risk of passing HIV to an infant. In fact, if a pregnant person is engaged in care, on HIV treatment and maintains an undetectable viral load throughout their entire pregnancy, studies have shown that the chance of passing HIV to their newborn is zero.<sup>2</sup> In these studies, the newborn child also received a short course of HIV medication to help prevent transmission.

One of the major studies that showed the impact of treatment on preventing HIV transmission to a newborn was a French cohort study conducted between 2000 and 2011.<sup>7</sup> This study found that no transmissions occurred among 2,651 infants born to women who were on treatment before they conceived and throughout their pregnancy, and who had an undetectable viral load at delivery.<sup>7</sup> However, if treatment is not taken for the entire duration of pregnancy or if an undetectable viral load is not maintained, there is a risk of HIV transmission to the infant during pregnancy and/or delivery.<sup>7</sup>

HIV testing for pregnant people is important for finding those who are at risk of passing HIV to their infant. People who are diagnosed with HIV during pregnancy, or who are not adherent to treatment throughout pregnancy may have a higher risk of transmission to their infant, especially if they have a high viral load.<sup>8,11,12</sup> When the risk of transmission may be higher due to an elevated viral load, a Caesarean delivery may be recommended to help prevent HIV transmission during childbirth since this is when the majority of perinatal transmissions occur if the viral load is detectable.<sup>13</sup>

Life-long HIV treatment is now recommended for all people diagnosed with HIV,<sup>14</sup> and people with HIV who wish to become pregnant should consult with an HIV specialist as soon as possible, preferably before conception, to determine a suitable treatment regimen.<sup>13</sup>

#### What is the risk of transmission through infant feeding?

There are two possible routes of HIV transmission to an infant after birth – through breastfeeding (sometimes called chestfeeding for trans people), and through feeding an infant food that has been pre-chewed by a parent or caregiver who has HIV (this is also called pre-mastication).

##### Breastfeeding

A systematic review of HIV transmission in breastfed infants of women on treatment found that the risk of transmission after birth was 1% after six months of breastfeeding, rising to almost 3% after one year.<sup>15</sup> However, within these studies, the women were on treatment for varying amounts of time and did not continue treatment beyond six months after giving birth. The systematic review did not account for adherence nor viral load, which means we don't know how many of the women had a detectable viral load at the time of transmission, despite taking HIV treatment.

There is very limited research on people on treatment who are breastfeeding that includes data on their viral loads. While an undetectable viral load does provide significant protection from HIV transmission, there have been cases of HIV transmission among breastfeeding women who had undetectable viral loads.<sup>16,17</sup>

A recent study from Tanzania reported no transmissions from breastfeeding women who had an undetectable viral load.<sup>18</sup> In this study there were two HIV transmissions among 177 infants who were breastfed by women who started treatment before the infant was born, but in both cases the women had detectable viral loads.<sup>18</sup>

Some people breastfeed while also supplementing their infant's diet with formula or other foods and liquids (known as mixed feeding). When done within the first six months of life there is a potential increased risk of HIV transmission to the infant compared to breastfeeding alone. Experts believe that this type of feeding can irritate and cause damage to the infant's developing gut, allowing HIV to be passed more easily.<sup>19</sup> However, in the context of being on treatment and having an undetectable viral load, mixed feeding is unlikely to increase the risk of HIV transmission.<sup>20</sup>

##### Pre-chewing food

Feeding an infant food that has been pre-chewed has been reported as a possible route of HIV transmission in three cases from the U.S.<sup>21</sup> In all three suspected cases, young children acquired HIV after being born HIV negative, and none were breastfed. All three were fed food that had been pre-chewed by a parent or caregiver with HIV, whose HIV treatment status and viral loads were not reported. In two cases oral bleeding was reportedly present, which may have increased the risk of transmission.

We don't know how often parents in Canada pre-chew their infant's food but a study in the U.S. found that 31% of primary caregivers at nine pediatric clinics cared for children who received pre-chewed food.<sup>22</sup> Of the 48 caregivers who reported pre-chewing food in this report, 79% were biological mothers with HIV.

To eliminate the risk of postnatal HIV transmission, parents with HIV in Canada are currently advised not to breastfeed (but rather to use formula exclusively) and not to feed their infants pre-chewed food. There are many programs across Canada that provide free formula for babies of people with HIV.

#### But isn't breastfeeding good for babies?

Breast milk is good for infants because it provides nutrition and hydration, helps the baby's immune system develop and helps fight off viruses and bacteria.<sup>23</sup> In fact, the natural protection provided by breast milk is part of the reason why the majority of infants who are exposed to HIV through breastfeeding do not get HIV.<sup>23</sup> However, formula is a feeding option that also provides the nutrition babies need to grow up healthy and strong.

The messaging around breastfeeding for people with HIV can be confusing. For people who do not have HIV, Health Canada recommends that newborn infants be breastfed exclusively for six months, continuing up to 24 months or more, with appropriate complementary feeding.<sup>24</sup> This is similar to the World Health Organization (WHO) guideline on infant feeding and HIV, which recommends that women with HIV should breastfeed exclusively for the first six months, continuing for at least 12 months, while on treatment and receiving adherence support.<sup>25</sup>

However, the WHO guideline is intended for low-income countries where undernutrition and diarrheal diseases are common causes of infant mortality, and clean water to prepare formula is not always available. In these settings, feeding a baby formula may put them at increased risk of undernutrition, illness or death. In Canada and the U.S., where undernutrition and diarrheal diseases are not common, breastfeeding is not currently recommended for people with HIV because of the unknown risk of HIV transmission to the infant; while it is a low risk, it is likely not negligible.

#### How does HIV get transmitted through breastfeeding?

The biology of how HIV transmission happens through breastfeeding is not perfectly understood. Transmission of HIV through breastfeeding is thought to occur when the mucosal membranes that line the back of the throat and the gut of an infant are exposed to breast milk that contains HIV.<sup>23</sup> HIV can enter

the infant's body through the throat or the gut, where it can replicate and spread throughout the body to cause a permanent infection.<sup>23,25</sup> Newborn babies are particularly vulnerable to HIV and other infections because their immune systems and their bodies, particularly their gut, are underdeveloped.<sup>23</sup> Breast milk can contain high levels of HIV. This is because breast milk contains a very large number of immune cells, much more than other fluids (such as semen or blood) that can also transmit HIV.<sup>26</sup> HIV infects immune cells, to make copies of itself from within these cells.

A viral load test can measure HIV copies in the blood or breast milk; however, HIV that lives in the infected immune cells is not detected by routine viral load tests. This means it can remain dormant, hiding in the immune cells, even when the viral load is undetectable.<sup>23</sup> When HIV is hiding in the cells, it also can't be killed by HIV treatment.<sup>26</sup>

If the immune cells that contain HIV are called upon to fight an infection in the breast, or in the gut of an infant, the cells can start producing large amounts of HIV. This is why HIV can be found in breast milk even when the viral load is undetectable in the blood.<sup>26</sup>

Certain factors are associated with an increased risk of HIV transmission through breastfeeding. These factors include: a higher viral load; a low CD4 count; inflammation in the breast (caused by mastitis, breast abscess, or engorgement); longer duration of breastfeeding; and mixed feeding.<sup>23,27</sup>

The most important factor in reducing the risk of transmission through breast milk is high adherence to HIV treatment that leads to a sustained undetectable viral load.<sup>28</sup> Evidence shows that treatment has a dramatic impact on lowering the risk of transmission through breastfeeding, and that a lower viral load is associated with a lower risk of passing HIV through breastfeeding.<sup>11</sup>

### Challenges with recommendations to avoid breastfeeding

Since breastfeeding introduces a risk of HIV transmission that can be avoided, Canada and other high-income countries currently recommend exclusive formula feeding from birth up to one year of age. Although parents with HIV want to eliminate the risk of passing HIV to their child, formula feeding may be difficult to implement or to accept for some.

While most families in Canada have reliable access to clean water with which to prepare formula, formula is expensive and exclusive formula feeding may be unaffordable to many families. Only five Canadian provinces (Alberta, British Columbia, Manitoba, Ontario and Saskatchewan) have provincially funded formula programs for the first year of life for infants of people with HIV,<sup>29</sup> however, there are many free formula programs available across the country.

Breastfeeding, on the other hand, is free and is associated with many positive health outcomes. It is also a social or cultural norm in many communities. As such, not breastfeeding may "out" someone as HIV positive and, in communities where HIV stigma is high, the fear of having one's status known may impact their decision-making regarding infant feeding.<sup>30,31</sup> For this reason, parents may need additional counselling to help explain to others why they are bottle feeding without disclosing their HIV status.

Despite recommendations not to breastfeed, some may choose to do so because they feel it is the best decision for them and their family. Some of these people may choose to breastfeed without telling their healthcare provider, for fear of stigma or criminalization.<sup>30,31</sup>

Service providers need to be aware of these issues and ensure that parents with HIV receive information and support to make fully informed and autonomous decisions around infant feeding. These can be complex issues and it can take weeks or months for parents to explore all the facts, feelings and emotions around the issue and feel comfortable with their decision.

### Key messages and guidance for service providers

- The vast majority of babies born to people with HIV in Canada are born without HIV.
- If a pregnant person is on HIV treatment prior to pregnancy and maintains an undetectable viral load throughout pregnancy, they will not transmit HIV to their newborn. This includes being engaged in regular HIV care, prenatal care, being adherent to treatment, maintaining an undetectable viral load throughout the entire pregnancy, and giving a short course of HIV medication to the newborn. However, the risk increases if HIV treatment is not given for the duration of the pregnancy, if the person is not adherent to treatment or if the viral load is detectable.
- Certain types of infant feeding can introduce a risk of HIV transmission after birth including breastfeeding and pre-chewing food for the infant. Breastfeeding, even when a person is on treatment and has a suppressed viral load, carries a small risk of HIV transmission. Breastfeeding and pre-chewing of food are not recommended in Canada. Exclusive formula feeding eliminates the risk of HIV transmission and women should be supported to explore this option. The sooner in pregnancy they are linked with community counselling supports (AIDS Service Organizations and peer support networks) the better.
- Service providers can support people with HIV before, during or after pregnancy by:
  - Encouraging them to seek care with an HIV specialist to get on treatment if not already and to determine a suitable drug regimen.
  - Helping them to access free or affordable formula, and to seek support from an AIDS Service Organization or peer network to negotiate potential challenges that they may experience related to exclusive formula feeding.
  - Encouraging them to discuss any challenges related to infant feeding openly and honestly with their care provider.
  - If parents with HIV want to breastfeed or are currently breastfeeding, they should be encouraged to talk about it in depth with their healthcare provider and a counsellor so that they can be supported to fully consider the issues and feed as safely as possible.
- If a person with HIV in Canada is breastfeeding their baby, experts do not recommend an automatic referral to child protection services.<sup>13</sup> However, according to the Canadian HIV/AIDS Legal Network,<sup>32</sup> a person with HIV who risks passing HIV to their child by breastfeeding may be threatened with criminal charges and/or intervention from child protection authorities.
- Women or trans people who are or who want to get pregnant should be encouraged to get tested for HIV.

### Related article

For a discussion on the issues related to pregnancy and infant feeding, see [Views from the front lines: Pregnancy and infant feeding](#).

### References

1. Public Health Agency of Canada. HIV and AIDS in Canada: Surveillance report to December 31, 2014. Ottawa: Minister of Public Works and Government Services Canada; 2015. Available at: <http://www.catie.ca/sites/default/files/2014%20HIV-AIDS-Surveillance-EN-FINAL.pdf>.
2. Public Health Agency of Canada. HIV in Canada: Surveillance summary tables, 2014-2015. Surveillance and Epidemiology Division, Professional Guidelines and Public Health Practice Division, Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada, 2016. Available from: <http://healthycanadians.gc.ca/publications/diseases-conditions-maladies-affections/hiv-aids-surveillance-2015-vih-sida/index-eng.php>.
3. [Siegfried N, van der Merwe L, Brocklehurst P, et al. Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection. \*Cochrane Database of Systematic Reviews\*. 2011;7:CD003510.](#)
4. [White AB, Mirjahangir JF, Horvath H, et al. Antiretroviral interventions for preventing breast milk transmission of HIV. \*Cochrane Database of Systematic Reviews\*. 2014;10:CD011323.](#)
5. [Luzuriaga K and Mofenson LM. Challenges in the elimination of pediatric HIV-1 Infection. \*New England Journal of Medicine\*. 2016 Feb 25;374\(8\):761-770.](#)
6. [Fowler MG, Qin M, Fiscus SA, et al. Benefits and risks of antiretroviral therapy for perinatal HIV prevention. \*New England Journal of Medicine\*. 2016 Nov 3;375:1726-1737.](#)
7. [Mandelbrot L, Tubiana R, Le Chenadec J, et al. No perinatal HIV-1 transmission from women with effective antiretroviral therapy starting before conception. \*Clinical Infectious Diseases\*. 2015;61:1715-1725.](#)
8. [Townsend CL, Cortina-Borja M, Peckham CS, et al. Low rates of mother-to-child transmission of HIV following effective pregnancy interventions in the United Kingdom and Ireland, 2000-2006. \*AIDS\*. 2008 May 11;22\(8\):973-981.](#)
9. [Townsend CL, Byrne L, Cortina-Borja M, et al. Earlier initiation of ART and further decline in mother-to-child HIV transmission rates, 2000-2011. \*AIDS\*. 2014 Apr 24;28\(7\):1049-1057.](#)
10. [Garcia PM, Kalish LA, Pitt J, et al. Maternal levels of plasma human immunodeficiency virus type 1 RNA and the risk of perinatal transmission. \*The New England Journal of Medicine\*. 1999 Aug 5; 341\(6\):394-402.](#)
11. [Davis N, Miller WC, Hudgens MG, et al. Maternal and breast milk viral load: Impacts of adherence on peripartum HIV infections averted - The breastfeeding, antiretrovirals, and nutrition study. \*Journal of Acquired Immune Deficiency Syndromes\*. 2016 Dec 15;73\(5\):572-580.](#)
12. [Drake AL, Wagner A, Richardson B, et al. Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis.](#)
13. [Bltnun A, Brophy J, Samson L, et al. Prevention of vertical HIV transmission and management of the HIV-exposed infant in Canada in 2014. \*Canadian Journal of Infectious Disease and Medical Microbiology\*. 2014;25\(2\):75-77.](#)
14. World Health Organization. [Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV](http://www.who.int/hiv/pub/guidelines/earlyrelease-arv/). 2015. Available from: <http://www.who.int/hiv/pub/guidelines/earlyrelease-arv/>.
15. [Bispo S, Chikhungu L, Rollins N, et al. Postnatal HIV transmission in breastfed infants of HIV-infected women on ART: a systematic review and meta-analysis. \*Journal of the International AIDS Society\*. 2017 Feb 20; 20\(1\):1-8.](#)
16. [Shapiro RL, Hughes MD, Ogwu A, et al. Antiretroviral regimens in pregnancy and breast-feeding in Botswana. \*New England Journal of Medicine\*. 17 June 2010;362\(24\):2282-2294.](#)
17. [Palombi L, Pirillo MF, Andreotti M, et al. Antiretroviral prophylaxis for breastfeeding transmission in Malawi: drug concentrations, virological efficacy and safety. \*Antiviral Therapy\*. 2012;17:1511-1519.](#)

18. [Luoga E](#). HIV transmission from mothers on antiretroviral therapy to their infants during breastfeeding in Rural Tanzania. In: Program and abstracts of the 16<sup>th</sup> European AIDS Conference, 25–27 October, Milan, 2017. Abstract P55/5.
19. [Kuhn L](#), [Sinkala M](#), [Kankasa C](#), et al. High uptake of exclusive breastfeeding and reduced early post-natal HIV transmission. *PLoS One*. 2007 Dec 26;2(12):e1363.
20. [World Health Organization](#), United Nations Children's Fund. *Guideline: updates on HIV and infant feeding: the duration of breastfeeding, and support from health services to improve feeding practices among mothers living with HIV*. Geneva: World Health Organization; 2016.
21. [Gaur AH](#), [Dominguez KL](#), [Kalish ML](#) et al., Practice of feeding pre-masticated food to infants: A potential risk factor for HIV transmission. *Pediatrics*. Aug 2009;124(2):658–666.
22. Centers for Disease Control. Premastication of food by caregivers of HIV-exposed children – nine U.S. sites, 2009–2010. *Morbidity and Mortality Weekly Report*. 2011;60:273–275. Available from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6009a2.htm>
23. [Van de Perre P](#), [Rubbo P](#), [Viljoen J](#), et al. HIV-1 reservoirs in breast milk and challenges to elimination of breast-feeding transmission of HIV. *Science Translational Medicine*. 2012 Jul 18;4(143):143sr3.
24. Government of Canada. *Infant feeding*. 2015. Available from: <https://www.canada.ca/en/health-canada/services/food-nutrition/healthy-eating/infant-feeding.html>
25. [Milligan C](#), [Overbaugh J](#). The role of cell-associated virus in mother-to-child HIV transmission. *Journal of Infectious Disease*. 2014 Dec 15;210(Suppl 3):S631–S640.
26. [Serghides L](#). HIV transmission risk through human milk: does U=U? Presented at: *The CATIE Forum 2017: Transforming our Practice: New knowledge, New strategies*. Toronto, Nov 23–24, 2017.
27. [Bulters M](#), [Ellington S](#), [Kourtis AP](#). HIV-1 and breastfeeding: biology of transmission and advances in prevention. *Clinical Perinatology*. 2010 Dec;37(4):807–824.
28. [Johnson G](#), [Levinson J](#), [Malek J](#). Should providers discuss breastfeeding with women living with HIV in high-income countries? An ethical analysis. *Clinical Infectious Diseases*. 2016;63(1):1368–1372.
29. [Khan S](#), [Kennedy VL](#), [Loutfy M](#), et al. Infant feeding in HIV in Canada. In: Abstracts of the 26<sup>th</sup> Annual Conference on HIV/AIDS Research (CAHR). Montreal, April 6–9, 2017. Abstract CS1.02. Available from: [https://www.cahr-acry.ca/wp-content/uploads/2015/10/CAHR2017\\_AbstractVolume\\_Mar29.pdf](https://www.cahr-acry.ca/wp-content/uploads/2015/10/CAHR2017_AbstractVolume_Mar29.pdf)
30. [Levinson J](#), [Weber S](#), [Cohan D](#). Breastfeeding and HIV-infected women in the United States: harm reduction counseling strategies. *Clinical Infectious Diseases*. 2014 Jul 15;59(2):304–309.
31. [CATIE](#). *A complicated dilemma: HIV and infant feeding* [webinar]. 2014. Available from: <http://www.catie.ca/en/webinars/complicated-dilemma-hiv-and-infant-feeding>
32. Canadian HIV/AIDS Legal Network. *Criminal Law & HIV Non-Disclosure in Canada*. 2014. Available from: [http://www.aidslaw.ca/site/wp-content/uploads/2014/09/CriminalInfo2014\\_ENG.pdf](http://www.aidslaw.ca/site/wp-content/uploads/2014/09/CriminalInfo2014_ENG.pdf)

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