

# Contraceptive Choice and Use of Dual Protection Among Women Living with HIV in Canada: Priorities for Integrated Care

**CONTEXT:** Preventing unintended pregnancy and HIV transmission is important for women with HIV, but little is known about their contraceptive use, particularly under current antiretroviral therapy (ART) recommendations for treatment and prevention.

**METHODS:** The prevalence of contraceptive use and of dual protection was examined among 453 sexually active women with HIV aged 16–49 and enrolled in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study in 2013–2015; multivariable logistic regression was used to identify correlates of use. Two definitions of dual protection were assessed: the World Health Organization (WHO) definition (consistent condom use alongside another effective method) and an expanded definition (consistent condom use or a suppressed HIV viral load alongside an effective method).

**RESULTS:** Overall, 73% of women used effective contraceptives, primarily male condoms (45%) or tubal ligation (19%). Eighteen percent practiced WHO-defined dual protection, and 40% practiced dual protection according to the expanded definition. Characteristics positively associated with contraceptive use were younger age, having been pregnant, being heterosexual, being unaware of ART's HIV prevention benefits and having had partners of unknown HIV status (odds ratios, 1.1–6.7). Younger age and perceived inability to become pregnant were positively associated with both definitions of dual protection (1.04–3.3); additionally, WHO-defined dual protection was associated with perceiving HIV care to be women-centered and having had partners of unknown HIV status (2.0–4.1), and dual protection under the expanded definition was related to having been pregnant (2.7).

**CONCLUSIONS:** Future research should explore how sustained ART and broader contraceptive options can support women's sexual and reproductive health care needs.

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Early and sustained use of antiretroviral therapy (ART) can suppress HIV viral load, thereby enabling women with HIV to live longer and healthier lives,<sup>1,2</sup> with improved fertility<sup>3</sup> and negligible risk of sexual and perinatal HIV transmission.<sup>4,5</sup> Motherhood is important for many women with HIV in Canada,<sup>6</sup> and they have fertility desires approaching those of the general population.<sup>6–8</sup> A majority of women with HIV, however, report wanting to delay or avoid pregnancy.<sup>7,8</sup> A rights-based and evidence-driven approach to sexual and reproductive health programming<sup>9</sup> supports a need for reproductive options, including improved contraceptive choice and pregnancy planning support.<sup>10,11</sup>

Women and couples affected by HIV face considerations regarding method choice that are similar to those of women without HIV, in terms of reproductive goals, method efficacy, safety and side effects, convenience, cost, availability, noncontraceptive benefits (e.g., prevention of STDs), and implications for sexual satisfaction and intimacy.<sup>12–14</sup> In the presence of HIV, however, method choice is additionally complex, as there is a need to balance prevention of both unintended pregnancy and HIV transmission.<sup>12,15</sup>

While condoms offer protection against transmission of HIV and other STDs, their use alone is suboptimal for preg-

nancy prevention: The typical-use failure rate in the first year of use is 18% for male and 21% for female condoms.<sup>16</sup> In contrast, hormonal contraceptives, long-acting reversible methods (implants and hormonal and nonhormonal IUDs), tubal ligation and male partner vasectomy provide excellent pregnancy prevention,<sup>16</sup> but offer no protection against transmission of HIV and other STDs. Moreover, concerns about possible interactions of hormonal methods with some ART regimens further complicate contraceptive decision making for women with HIV, as well as for health care providers on whom they rely for clinical guidance. Drug interactions may reduce contraceptive efficacy, thereby risking unintended pregnancy, or may lower ART efficacy, potentially leading to virological rebound, ART resistance and increased risk of HIV transmission.<sup>17–20</sup>

Uncertainty about optimal contraceptive choice for women with HIV contributes to high rates of unintended pregnancy, which has consequences for women's health, as well as for their partners and children.<sup>21–23</sup> In Canada, an estimated 56–61% of all pregnancies among women with HIV are unintended,<sup>24,25</sup> a proportion that is notably higher than that among the general population of Canadian women (30%)<sup>26</sup> and the most recent global estimate (40%).<sup>27</sup>

Contraceptive uptake is influenced by models of HIV care delivery, and evidence suggests that women-centered HIV care approaches may yield improved sexual and reproductive health outcomes.<sup>28–30</sup> Current World Health Organization (WHO) guidelines advise that women with HIV may safely use the full range of hormonal contraceptive options.<sup>31</sup> However, given inconsistencies in the literature regarding HIV transmission risk associated with certain hormonal contraceptives, WHO recommends that women with HIV who are seeking to avoid pregnancy and who have an HIV-negative partner or a partner of unknown status practice dual protection, defined as simultaneous use of condoms and another effective method.<sup>31,32</sup>

Yet a growing body of evidence demonstrates that there is no risk of sexual HIV transmission when a person living with HIV is on ART and achieves sustained HIV viral suppression,<sup>5,33</sup> thereby presenting an opportunity to explore an expanded definition of dual protection that considers either condom use or reliance on HIV-RNA plasma viral load suppression alongside an effective contraceptive method. While this expanded definition does not protect against other STDs, it is a safer sex option that women and couples with HIV may find useful and may already be practicing.<sup>34</sup>

Little is known about patterns of contraceptive use and dual protection use among women with HIV, particularly in settings where HIV treatment and care are provided through a universal publicly funded health care system, and where awareness of the HIV prevention benefits of ART-related viral suppression is growing. We measured the prevalence and correlates of use of effective contraceptives among sexually active women with HIV in Canada, and assessed the range of methods used, as well as method satisfaction and reasons for nonuse. We then evaluated the prevalence and correlates of both WHO-defined dual protection and an expanded definition of dual protection.

## METHODS

### Study Setting and Design

In Canada, women represent 22% of the estimated 75,500 people with HIV.<sup>35</sup> HIV prevalence, incidence and impact are inequitably distributed among women, and are particularly evident among those living in poverty; those with a history of injection-drug use or sex work; refugees or newcomers; those of indigenous ancestry; African, Caribbean and black women; and individuals who are transgender or who identify as lesbian, gay, bisexual, two-spirit or queer (LGBTQ).<sup>35</sup> Moreover, there are several points of intersection among these groups. Thirty-nine percent of all women with HIV in Canada reside in Ontario, 25% in Quebec and 17% in British Columbia.

\*Emergency contraception is included in the WHO definition of effective methods. Including this method in our analysis might have inflated estimates of use of effective contraceptives; however, six of the seven women reporting its use also reported use of another effective method, and thus its inclusion had a negligible effect.

The present analysis uses baseline questionnaire data from participants in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS), a prospective, community-based study conducted by, with and for women with HIV in British Columbia, Ontario and Quebec. Women who identified themselves as having HIV and who were 16 or older were eligible. CHIWOS is grounded in critical feminist theory—which draws attention to intersecting social positions and structural inequities that influence women's experiences of health care and health<sup>36</sup>—and community-based research principles, and is guided by a social determinants of health framework.<sup>37,38</sup> Women with HIV and allied researchers, providers and policymakers were involved in all stages of the research. A national team of experts in women's health and HIV, including women with HIV, contributed to the development of the comprehensive questionnaire,<sup>39</sup> which was designed to maximize psychometric validity and reliability.

All participants provided voluntary informed consent at enrollment. Ethical approval was provided by the research ethics boards of Simon Fraser University, University of British Columbia/Providence Health, Women's College Hospital and McGill University Health Centre. A full description of the CHIWOS methods is available elsewhere.<sup>40,41</sup>

Between August 2013 and May 2015, participants completed a structured questionnaire (supported by FluidSurveys online software) administered by peer research associates, women with HIV who were hired and trained as part of the study team.<sup>42</sup> Surveys were administered in English or French, in-person at collaborating HIV clinics, AIDS service organizations or community organizations, or in women's homes; or via phone or Skype. Median survey completion time was 120 minutes (interquartile range, 90–150), and participants received an honorarium of Can\$50.

This analysis of contraceptive use was restricted to women who were of reproductive age, defined as 16–49, at interview; this criterion led to the exclusion of 399 individuals from the full cohort of 1,424. We also excluded women who reported being pregnant (23), postmenopausal (47) or transgender (48), as well as individuals who had had no consensual vaginal sex in the previous six months (454). Our analytic sample thus comprised 453 sexually active women with reproductive potential (representing 32% of the full cohort).

### Measures

•**Primary outcomes.** The central outcome for this analysis was ever-use of effective contraceptives in the six months prior to interview. This was measured by self-reported use of at least one of the following methods, all of which are approved for use by women with HIV and have a typical-use failure rate of less than 10% within the first year:<sup>16,32</sup> the pill, injectable, vaginal ring, patch, hormonal or nonhormonal IUD, or implant; emergency contraception;\* and permanent methods (hysterectomy, tubal ligation or primary male partner vasectomy). We included male or female condoms

if used consistently (defined as “100% of the time”). Women who used these methods alone or in combination were considered users of effective methods.<sup>32</sup> Women who reported not using any method, as well as those who relied on withdrawal, timed intercourse, the sponge, vaginal creams or inconsistent condom use, were considered not to be users of effective contraceptives. We also assessed use of the cervical cap and the diaphragm, but no participants reported using these methods.

WHO-defined dual protection entails consistent use of male or female condoms in combination with another effective method. An expanded definition of dual protection was also evaluated: use of an effective method in addition to either consistent condom use or reliance on HIV-RNA plasma viral load suppression (fewer than 50 copies per milliliter); viral load suppression was self-reported.

We report on the different types of effective methods used. Because women may have reported use of more than one method concurrently or sequentially during the reference period, we created six mutually exclusive categories: no effective method; barrier methods only; hormonal methods (excluding hormonal IUDs) only; an IUD (hormonal or nonhormonal) only; permanent methods only; or dual protection (using both the standard WHO definition and the expanded definition). In rare instances where women reported using, for example, both a nonhormonal IUD and a hormonal method, their use was assigned to the more effective group (in this example, the IUD).

•**Secondary outcomes.** Given that women may have reported use of more than one effective contraceptive in the six months prior to interview, we also examined the primary method being used at the time of the survey. We assessed satisfaction with this method using a seven-point Likert scale (from “extremely satisfied” to “extremely dissatisfied”), and focused on the proportion of women who reported being “somewhat,” “very” or “extremely dissatisfied.” Among this subgroup, we assessed preference to use another method, preferred method and reasons for not using this method. For women who did not report using an effective contraceptive, we captured their main reasons for nonuse.

•**Covariates.** Potential correlates of use of effective contraceptives and dual protection were identified a priori, and included a range of characteristics. The sociodemographic characteristics examined were age, province, sexual orientation, race and ethnicity, education, personal annual income, ever-use of injection drugs and history of sex work. A number of HIV clinical characteristics were assessed: years living with HIV; current receipt of ART; self-reported undetectable viral load (shown to have a high sensitivity and specificity when compared with laboratory-confirmed viral load<sup>43</sup>); self-reported current CD4 cell count (a low count indicates poor immune system health); perception of how taking ART changes HIV transmission risk; perception that the respondent’s HIV doctor provides women-centered HIV care; and whether the respondent has a health care provider whom she feels comfortable talking to about reproductive goals. Receipt of women-centered HIV care was assessed

using a five-point Likert scale measuring agreement with the statement “Overall, I think that the care I have received from my HIV doctor has been women-centered.” (This statement was preceded by a definition of women-centered HIV care that was developed from a comprehensive literature review;<sup>29</sup> consultation with women with HIV, health care providers and other stakeholders;<sup>39</sup> and qualitative work.<sup>44</sup> The definition was subsequently tested for construct validity.) Responses were dichotomized; yes signified a response of “strongly agree” or “agree,” and no reflected a response of “strongly disagree,” “disagree” or “neutral.”

Four sexual and reproductive health characteristics were examined: current relationship status, HIV status of regular partners in the past six months, history of pregnancy and intention to become pregnant. For the last measure, reasons for being unable to become pregnant were not being sexually active, not having sex with a male partner, and perceiving that oneself or one’s partner was infertile.

Finally, three possible psychosocial covariates were assessed. HIV-related stigma was measured using the 10-item HIV Stigma Scale;<sup>45,46</sup> scores range from 0 to 100, and higher scores indicate greater stigma. Depression was assessed using the 10-item Center for Epidemiologic Studies Depression Scale; scores range from 0 to 30, and a score of 10 or higher is considered indicative of “probable depression.”<sup>47,48</sup> The experience of any violence in the three months prior to interview was also considered, and this included physical, sexual, verbal or control violence. Verbal violence consisted of being insulted, threatened, screamed at or cursed at; control violence consisted of being restricted in terms of where one could go or what one could do.

## Analysis

Descriptive statistics were used to characterize the sample at baseline. Differences between women using and those not using effective contraceptives or dual protection were assessed using Wilcoxon rank sum tests for continuous variables and Pearson chi-square or Fisher’s exact tests for categorical ones.

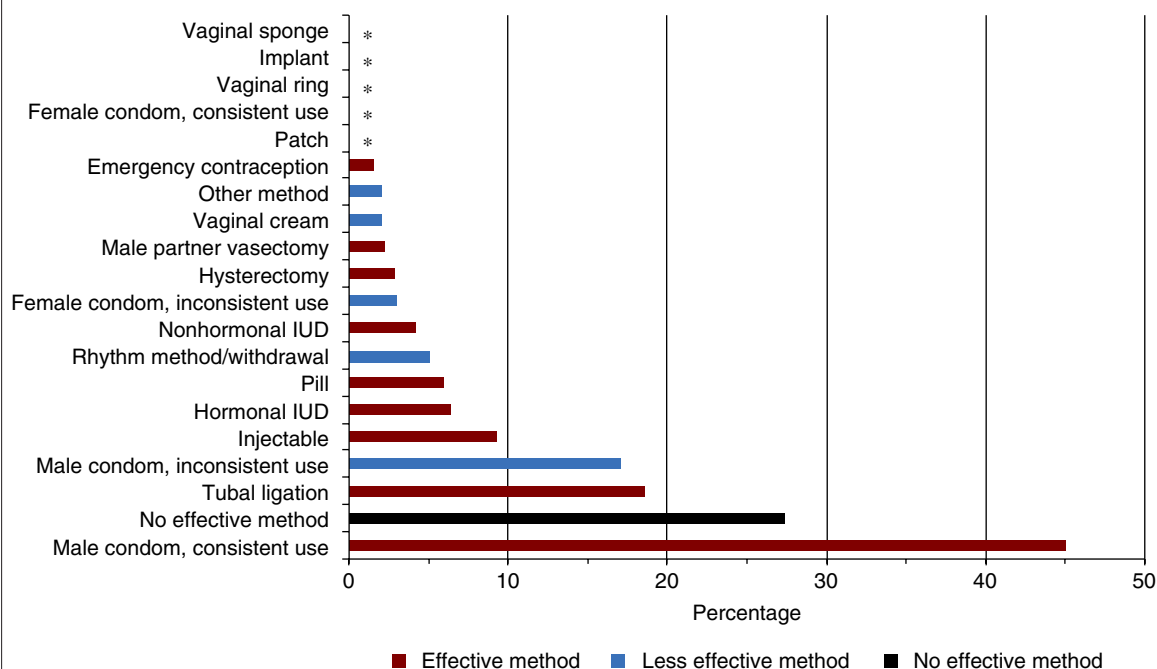
Separate multivariable logistic regression models examined covariates of use of effective contraceptives, dual protection according to the WHO definition and dual protection according to the expanded definition. After normality assumptions and collinearity were tested, variables that were significant in bivariable analyses (at  $p < .20$ ) were considered for the adjusted models to assess the relative contribution of each covariate. Model selection was achieved by minimizing the Akaike information criterion (AIC) while maintaining type III  $p$  values for covariates below .20.<sup>49</sup> The stepwise model selection process dropped the variable with the largest  $p$  value at each step until the model reached minimum AIC value. All statistical tests were two-sided and were considered statistically significant at  $p < .05$ . Data were analyzed using SAS version 9.4.

**TABLE 1. Selected characteristics of sexually active women with HIV aged 16–49, by use of effective contraceptives in the past six months, Canadian HIV Women’s Sexual and Reproductive Health Cohort Study, 2013–2015**

Characteristic	All (N=453)	Use of effective methods		Characteristic	All (N=453)	Use of effective methods	
		Yes (N=329)	No (N=124)			Yes (N=329)	No (N=124)
<b>SOCIODEMOGRAPHIC</b>				<b>HIV CLINICAL (continued)</b>			
<b>Median age</b>	38 (33–43)	38 (33–43)	37 (33–44)	<b>Perception of how ART changes HIV transmission risk**</b>			
<b>Age</b>				Reduces a lot or a little	84	82	90
16–34	35	36	34	No effect or increases	9	11	3
≥35	65	64	66	Don’t know†	7	7	7
<b>Province</b>				<b>Perceives HIV care as women-centered</b>			
British Columbia	26	27	24	Yes	51	51	52
Ontario	48	48	48	No	41	40	41
Quebec	26	25	28	Not receiving care	8	9	7
<b>Sexual orientation</b>				<b>Is comfortable talking to provider about reproductive goals§</b>			
Heterosexual	88	89	84	Yes	65	66	63
LGBTQ	12	11	16	No	35	34	37
<b>Race/ethnicity*</b>				<b>REPRODUCTIVE HEALTH</b>			
Indigenous	23	25	19	<b>Current relationship status</b>			
African/Caribbean/black	31	29	39	In a relationship	53	53	54
White	41	40	42	Not in a relationship	47	47	46
Other/multiple	5	6	1	<b>HIV status of regular partners in past six months</b>			
<b>Education</b>				All HIV-positive	24	23	27
<high school	13	13	15	Some/all HIV-negative	61	61	61
≥high school	87	87	85	All of unknown status	7	9	3
<b>Annual income (Can\$)**</b>				No regular partner	8	7	9
<20,000	66	70	56	<b>Ever been pregnant</b>			
≥20,000	34	30	44	Yes	77	79	70
<b>Ever used injection drugs</b>				No	23	21	30
Yes	32	33	28	<b>Intend to become pregnant</b>			
No	68	67	72	Yes/unsure	42	40	48
<b>Ever engaged in sex work</b>				No	43	43	40
Yes	32	33	29	Unable to become pregnant†	15	16	11
No	68	67	71	<b>PSYCHOSOCIAL</b>			
<b>HIV CLINICAL</b>				<b>Median HIV stigma score (range, 0–100)</b>			
<b>Years living with HIV</b>					57.5	58.8	57.5
<6	30	31	25		(42.5–70.0)	(42.5–70.0)	(42.5–67.5)
6–14	42	42	44	<b>Probable depression</b>			
≥15	24	24	26	Yes	58	66	63
Don’t know†	4	3	6	No	42	34	37
<b>Currently receiving ART</b>				<b>Experienced violence in past three months††</b>			
Yes	78	77	81	Yes	26	28	19
No	22	23	19	No	69	66	76
<b>Current HIV viral load‡</b>				Did not answer‡	6	6	5
Undetectable	74	71	80	<b>Current CD4 count (cells/mm<sup>3</sup>)</b>			
Detectable	18	20	11	<200	5	6	2
Don’t know	9	9	9	200–500	25	27	27
<b>Current CD4 count (cells/mm<sup>3</sup>)</b>				>500	49	46	48
<200	5	6	2	Don’t know†	17	16	21
200–500	25	27	27	Never received care/had count†	4	5	2
>500	49	46	48				
Don’t know†	17	16	21				
Never received care/had count†	4	5	2				

\*Distributions by use of effective methods are significantly different at p<.05. \*\*Distributions by use of effective methods are significantly different at p<.01. †Excluded from bivariable testing. ‡An undetectable load is fewer than 50 copies per milliliter, and a detectable load is anything greater. §Some 125 women were excluded because they perceived themselves to be infertile or because they used a permanent method. ††Any physical, sexual, verbal or control violence. Notes: Unless noted otherwise, figures are percentages. Numbers in parentheses are interquartile ranges. Percentages may not total 100 because of rounding. LGBTQ=lesbian, gay, bisexual, two-spirit or queer. ART=antiretroviral therapy.

**FIGURE 1. Percentage of sexually active women with HIV who used various contraceptive methods in the past six months**



\*Less than 1%. Note: Women could report use of more than one method at a time or more than one method sequentially over the six-month period.

**RESULTS**

**Sample Characteristics**

Participants’ median age was 38; nearly half lived in Ontario, and one-quarter each lived in British Columbia and Quebec (Table 1). Some 88% of women were heterosexual, and 12% identified as LGBTQ. Twenty-three percent identified as indigenous; 31% as African, Caribbean or black; 41% as white; and 5% as being of other or multiple ethnicities. Nearly nine in 10 women had at least a high school education, and two-thirds reported annual personal income of less than \$20,000. One-third of participants had ever used injection drugs, and an equal proportion had engaged in sex work.

Thirty percent of respondents had been living with HIV for fewer than six years, and 78% were currently receiving ART. Overall, 74% (and 92% of those on ART) reported having an undetectable viral load, and 49% had a current CD4 cell count of more than 500 cells per cubic millimeter (which is the normal range). Some 84% correctly perceived that ART reduces HIV transmission risk, and 51% perceived their HIV care to be women-centered. After we excluded 125 women who felt discussions about reproductive goals were not applicable to them (because they perceived themselves to be infertile or because they used a permanent method), 65% reported having a health care provider they felt comfortable talking to about these goals.

Fifty-three percent of women were married, in a common-law partnership or in a relationship. In the past six months, 61% of women had had an HIV-negative regular sexual partner, 24% had had only HIV-positive regular partners, 7% had had only regular partners whose HIV status was unknown and 8% had had no regular part-

ners. Seventy-seven percent of participants had ever been pregnant, and 42% intended to become pregnant or were unsure. Women’s median stigma score was 57.5 (on a scale of 0–100), 58% were experiencing probable depression and 26% had experienced some type of violence in the past three months.

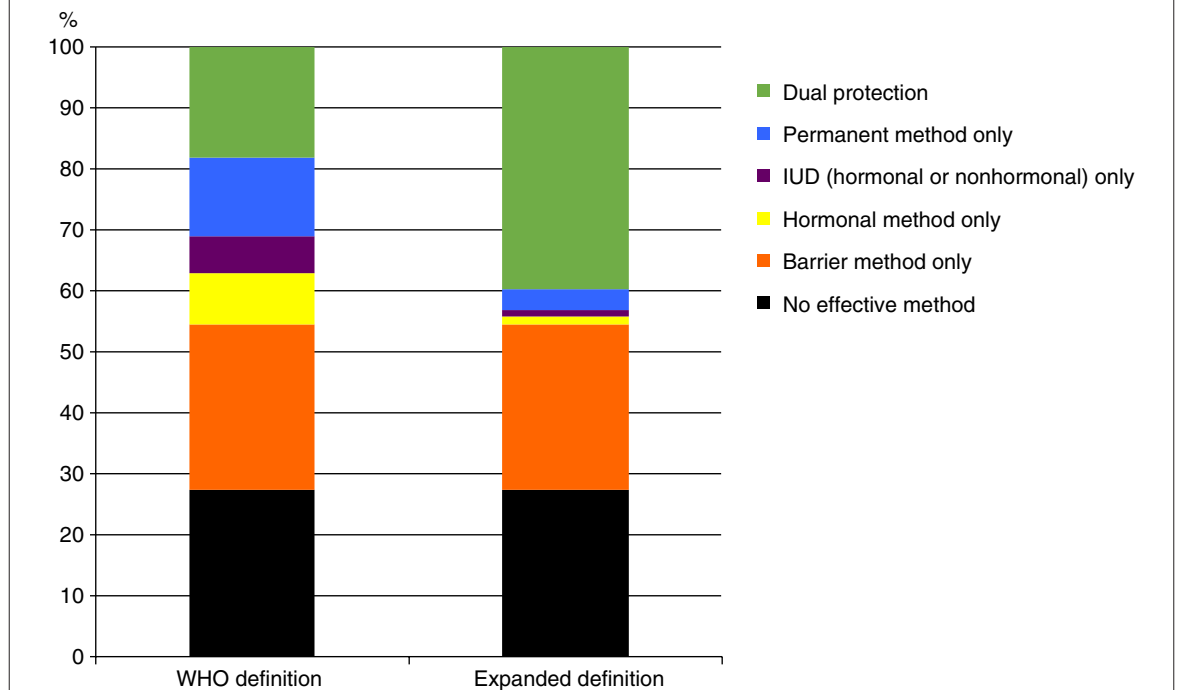
**Use of Effective Methods and Dual Protection**

Overall, 73% of women (95% confidence interval, 68–77%) had used an effective contraceptive in the six months prior to interview. Bivariable associations were found between such use and three characteristics: Greater proportions of women who had not used these methods than of those who had were African, Caribbean or black (39% vs. 29%), reported incomes of at least \$20,000 (44% vs. 30%) and believed that ART makes the risk of transmission a lot or a little lower (90% vs. 82%).

Forty-five percent of women reported consistent use of male condoms (Figure 1). Nineteen percent of women had had a tubal ligation, but reliance on other permanent methods was minimal: Only 2–3% were protected by hysterectomy or their partner’s vasectomy. Use of hormonal methods was modest: Nine percent used the injectable; 6% the pill; and fewer than 2% emergency contraception, the patch, the female condom (consistently), the ring, the implant or the sponge. Six percent of women reported using a hormonal IUD, and 4% a nonhormonal IUD. Overall, 91 participants reported using more than one method over the six-month period.

When contraceptive methods were grouped into mutually exclusive categories and included WHO-defined dual protection, we found that 27% of women had not used any

**FIGURE 2. Percentage distribution of sexually active women with HIV, by contraceptive method category, according to two definitions of dual protection**



effective method in the past six months, 27% had used barrier methods only (nearly exclusively the male condom), 8% had used hormonal methods only, 6% had used a hormonal or nonhormonal IUD only, 13% had relied on permanent methods only and 18% had practiced dual protection (Figure 2).<sup>\*</sup> Among those reporting dual protection, 43% had relied on consistent condom use with a permanent method, 34% condoms with a hormonal method, and 23% condoms and at least two other methods (not shown). When we applied the expanded definition, the prevalence of dual protection increased to 40%. Under this definition, 27% of women still had not used an effective method and 27% still had used barrier methods only; 3% had relied on permanent methods only, 1% on an IUD only and 1% on hormonal methods only.

#### Method Satisfaction and Preference

Of 368 women who reported using a primary contraceptive method (regardless of effectiveness), only 4% reported being dissatisfied. The proportion who were dissatisfied appeared to vary across methods (12% among IUD users, 7% among pill users, 4% among injectable users and 4% among male condom users), but given the small samples, these data should be interpreted with caution.

Overall, 10% of women reporting a primary method would have preferred to use a different method. Of these 36 women, 33% would have preferred a hormonal method or

a different hormonal method, 14% the female condom, 8% male partner vasectomy, 6% the male condom, 3% a female permanent method and 36% other, unspecified methods.

The main reasons women gave for not using their preferred method were that their partner objected to the method (21%), they were still trying to decide the best method for themselves (21%), their health care provider would not prescribe or did not offer the method (10%) or the method was difficult to access (10%). Women who cited a provider issue primarily preferred to use the injectable, tubal ligation or male partner vasectomy, and those who cited access difficulty preferred to use female condoms or the implant.

Reasons for not using effective contraceptives were varied. Some participants reported that they were trying to become or would not mind becoming pregnant (21%), that they perceived themselves or their partner to be infertile (24%) or that they currently had a female sex partner (7%). Other responses did not relate to risk of pregnancy, but reflected that women were not worried about transmitting HIV to a partner because they had an undetectable viral load (22%), were in a mutually faithful relationship (15%) or had an HIV-positive partner (10%). Some women cited a personal or partner dislike of contraception (6% and 10%, respectively).

#### Correlates of Effective Use and Dual Protection

In the multivariable model (Table 2), women's age was independently associated with use of an effective contraceptive. For each year younger a woman was, her likelihood of use increased by 10% (odds ratio, 1.1). Other characteristics associated with use were being heterosexual (2.3), being

<sup>\*</sup>The proportion reporting consistent condom use, with or without another effective method, was 56% among those 16–29 years old, 42% among those aged 30–39 and 44% among those aged 40–49.

unaware of the HIV prevention benefits of ART (3.6) and having been pregnant (1.8). Although partner HIV status overall was not found to be significant (not shown), women who did not know the status of any of their regular partners in the past six months had greater odds of using an effective contraceptive than those reporting only HIV-positive partners (6.7).

Characteristics independently associated with use of dual protection according to the WHO definition included age (odds ratio, 1.1 for each year younger), reporting an inability to become pregnant (3.3) and perceiving HIV care to be women-centered (2.0—Table 3). Again, although partner HIV status overall was not significant (not shown), women who reported that all of their regular sexual partners in the last six months were of unknown HIV status had elevated odds of using dual protection (4.1).

Finally, characteristics independently associated with use of dual protection according to the expanded definition included age (odds ratio, 1.04 for each year younger), having been pregnant (2.7) and reporting an inability to become pregnant (2.7). In addition, women in Ontario and Quebec had lower odds of using dual protection than women in British Columbia (0.4–0.5).

## DISCUSSION

This analysis draws on data from the largest community-based study of women with HIV across Canada, and presents the most comprehensive contemporary picture of contraceptive use among this population in an era when ART is recommended for both HIV treatment and prevention goals.<sup>50</sup> We found that nearly three-quarters of sexually active 16–49-year-olds used effective contraceptives, most commonly male condoms and tubal ligation; use of female-controlled reversible methods was limited. Dual protection as defined by the WHO was reported by fewer than one-fifth of participants. Under the expanded definition, which acknowledges the HIV prevention benefits of ART, the proportion increased to two-fifths.

The prevalence of use of effective contraceptives in our cohort was greater than that reported in 2006 for the general population of Canadian women of reproductive age (65%).<sup>51</sup> Similarly, research in South Africa has shown that HIV-positive serostatus and ART use are both positively associated with contraceptive use, perhaps because of increased contact with health care providers and elevated rates of male condom use for HIV prevention.<sup>52</sup>

Consistent with findings from other countries,<sup>23,53</sup> in our multivariable analyses, older women were less likely to use effective methods and dual protection. Although postmenopausal women and women 50 or older were excluded from our analyses, these findings may reflect age-related reductions in fertility, as well as a reduced real or perceived need to practice contraception. However, the Women's Interagency HIV Study, in the United States, found no association between self-reported menopausal status and condom use,<sup>54</sup> suggesting that additional research is necessary to assess determinants of reduced contraceptive use among older women.

**TABLE 2. Odds ratios (and 95% confidence intervals) from logistic regression analyses assessing associations between selected characteristics and respondents' use of effective contraceptives**

Characteristic	Unadjusted	Adjusted
<b>SOCIODEMOGRAPHIC</b>		
<b>Age (per year decrease)</b>	1.02 (0.99–1.05)	1.06 (1.01–1.10)
<b>Province</b>		
British Columbia (ref)	1.00	na
Ontario	0.99 (0.57–1.74)	na
Quebec	0.75 (0.41–1.37)	na
<b>Sexual orientation</b>		
LGBTQ (ref)	1.00	1.00
Heterosexual	1.73 (0.93–3.23)	2.34 (1.15–4.75)
<b>Race/ethnicity</b>		
Indigenous (ref)	1.00	1.00
African/Caribbean/black	0.54 (0.29–1.03)	0.56 (0.27–1.15)
White	0.62 (0.34–1.14)	0.73 (0.38–1.41)
Other/multiple	4.55 (0.57–36.38)	5.81 (0.69–48.69)
<b>Annual income (Can\$)</b>		
<20,000 (ref)	1.00	na
≥20,000	0.58 (0.36–0.92)	na
<b>HIV CLINICAL</b>		
<b>Current HIV viral load†</b>		
Undetectable (ref)	1.00	na
Detectable	1.57 (0.83–2.98)	na
Don't know	1.13 (0.46–2.78)	na
<b>Perception of how ART changes HIV transmission risk</b>		
Reduces a lot or a little (ref)	1.00	1.00
No effect or increases	3.93 (1.37–11.32)	3.55 (1.19–10.56)
<b>REPRODUCTIVE HEALTH</b>		
<b>HIV status of regular partners in past six months</b>		
All HIV-positive (ref)	1.00	1.00
Some/all HIV-negative	1.02 (0.60–1.72)	0.93 (0.52–1.66)
All of unknown status	4.43 (0.97–20.16)	6.65 (1.38–31.99)
No regular partner	0.77 (0.32–1.86)	0.73 (0.28–1.95)
<b>Ever been pregnant</b>		
Yes	1.64 (0.99–2.70)	1.77 (1.00–3.18)
No (ref)	1.00	1.00
<b>Intend to become pregnant</b>		
Yes/unsure (ref)	1.00	1.00
No	1.29 (0.80–2.09)	1.75 (0.96–3.19)
Unable to become pregnant	1.61 (0.80–3.24)	2.17 (0.91–5.16)
<b>PSYCHOSOCIAL</b>		
<b>Experienced violence in past three months‡</b>		
Yes (ref)	1.00	1.00
No	0.55 (0.32–0.94)	0.60 (0.34–1.09)

†An undetectable load is fewer than 50 copies per milliliter, and a detectable load is anything greater.  
‡Any physical, sexual, verbal or control violence. Notes: Based on 386 participants who had complete information for the variables included in the regression analysis. ref=reference group. na=not applicable. LGBTQ=lesbian, gay, bisexual, two-spirit or queer. ART=antiretroviral therapy.

We observed reduced odds of effective contraceptive use among LGBTQ participants. This observation is likely mediated by decreased condom use given the reduced risk of HIV transmission per sexual act and the absence of pregnancy risk within female-female partnerships.<sup>55,56</sup> Consistent with previous work,<sup>53,57</sup> we also found that women who had been pregnant had elevated odds of using effective contraceptives. We hypothesize that a previous pregnancy may be associated with an increased perception of being fertile. In addition, for women who have never

**TABLE 3. Odds ratios (and 95% confidence intervals) from logistic regression analyses assessing associations between selected characteristics and respondents' use of dual protection, according to both the WHO definition and the expanded definition**

Characteristic	WHO definition		Expanded definition	
	Unadjusted	Adjusted	Unadjusted	Adjusted
<b>SOCIODEMOGRAPHIC</b>				
<b>Age (per year decrease)</b>	1.03 (0.99–1.06)	1.08 (1.03–1.12)	1.00 (0.97–1.02)	1.04 (1.00–1.08)
<b>Province</b>				
British Columbia (ref)	1.00	na	1.00	1.00
Ontario	0.93 (0.50–1.72)	na	0.43 (0.26–0.72)	0.48 (0.29–0.82)
Quebec	0.47 (0.21–1.06)	na	0.43 (0.25–0.77)	0.44 (0.25–0.80)
<b>Sexual orientation</b>				
LGBTQ (ref)	1.00	1.00	1.00	1.00
Heterosexual	2.33 (0.81–6.67)	2.56 (0.84–7.69)	1.96 (0.99–3.85)	1.92 (0.93–4.00)
<b>Race/ethnicity</b>				
Indigenous (ref)	1.00	na	1.00	na
African/Caribbean/black	0.42 (0.20–0.87)	na	0.45 (0.25–0.81)	na
White	0.44 (0.23–0.86)	na	0.75 (0.44–1.29)	na
Other/multiple	0.57 (0.15–2.19)	na	0.87 (0.30–2.47)	na
<b>Annual income (Can\$)</b>				
<20,000 (ref)	1.00	na	1.00	na
≥20,000	0.59 (0.32–1.10)	na	0.81 (0.52–1.25)	na
<b>HIV CLINICAL</b>				
<b>Perception of how ART changes HIV transmission risk</b>				
Reduces a lot or a little (ref)	1.00	na	1.00	na
No effect or increases	1.58 (0.68–3.67)	na	0.98 (0.48–2.01)	na
<b>Perceives HIV care as women-centered</b>				
Yes	1.89 (1.06–3.45)	1.96 (1.08–3.57)	1.28 (0.84–1.92)	na
No (ref)	1.00	1.00	1.00	na
<b>REPRODUCTIVE HEALTH</b>				
<b>HIV status of regular partners in past six months</b>				
All HIV-positive (ref)	1.00	1.00	1.00	na
Some/all HIV-negative	1.79 (0.86–3.75)	1.79 (0.84–3.81)	0.88 (0.53–1.44)	na
All of unknown status	2.60 (0.84–8.08)	4.14 (1.26–13.56)	0.86 (0.34–2.14)	na
No regular partner	1.30 (0.37–4.52)	1.21 (0.33–4.48)	0.40 (0.15–1.04)	na
<b>Ever been pregnant</b>				
Yes	1.47 (0.73–2.94)	1.85 (0.84–4.00)	2.86 (1.64–5.00)	2.70 (1.47–5.00)
No (ref)	1.00	1.00	1.00	1.00
<b>Intend to become pregnant</b>				
Yes/unsure (ref)	1.00	1.00	1.00	1.00
No	1.16 (0.62–2.14)	1.82 (0.88–3.75)	1.22 (0.77–1.94)	1.55 (0.90–2.68)
Unable to become pregnant	1.80 (0.85–3.79)	3.30 (1.32–8.20)	2.20 (1.20–4.05)	2.67 (1.32–5.42)

Notes: Based on 365 participants who had complete information for the variables included in the regression analysis. ref=reference group. na=not applicable. LGBTQ=lesbian, gay, bisexual, two-spirit or queer. ART=antiretroviral therapy.

been pregnant, perceived fertility likely declines the longer that risk-taking (i.e., not using contraceptives during penetrative sex) does not result in pregnancy.

In our analysis, contraceptive use was associated with the perceived risk of HIV transmission to sexual partners. Consistent with previous findings,<sup>58</sup> women whose regular partners were of unknown HIV status were more likely than women whose regular partners were all HIV-positive to report the use of effective contraceptives and dual protection (according to the WHO definition). We found no other differences regarding partner HIV status and contraceptive use or dual protection. Women who knew that ART reduced the risk of HIV transmission were less likely than others to use effective methods. Perhaps these women considered viral load suppression an alternative to condom use as a way to reduce HIV transmission; this hypothesis is consistent with findings from

previous analyses of the CHIWOS cohort,<sup>34</sup> the Swiss HIV Cohort Study<sup>59</sup> and the Women's Interagency HIV Study cohort.<sup>60</sup> These findings also suggest that women with HIV may prioritize HIV prevention over pregnancy prevention.

Condoms were the most prevalent method used by women in this cohort. A reliance on condoms as the primary contraceptive used by women with HIV has been observed in France and the United States.<sup>23,53,61</sup> Indeed, work in Canada<sup>62</sup> and elsewhere<sup>52,53,63</sup> has identified a higher level of condom use among women with HIV than among their HIV-negative counterparts, likely reflecting concerns about sexual HIV transmission.<sup>64</sup> Given the high level of sexual inactivity previously observed within the CHIWOS cohort (49%),<sup>40</sup> the sporadic nature of sexual activity for some women with HIV may also influence their reliance on condoms.



Despite clinical guidance that women with HIV may safely use all contraceptive options,<sup>32,65,66</sup> the range of methods used in this cohort is more limited than that used by women in the general Canadian population, particularly with respect to the low prevalence of hormonal and long-acting reversible contraceptives (use of hormonal methods is estimated at 44% in the general population).<sup>51</sup> The limited range of methods reported may be a result of health system<sup>67</sup> or provider barriers, including lingering questions about the safety of hormonal contraceptives for women with HIV. Systematic reviews reporting that hormonal methods do not accelerate HIV disease progression are reassuring;<sup>17</sup> however, robust data are needed to clarify whether they increase HIV transmissibility<sup>17,18</sup> and whether certain antiretroviral regimens compromise their effectiveness (and vice versa).<sup>19</sup> Health care providers' uncertainty about the safety of hormonal contraceptives, coupled with infrequent discussions about clients' reproductive goals, may influence prescribing practices among providers caring for women with HIV,<sup>68</sup> and may help explain why the prevalence of hormonal contraceptive use is lower in this cohort than in the general Canadian population. Other concerns that may be related to reduced use of these methods, suggested by qualitative data from South Africa, are the severity of side effects, changes in menstrual bleeding and (in the case of oral contraceptives) increased daily pill burden beyond ART use.<sup>69</sup>

Given the availability of nonhormonal copper and progestogen-only IUDs, their level of use was low in our cohort, albeit consistent with rates reported in similar settings (less than 1% to 16%).<sup>61,70</sup> A longitudinal analysis conducted within the Women's Interagency HIV Study found that while the uptake of long-acting reversible methods has increased among the HIV-negative population, no comparable increase has occurred among women with HIV.<sup>63</sup> The WHO and Canadian Consensus guidelines confirm the safety of IUDs for women with HIV.<sup>32,71</sup> Previously reported barriers to uptake among HIV-positive women included high initial cost, misconceptions about or limited knowledge of IUDs among women and providers, and the low number of providers trained in IUD insertion.<sup>72</sup> Method dissatisfaction appeared to be highest (12%) among IUD users in our cohort, suggesting that close clinical follow-up and support of women using this method may be needed.

Use of permanent contraceptive methods (mainly tubal ligation) was prevalent in our cohort. Many women may have initiated these methods in earlier eras of the HIV pandemic, when reproductive options for infected women were limited and sterilization was commonly recommended, and even coerced in some settings.<sup>73</sup> Previous research has shown that women with HIV in Canada are almost twice as likely as those in the general population to use permanent methods.<sup>62</sup> Our findings are consistent with those from a study in Atlanta, which reported that HIV infection was the chief reason for sterilization among more than half of participants who had undergone the

procedure.<sup>70</sup> Contraceptive choice is a central component of sexual and reproductive health and rights for all women, including those with HIV.<sup>74</sup> Our findings reinforce the need to expand the availability of options that are best suited to the needs of each woman at her stage of life—and considering her reproductive intentions—in an effort to improve contraceptive uptake and satisfaction, as well as reproductive health outcomes.<sup>75</sup>

In this cohort, 18% of women practiced dual protection, mainly by using condoms and a permanent method. The prevalence was greater than that observed in France (9%),<sup>23</sup> similar to levels found in India (23%)<sup>64</sup> and Zambia (18%),<sup>76</sup> but less than those reported in the United States (39%)<sup>77</sup> and South Africa (33%).<sup>52</sup> Reported barriers to the uptake of dual protection include concerns relating to cost, contraceptive side effects and challenges in consistently using two methods.<sup>64</sup> We found that being younger and having a regular partner of unknown HIV status were positively associated with the use of dual protection, as they were with the use of effective contraceptives. Notably, women who perceived their HIV care to be women-centered were more likely than others to use dual protection. This finding suggests the need for research on whether integrated women-centered HIV and sexual and reproductive health care may improve the uptake of dual protection. Given that untreated chlamydia, gonorrhea and other STDs can compromise women's future fertility,<sup>78</sup> the promotion of dual protection aimed at preventing other STDs must also be considered within integrated HIV care.

With accumulating evidence that the risk of sexual HIV transmission is zero in the presence of ART-related viral suppression in the HIV-positive partner,<sup>5,33</sup> a growing community of researchers, clinicians and community advocates agree that such viral suppression constitutes safer sex,<sup>79,80</sup> offering women another option by which to eliminate HIV transmission risk. Indeed, evidence suggests that knowledge of the HIV prevention benefits of ART influences condom use practices among people with HIV.<sup>34,59</sup> When we assessed the expanded definition of dual protection, prevalence was 40%. Hence, an alternative strategy that can simultaneously prevent unintended pregnancy and minimize HIV transmission, and that does not require male-controlled condoms, merits further consideration; indeed some women may already be intentionally using this approach.<sup>34</sup> This strategy does not, however, offer protection against other STDs, and additional guidance should be offered when recommending this strategy to women who may be at risk of STD acquisition. Furthermore, in Canada, the risk of criminal charges by a sexual partner in the context of condomless sex without proactive HIV status disclosure must not be overlooked.<sup>81</sup>

One in 10 CHIWOS participants were not using their preferred contraceptive method. For such women, assessing the frequency and quality of contraceptive counseling in the HIV care setting is essential, particularly if they report partner objection to methods, personal uncertainty

about optimal methods or barriers to access. Despite CHIWOS participants' engagement in HIV care, one-third reported not feeling comfortable discussing reproductive goals with their health care provider. Previous research has commented on inconsistent, incomplete and largely patient-initiated discussions related to sexual health and contraception in HIV clinical care settings.<sup>82–84</sup> Integrating HIV and sexual and reproductive health care offers promise toward ensuring that women's reproductive intentions are comprehensively considered within the clinical context, hence advancing contraceptive counseling beyond condoms and tailoring this process to each woman's situation. This approach supports the use of effective contraceptives and dual protection.<sup>28,85</sup>

### Limitations and Strengths

Limitations of this analysis must be acknowledged. First, contraceptive use was self-reported, and therefore is subject to social desirability and recall bias. Second, we were unable to determine whether women used their methods appropriately or consistently. Third, CHIWOS recruited women from only three provinces; findings may not be generalizable to all of Canada or to other settings. However, 81% of women living with HIV in Canada reside in the three enrolling provinces,<sup>35</sup> and this study represents the largest analysis of contraceptive use among women with HIV in the country in the modern ART era. Fourth, our measure of viral suppression was self-reported, which may have influenced the proportion of women assessed as practicing dual protection under the expanded definition. However, in validation analyses, self-reported undetectable viral load had high sensitivity and specificity when compared with laboratory-confirmed viral load.<sup>43</sup> Finally, we were unable to explore associations between contraceptive use and frequency of sex, as necessary data were not collected.

A key strength of this analysis is that data were drawn from the largest national cohort of women with HIV in Canada. Additionally, the survey incorporated a comprehensive set of questions assessing contraceptive use, using a validated tool that was informed by, reviewed and extensively piloted with, and administered by women with HIV.

### Conclusions

Determining the optimal contraceptive strategies to support the reproductive desires of women with HIV and mediate HIV transmission risk is of paramount importance. Our findings demonstrate that women with HIV in Canada utilize a narrow range of available methods. Future studies are required to assess contraceptive counseling for these women both within and beyond HIV clinical care settings, and to explore possible barriers to expanding contraceptive choice.

Our findings also demonstrate that many women are benefiting, deliberately or incidentally, from the reduced risk of HIV transmission that comes with effective ART.

Supporting women with HIV and their care providers to harness this benefit of sustained ART use may constitute an important strategy to engage women in care and improve both HIV and other sexual and reproductive health outcomes. HIV care delivery models that integrate women's health and primary care may facilitate this process by prioritizing discussions of women's sexual and reproductive desires.<sup>29</sup> A women-centered HIV care approach to increase the use of effective contraceptive and HIV prevention options, reduce unplanned pregnancies, and increase options for safer and satisfying sex among women with HIV should be further pursued.

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