ORIGINAL RESEARCH ARTICLE

Family planning methods and fertility preferences according to HIV status among women in Cameroon

DOI: 10.29063/ajrh2021/v25i5.3

Allison Ruark[1], Kathleen Nulah[2], Simon Manga[2,3], Mbebwo Babila[2], Edith Welty[2], Mona Bormet[4], Thomas Welty[2]*

Wheaton College (Illinois)[1]; Cameroon Baptist Convention Health Services[2]; University of Alabama at Birmingham School of Medicine[3]; Christian Connections for International Health[4]

***For Correspondence:** Email: *allison.ruark@wheaton.edu*; Phone: + 1 (630) 752-5664

Abstract

We investigated whether HIV-positive women differ from HIV-negative women in their fertility, fertility intentions, and use of family planning (FP) among 16,202 women who received services through the Cameroon Baptist Convention Health Services' Women's Health Program from 2015 to 2017. The 13% of women who were HIV-positive had similar rates of modern FP usage and unmet need compared to HIV-negative women (26% versus 29% for modern FP usage, and 20% versus 21% for unmet need). However, HIV-positive women were more likely to be satisfied with their FP method (aOR = 1.70, $p < .001$). There were no significant differences in usage by HIV status for most FP methods, but HIV-positive women were more likely to use condoms (aOR = 1.85, $p < .01$) and less likely to use IUDs (aOR = 0.77, $p < .05$). HIV-positive women had fewer living children and also desired fewer children (both associations significant at $p < .001$ in multivariate linear regression). These findings highlight low FP usage and high unmet need among all women, and the need for integrated HIV and FP services for HIV-positive women, particularly aimed at increasing use of more reliable FP methods in addition to condoms. *(Afr J Reprod Health 2021; 25[5]: 25-36).*

Keywords: Reproductive health, contraception, HIV, condoms, faith-based organizations (FBOs)

Résumé

Nous avons enquêté pour savoir si les femmes séropositives sont différées des femmes séronégatives en ce qui concerne leur fertilité, leurs intentions de fertilité et leur utilisation de la planification familiale (PF) parmi 16 202 femmes qui ont reçu des services par le programme de santé des femmes des services de santé de la Cameroon Baptist Convention entre 2015 et 2017. Les 13% de femmes séropositives avaient des taux similaires d'utilisation de la PF moderne et de besoins non satisfaits par rapport aux femmes séronégatives (26% contre 29% pour l'utilisation de la PF moderne, et 20% contre 21% pour les besoins non satisfaits). Cependant, les femmes séropositives étaient plus susceptibles d'être satisfaites de leur méthode de PF (aOR = 1,70, $p < 0,001$). Il n'y avait pas des différences significatives dans l'utilisation de la plupart des méthodes de PF en fonction du statut VIH, mais les femmes séropositives étaient plus susceptibles d'utiliser des préservatifs (aOR = 1,85, $p < 0,01$) et moins susceptibles d'utiliser des DIU (aOR = 0,77, $p < 0,05$). Les femmes séropositives avaient moins d'enfants vivants et souhaitaient également avoir moins d'enfants (les deux associations étaient significatives à $p < 0,001$ dans la régression linéaire multivariée). Ces résultats soulignent la faible utilisation de la PF et les besoins non satisfaits élevés chez toutes les femmes, ainsi que la nécessité de services intégrés de VIH et de PF pour les femmes séropositives, visant en particulier à accroître l'utilisation de méthodes de PF plus fiables en plus des préservatifs. *(Afr J Reprod Health 2021; 25[5]: 25-36).*

Mots-clés: Santé de la reproduction, contraception, VIH, préservatifs, organisations confessionnelles

Introduction

Family planning (FP) usage may be affected by a woman's HIV status, although research in African settings over the past decade has produced inconsistent findings regarding whether women's fertility preferences and family planning usage vary by HIV status[1]. A recent meta-analysis found that 56% of pregnancies among women living with HIV in sub-Saharan Africa were unintended and that contraceptive failure contributed to many unintended pregnancies, and emphasized the significant unmet need for FP among this population[2]. Of the six studies included in the meta-analysis, three indicated that women living with HIV had a higher risk of unintended pregnancy

compared to HIV-negative women[2]. Some researchers have hypothesized that widening access to anti-retroviral therapy (ART) has resulted in similar fertility intentions among HIV-positive women and their HIV-negative counterparts[3]. Furthermore, integrating FP and ART services has been shown to increase the use of contraception, particularly with methods other than condoms[4].

FP usage in Cameroon is low and availability of FP commodities is often poor, although the government has made an ambitious commitment under the Family Planning 2020 (FP2020) initiative to increase access nationwide. The modern contraceptive prevalence rate (mCPR) increased from 17.3% in 2012 to 24.6% in 2018 (modeled, among all women), although Cameroon's mCPR was less than half of the average mCPR across FP2020 focus countries, and unmet need for modern FP methods was more than 50% higher than the average[5]. The 2018 Demographic and Health Survey (DHS) had similar findings to the FP2020 estimates, with an mCPR of 19.3% among married women and 46.8% among unmarried, sexually active women aged 15-49, and an unmet need for FP of 23.0% and 33.9%, respectively[6]. The 2018 DHS also found HIV prevalence of 3.4% among women aged 15-49, peaking at 6.5% for women aged 35-39[6].

Previous research in Cameroon has found unmet need for FP ranging from 20%[7] to 47%[8], with FP availability as well as personal and couple-level factors playing a role in FP preferences and use. A survey done in 2017 found stock-out rates of over 80% (on day of assessment) for all modern FP methods, and no primary service delivery point surveyed had 3 modern methods of contraception available[9]. Research at a family planning clinic in urban Yaounde in 2010-2011 found the most popular FP method to be injectables (chosen by 72% of women), followed by the oral hormonal pills (21%), implants (3%), and IUD (2%) (condom uptake was not recorded)[10]. Among a community-based sample in Yaounde, women who had discussed contraception with their partners or reported that their husband approved of FP were significantly less likely to have unmet need; religion, education, and number of children did not show significant associations[7]. In a household survey in rural western Cameroon, women were most likely to be aware of male condoms and the "safe period" (i.e. rhythm method) as methods of family planning, with 96% aware of condoms and 86% aware of the safe period[11]. Half of women reported using the safe period as a method of family planning, making it the most popular method, with a further 1 in 10 women practicing other traditional methods such as withdrawal and abstinence[11].

The current study uses data from the Cameroon Baptist Convention Health Services' (CBCHS) Women's Health Program (WHP) to investigate whether women living with HIV differ from HIV-negative women in their fertility, fertility intentions, and use of family planning. CBCHS is one of the largest providers of healthcare in Cameroon and since 2007 has operated the WHP, which provides comprehensive family planning services and diagnosis, syndromic management of sexually transmitted infections, and screening for breast and cervical cancer[12]. CBCHS facilities also provide HIV testing. All women included in this analysis were seen at the WHP at one of eight CBCHS facilities in the period 2015-2017. The facilities are located in Northwest, Southwest, Littoral, Centre and West Region.

A previous analysis had found that HIV-positive women visiting CBCHS facilities between 2007 and 2013 were more likely to use contraception than HIV-uninfected women, although they did not differ in their desire to become pregnant[13]. The current analysis expands on this earlier work by analyzing more recent data, and additionally examining whether FP method, unmet need, satisfaction with FP method, desire for further information about FP, and fertility (both number of living children and number of desired children) differ by HIV status, for WHP clients. In addition, this analysis examines whether HIV status was associated with the type of FP provided to clients at their visit to the WHP.

Methods

We carried out a cross-sectional analysis of client data collected at WHP sites between July 2015 and December 2017. WHP staff collected patient data using paper forms which capture medical history and services provided at the clinic visit, including HIV testing and FP services, and patients were not

asked to give consent for this routine data collection. WHP staff then entered data from the forms into an Epi Info database for monitoring and evaluation. Data used in this analysis were collected using a standard intake form which captured demographic data, self-reported HIV status, and FP usage. The CBCHS Institutional Review Board granted approval for analysis of de-identified patient data.

The initial database included 20,600 women ages 15 to 49. Women younger than 15 or older than 49 were excluded. Women whose HIV status was unknown at the time of clinic visit were also excluded (N=1,336), as were women whose FP status was unknown (N=2,660) or whose HIV and FP status were both unknown (N=402). This reduced the sample size to 16,202. The fact that more than 1 in 5 women were excluded from analysis is a significant limitation of the data, and is discussed below.

Dependent variables

The following dependent variables (outcomes) were used in the analysis:

Current use of any FP method: This includes all women answering "yes" to the question "Are you currently using a child spacing/FP method to prevent pregnancy?", regardless of method.

Current use of modern FP method: Modern methods were defined according to the definitions used by the Family Planning 2020 initiative and DHS to include implants, injectable contraceptives, IUDs, oral contraceptive pills, female or male condoms, female or male sterilization, emergency contraception, Standard Days Method (SDM) using CycleBeads, Fertility Awareness Method (FAM), and Lactational Amenorrhea Method (LAM)[5]. Breastfeeding, rhythm or calendar method, abstinence, withdrawal, and other natural methods were not considered modern methods. We counted women as using a modern method if they reported use of at least one modern method, even if they also reported use of non-modern methods.

Unmet need for FP: We assessed unmet need based on the definition used by Demographic and Health Surveys (DHS)[14], but expanded the definition to include all women and not only those who were married or in a union. The flowchart for this calculation is shown in the Figure. Some modifications were necessary as the data available could not be fully aligned with the DHS algorithm. Notes about modifications to the DHS algorithm are given in the Figure.

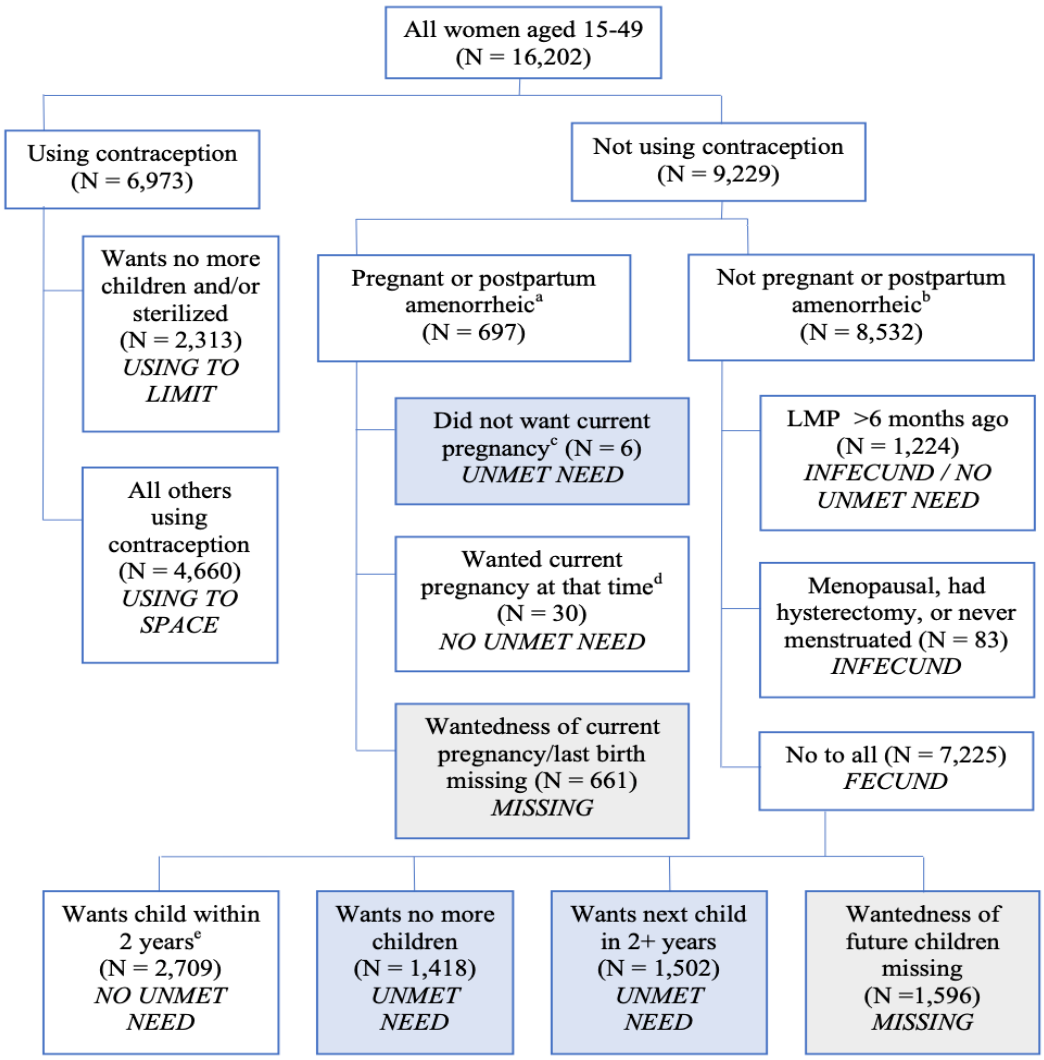
Desire for more information on FP: The numerator for this calculation is women answering "yes" to the question "Would you like more information on family planning?", and the denominator is all women with unmet need (as women who were already using FP were not asked the question).

Use of FP methods: We assessed the proportion of FP users using each of the following methods: condoms (male or female), implant, injectable, intrauterine device (IUD), pill (progestin-only or combined estrogen/progestin), sterilization, emergency contraception, Standard Days Method (SDM), Fertility Awareness Method (FAM), calendar or rhythm method, abstinence, withdrawal, breastfeeding, and other traditional method (non-specified). Women could report multiple forms of FP. The only FP methods given as options on the medical intake form were male condoms, female condoms, injectable (depot medroxyprogesterone acetate [DMPA] shot every 3 months), progestin-only pills (POP), combined estrogen/progestin pill (COC), IUD, implant, tubal ligation, partner vasectomy, breastfeeding, and rhythm method. The questionnaire also included an "other" response which allowed clients to specify another method. These open-ended responses were coded into the categories emergency contraception, calendar or rhythm method, SDM, FAM, abstinence, withdrawal, and breastfeeding (which was combined with the breastfeeding close-ended response). No women reported using LAM. Other open-ended responses such as "natural" were classified as "other traditional method."

Use multiple forms of FP: This included women who reported currently using two or more FP methods.

Satisfied with current FP method: This included the FP users who answered "yes" to the question "Are you satisfied with your current method?"

FP method received at clinic visit: A subset of WHP clients also received a FP method at their clinic visit.



Notes

a. Question about contraceptive use was asked of pregnant women and not of amenorrheic women.
b. Other categories for infecund not listed because data not available. (See Figure 2 in Bradley et al. 2002 for additional infecund categories.)
c. DHS definition includes "wants child and undecided timing, or undecided if wants child," but these responses were not available in the dataset.
d. "Wanted current pregnancy later" not listed as data not available.
e. Dataset contained a variable for when women wanted to get pregnant but not when they wanted to give birth. Women who wanted to get pregnant in next year were coded as wanting a child within next 2 years.

Figure: Classification of family planning usage and unmet need for family planning

The five methods dispensed were condoms, implants, injectables, IUDs, and pills.

Number of living children: WHP clients reported their number of living children.

Number of desired children: WHP clients were asked to answer the question "How many children would you like to have (or would you have loved to have)?"

Independent variables

The primary independent variable was HIV status, although all multivariate analyses also included a number of demographic variables as covariates.

HIV status: HIV status was assessed according to self-report, except for women who had an HIV test during the clinic visit and were classified according to the results of that test.

Age: This was a continuous variable based on age in years.

Education: Women were classified as having primary (1-7 years), secondary (8-12 years), tertiary (13 or more years), or no education.

Religion: This was a categorical variable, with women classified as Catholic, Baptist, Presbyterian, Pentecostal, Muslim, or other.

Marital status: According to the wording of the medical history form, women were classified as being married if they had a marriage certificate and cohabiting if they lived with a man but did not have a marriage certificate. Women could also be classified as single (never married) or widowed, separated, or divorced.

Polygamous marriage: Married women were asked if their husband or partner currently had other wives and if so, how many. The denominator was all married women.

Other sexual partner(s): Women were asked whether their husband or partners currently had other sexual partner(s) to whom he was not married (not including other wives in a polygamous marriage). The denominator was all married women.

Statistical analysis

We carried out univariate analysis and bivariate and multivariate regressions using Stata version 14. Descriptive characteristics were computed and stratified by HIV status. We used logistic regression (for binary variables) and linear regression (for continuous variables) to calculate crude odds ratios (ORs), and adjusted odds ratios (aORs) which included the covariates described above as well as clustering by facility. For all regressions, HIV-negative women were the referent category and significance was assessed at $p < .05$.

Results

Demographic characteristics of the study population by HIV status are shown in Table 1. Women had a mean age of 33, with HIV-positive women being slightly older (mean age 35). Approximately half of HIV-positive women had not progressed beyond primary school (51%), whereas only 38% of HIV-negative women had only primary school education or no education. The majority of women were Christian, with approximately a third being Catholic. A minority of women were formally married (having a marriage certificate), and among married women, approximately 1 in 10 were in a polygamous marriage.

Of the 16,202 women in the final sample, 2,113 (13.0%) were HIV-positive. Women living with HIV were less likely than HIV-negative women to be married (28% versus 47%) or cohabiting (20% versus 27%), but more likely to be never married (30% versus 20%) or widowed, separated, or divorced (22% versus 6%). HIV prevalence varied strikingly by marital status, with 8% of married women and 10% of cohabiting women being HIV-positive, compared to 18% of never married women and 36% of widowed, separated, or divorced women. Among women living with HIV, 53% reported being on ART, whereas 24% were not and for 23% data on ART status was missing. Women living with HIV were less likely to report current use of FP than were HIV-negative women, although for both groups of women a minority reported using FP (44% and 37%, respectively) (Table 2).

Table 1: Demographic characteristics by HIV status

	HIV negative (N = 14,089)	**HIV positive (N = 2,113)**	**Total (N = 16,202)**
	N (%)	*N (%)*	*N (%)*
Age			
15-19	167 (1.2)	11 (0.5)	178 (1.1)
20-24	1,829 (13.0)	128 (6.1)	1,957 (12.1)
25-29	3,149 (22.4)	323 (15.3)	3,472 (21.4)
30-34	3,080 (21.9)	532 (25.2)	3,612 (22.3)
35-39	2,388 (17.0)	519 (24.6)	2,907 (17.9)
40-44	2,077 (14.7)	386 (18.3)	2,463 (15.2)
45-49	1,399 (9.9)	214 (10.1)	1,613 (10.0)
Mean age (SD)	33.2 (7.7)	35.1 (6.9)	33.4 (7.6)
Education			
None	282 (2.1)	54 (2.6)	336 (2.2)
Primary	4,855 (35.7)	1,049 (51.4)	5,904 (37.7)
Secondary	3,861 (28.4)	533 (26.1)	4,394 (28.1)
Tertiary	4,604 (33.9)	406 (19.9)	5,010 (32.0)
Religion			
Catholic	4,976 (35.6)	724 (34.5)	5,700 (35.4)
Baptist	2,972 (21.2)	401 (19.1)	3,373 (21.0)
Presbyterian	2,329 (16.6)	424 (20.2)	2,753 (17.1)
Pentecostal	1,664 (11.9)	264 (12.6)	1,928 (12.0)
Muslim	879 (6.3)	152 (7.3)	1,031 (6.4)
Other	1,179 (8.4)	132 (6.3)	1,311 (8.1)
Marital status			
Married	6,602 (46.7)	582 (27.6)	7,184 (44.4)
Polygamous	590 (4.2)	70 (3.3)	681 (4.0)
Not polygamous	6,012 (42.7)	512 (24.2)	6,833 (40.4)
Cohabiting	3,756 (26.7)	413 (19.6)	4,169 (25.8)
Never married	2,868 (20.4)	641 (30.4)	3,509 (21.7)
Widowed, separated, or divorced	834 (5.9)	471 (22.4)	1,305 (8.1)
Currently on ART			
Yes		1,112 (52.6)	
No		515 (24.4)	
Missing		486 (23.0)	

ART = anti-retroviral therapy; SD = standard deviation

HIV status is according to self-report on day of clinic visit *or* according to positive HIV test during clinic visit. Women who self-reported as HIV-negative but tested HIV-positive during the clinic visit (N = 27) are counted as HIV-positive.

In multivariate analysis, there was no difference in FP use by HIV status. Slightly more than a quarter of HIV-positive women and HIV-negative women reported using modern FP (26% and 29%), and the difference was not significant in multivariate analysis. Approximately 1 in 5 women had an unmet need for FP, with no significant difference by HIV status. A higher proportion of HIV-negative women with an unmet need for FP had a desire for more information on FP, compared to women living with HIV (53% versus 39%, respectively) but this difference was also not significant in multivariate analysis. The majority of women reported being satisfied with their current FP method (76% of HIV-negative women and 88% of HIV-positive women), and women living with HIV were significantly more likely to be satisfied (aOR = 1.70, $p < .001$). For most types of FP, there was no significant difference in usage by HIV status. The major exception was for condoms, as women living with HIV had nearly twice the odds of using condoms for FP compared to HIV-negative women (43% versus 29%, aOR = 1.85, $p < .01$). In contrast, women living with HIV were significantly less likely to use IUDs (aOR = 0.77, $p < .05$), although the total number of women using IUDs was relatively small (5% of HIV-positive women and 8% of HIV-negative women). Women living with HIV were also significantly less

Table 2: Family planning, fertility intentions, and parity by HIV status

	HIV negative (N = 14,116)	**HIV positive (N = 2,086)**	**Univariate analysis**	**Multivariate analysis**
	N (%)	*N (%)*	*OR (95% CI)*	*aOR (95% CI)*
Current use of any FP method	6,204 (44.0)	769 (36.9)	0.74 (0.67, 0.82)***	0.99 (0.83, 1.17)
Current use of modern FP method[a]	4,088 (28.9)	543 (26.0)	0.86 (0.78, 0.96)**	1.18 (0.97, 1.45)
Unmet need for FP[b]	2,588 (21.2)	338 (19.5)	0.90 (0.80, 1.03)	0.94 (0.76, 1.17)
Desire for more information on FP[c]	1,294 (52.5)	127 (38.8)	0.58 (0.52, 0.64)***	0.85 (0.59, 1.20)
Satisfied with current FP method[e]	3,995 (76.2)	555 (88.4)	2.37 (1.84, 3.05)***	1.70 (1.27, 2.29)***
Use of FP methods[d]				
Condoms (female or male)	1,800 (29.0)	333 (43.3)	1.87 (1.60, 2.18)***	1.85 (1.29, 2.64)**
Implant	760 (12.3)	75 (9.8)	0.78 (0.60, 0.99)*	1.15 (0.72, 1.82)
Injectable	600 (9.7)	49 (6.4)	0.64 (0.47, 0.86)**	0.71 (0.47, 1.06)
IUD	463 (7.5)	37 (4.8)	0.63 (0.44, 0.88)**	0.77 (0.61, 0.97)*
Pill	300 (4.9)	35 (4.6)	0.94 (0.66, 1.34)	1.06 (0.61, 1.83)
Sterilization	178 (2.9)	15 (2.0)	0.67 (0.40, 1.15)	0.93 (0.56, 1.53)
Emergency contraception	34 (0.6)	1 (0.1)	0.24 (0.03, 1.73)	0.32 (0.08, 1.32)
SDM or FAM	15 (0.2)	5 (0.7)	2.70 (0.99, 7.45)	2.84 (1.79, 4.53)***
Rhythm method	1,316 (21.2)	119 (15.5)	0.68 (0.55, 0.83)***	0.56 (0.39, 0.81)**
Abstinence	230 (3.7)	51 (6.6)	1.84 (1.35, 2.52)***	1.00 (0.67, 1.52)
Withdrawal	138 (2.2)	12 (1.6)	0.70 (0.38, 1.26)	1.02 (0.69, 1.50)
Breastfeeding	88 (1.4)	3 (0.4)	0.27 (0.09, 0.86)*	0.46 (0.16, 1.32)
Other traditional method	107 (1.7)	7 (0.9)	0.52 (0.24, 1.13)	0.66 (0.36, 1.20)
Using multiple forms of FP[d]	101 (1.6)	12 (1.6)	0.96 (0.52, 1.75)	0.93 (0.65, 1.33)
FP method not reported[d]	279 (4.5)	40 (5.2)	1.17 (0.83, 1.64)	0.99 (0.62, 1.57)
	mean, SD	*mean, SD*	*Coefficient (95% CI)*	*Coefficient (95% CI)*
Number of living children	2.82 (2.00)	2.40 (1.76)	-0.42 (-0.51, -0.33)***	-0.55 (-0.68, -0.42)***
Number of desired children	4.53 (1.76)	4.03 (1.84)	-0.50 (-0.59, -0.42)***	-0.42 (-0.53, -0.30)***

aOR = adjusted Odds Ratio; SD = standard deviation; SDM = Standard Days Methods; CI = confidence interval; FAM = Fertility Awareness Method; FP = family planning; OR = Odds Ratio

* = p < .05; ** = p < .01; *** = p < .001

HIV status is classified according to self-report on day of clinic visit. Women who self-reported as HIV-negative but tested HIV-positive during clinic visit (N = 27) are counted as HIV-negative, with the logic that they had believed themselves to be HIV-negative when the medical history data shown in this table were collected.

HIV negative women are the referent group for all analyses. Multivariate models are adjusted for age, education, religion, marital status (including whether in a polygamous union), number of children, and health facility.

[a] Modern methods include implants, injectables, IUD, pill, female or male condoms, female or male sterilization, emergency contraception, SDM (using CycleBeads), FAM, and Lactational Amenorrhea Method (not reported by any women). Breastfeeding, rhythm or calendar method, abstinence, withdrawal, or other natural methods are not considered modern methods. Women were counted as using a modern method if they reported use of at least one modern method, even if they also reported use of non-modern methods.

[b] Data missing for 1,901 (13.5%) of HIV-negative women and 356 (17.1%) of HIV-positive women.

[c] Denominator is women with unmet need for FP (N = 2,926). See Figure for details on calculation of unmet need.

[d] Denominator is all FP users.

[e] Data missing for 963 (15.5%) of HIV-negative women and 141 (18.3%) of HIV-positive women.

likely to use the calendar or rhythm method (16% versus 21% of HIV-negative women, aOR = 0.56, p < .01). Less than 1% of all women reported using the modern methods of SDM and FAM, but women living with HIV were more likely to report these methods (aOR = 2.84, p < .001). For all other FP methods except for abstinence, HIV-positive women were less likely than HIV-negative women to use the method, although differences were not statistically significant in multivariate analysis. Regarding fertility, women living with HIV had fewer living children and also desired fewer children. Whereas HIV-negative women had a mean of 2.8 children and desired a mean of 4.5 children, HIV-positive women had a mean of 2.4 children and desired a mean of 4.0 children. Even when accounting for age and other factors in multivariate analysis, these differences were highly significant at p < .001.

Table 3: FP method provided at WHP clinic visit, by HIV status

	HIV negative (N = 2,129)	**HIV positive (N = 97)**	**Univariate analysis**	**Multivariate analysis**
	N (%)	N (%)	OR (95% CI)	aOR (95% CI)
Condoms (female or male)	19 (0.7)	0 (0.0)		
Implant	940 (46.2)	28 (30.4)	0.51 (0.33, 0.80)**	0.44 (0.27, 0.71)**
Injectable	226 (11.1)	11 (12.0)	1.07 (0.54, 2.04)	1.26 (0.65, 2.45)
IUD	774 (38.1)	50 (54.4)	1.85 (1.23, 2.79)**	1.97 (1.28, 3.03)**
Pill	84 (4.1)	3 (3.3)	0.77 (0.24, 2.47)	0.79 (0.24, 2.67)

aOR = adjusted Odds Ratio; CI = confidence interval; OR = Odds Ratio; * = p < .05; ** = p < .01; *** = p < .001
HIV negative women are the referent group for all analyses. Multivariate models are adjusted for age, education, religion, marital status (including whether in a polygamous union), and health facility.

More than two thousand women (N=2,126) were provided FP at their visit to the WHP (Table 3), including 92 women living with HIV (4% of all HIV-positive women in the database) and 2,034 HIV-negative women (14% of all HIV-negative women in the database). In multivariate analysis, women living with HIV had half the odds of being provided FP (aOR = 0.47, p < .01) compared to HIV-negative women. Furthermore, women living with HIV were significantly more likely than HIV-negative women to receive an IUD (54% versus 38%, aOR = 1.97, p < .01) and significantly less likely to receive an implant (46% versus 30%, aOR = 0.44, p < .01). There were no other significant differences by HIV status in the proportions of women receiving injectables, IUD, and the pill, and very few women (and no HIV-positive women) received condoms at their visit to the WHP.

Discussion

This analysis found low use of FP, with less than half of all women using any FP method and fewer than 1 in 3 using a modern method. Approximately 1 in 5 women had an unmet need for FP, and only 1 in 5 women with an unmet need were provided with FP at their clinic visit. However, women attending the WHP were more likely to use FP than women surveyed in the 2018 DHS, which found that fewer than 1 in 4 women aged 15-49 were using FP, and only 1 in 5 were using a modern method[6]. This difference may be attributable to the fact that women seen at the WHP were self-selecting, and many were actively seeking FP services. The 2018 DHS additionally found that 25% of women aged 15-49 had an unmet need for FP, which was higher than the 21% of women with unmet need in the current study. We also note limitations of the DHS definition of unmet need, as noted by previous researchers[15], such as that this definition does not distinguish between lack of contraceptive use and lack of demand for contraception. In fact, our analysis found that more than half of women defined as having "unmet need" were not interested in receiving further information on contraception.

In contrast to an analysis of earlier data from the same health facilities[13], this analysis found that HIV-positive and HIV-negative women did not differ significantly in their likelihood of using FP or modern methods of FP. They also did not differ in their unmet need for FP, although women living with HIV were significantly more likely to be satisfied with their current FP method. Women living with HIV were also significantly less likely to receive FP at their clinic visit than their HIV-negative counterparts. These differences between HIV-positive and HIV-negative women may reflect the fact that women living with HIV have already had more interaction with the healthcare system, including previous counseling on FP and provision of FP services.

The two most common FP methods were condoms and the rhythm method. In the 2018 DHS, condoms were also the most popular method, although the rhythm method was the fourth most popular method (behind implants and injectables). In this study, condoms were particularly popular among women living with HIV, which is likely due to condoms having a dual protection role against pregnancy and STIs, including HIV. Although no HIV-positive women were provided with condoms

as a method of FP at their visit to the WHP, this is likely because they were accessing condoms through other means, including when receiving HIV care at CBCHS facilities. Education and provision of condoms is an integral part of HIV prevention, care and treatment at all CBCHS facilities.

Women living with HIV were less likely to use the rhythm method, likely because so many were already using condoms for FP. Conversely, HIV-negative women were more likely to use the rhythm method, with the implication that this population has a particular need for education about more effective methods. Some of the approximately 1 in 5 women who reported using the rhythm method may in fact have been using the more reliable SDM and FAM methods (which are considered modern methods), as the data collection form contained a response for the rhythm method and not for SDM or FAM. (The only women who could be classified as using SDM/FAM in this analysis were those who reported SDM or FAM under an "other" response category.) However, the popularity of the rhythm method suggests that there is an opportunity for more effectively counseling women on their FP options, including SDM and FAM.

Less than 2% of women living with HIV reported using dual methods of FP, indicating that very few HIV-positive women who were using condoms were also using more effective FP methods. Although women living with HIV desired (and had) significantly fewer children than their HIV-negative counterparts, the vast majority (all but 6 women) did desire children. Thus these women need not only HIV prevention counseling but also effective FP counseling and safe conception strategies. Indeed, women in multiple African settings have expressed a desire for integrated FP and HIV services[16]. In this study, nearly 4 in 5 HIV-positive women reported being satisfied with their current FP method, indicating that they were being relatively well served by available health services. In some CBCHS facilities, FP has been integrated into HIV care and treatment services. HIV-negative women were significantly less likely than women living with HIV to be satisfied with their current FP method, underscoring that they also have an important (and often unmet) need for effective FP counseling.

The WHP disproportionately serves women living with HIV. In this dataset, 13% of clients were living with HIV, nearly four times the national HIV prevalence of 3.4% among women of reproductive age[6]. Based on HIV-positive women's increased risk of cervical cancer[17], the WHP offers them free or low-cost cervical cancer screening, which may contribute to the large number of HIV-positive women seeking services at the WHP. The WHP also prioritizes assessing and meeting the family planning needs of women living with HIV. Among women provided with FP at a WHP clinic visit, women living with HIV were significantly more likely to be provided with an IUD, and less likely to be provided with an implant, than their HIV-negative counterparts. This suggests that WHP staff were appropriately counseling women living with HIV that IUDs are a safe and effective method, whereas implants are non-optimal if using efavirenz-based ART (which was prescribed as a first-line regimen at CBCHS in the period 2015-17) due to interactions between contraceptive hormones and this ART regimen which may reduce implants' ability to prevent pregnancy[18].

This analysis benefited from a large, multi-year database of patient data, but also had notable limitations. Our analysis controlled for a number of variables that differed between HIV-positive and HIV-negative women (age, education, religion, marital status, polygamous union, and number of children) and which likely affected the outcomes of interest (namely contraceptive use, fertility, and fertility preferences). However, it is possible that HIV-positive and HIV-negative women differed in other ways that we did not measure, such as economic status and employment, which affected the outcomes of interest. Therefore, observed differences between HIV-positive and HIV-negative women in the multivariate analysis may not have been due to HIV status alone. For example, HIV-positive women were more likely to be widowed, separated, divorced, and never-married. These women may have also been more likely to be economically vulnerable (a variable we did not measure), and economic status may have impacted contraceptive use, fertility, and fertility preferences in ways we could not account for.

In addition, the dataset contained large amounts of missing data, which both reduced the

sample size and may have introduced biases, as women who were excluded from the analysis differed from women who were included in significant ways. Of the initial sample of 20,600, more than 1 in 5 (4,398) were excluded due to missing data on HIV status or FP usage. These women differed from women included in the analysis in significant ways on the demographic variables measured (using chi-squared statistics, all differences measured were significant at $p < .01$). For example, women who were dropped from analysis had less education, were less likely to be married or cohabiting, and on average were more than a year younger. We cannot evaluate how excluding these women may have biased the findings, but note that the women evaluated were not representative of CBCHS clients as a whole.

Finally, the fact that most women's HIV status was based on self-report (with the exception of a small number of women who were tested during their visit) may have led to under-estimation of HIV prevalence and a bias towards the null. In other words, if a significant number of HIV-positive women reported themselves as HIV-negative due to stigma, the true differences between women living with HIV and HIV-negative women may be greater than those reported here.

The definitions and skip patterns in the original data collection tool also constrained the analysis in several key ways. For example, nearly 6,000 women were not asked about current FP use and were classified as non-users. Some of these women may have been mistakenly counted as having unmet need, when they were actually using FP, which may have resulted in an over-estimation of unmet need in this population. Other modifications to the DHS algorithm for unmet need, which were necessary based on available data, may have also resulted in under- or over-estimation of unmet need. The use of some types of modern FP (namely EC, SDM, and LAM) may have also been under-estimated, as these forms of FP were not included in the medical history form and were only counted if a woman reported their use in an "other" response category. Under-estimates of these methods would have led to an under-estimation of mCPR.

Conclusion

This study contributes to existing knowledge of FP usage in Cameroon, and to the broader discussion of FP usage, unmet need, and fertility intentions among women living with HIV in Africa. In this study, women living with HIV seemed to be well-served by existing FP services, as they did not differ from HIV-negative women in overall use of FP (including modern methods) or in unmet need, and were more likely to report being satisfied with their current FP method. However, the high usage of condoms for FP by women living with HIV suggests the need for improved FP counseling aimed at increasing the usage of more reliable modern FP methods in tandem with condom use (dual protection), ideally within integrated FP and HIV services. Furthermore, the low usage of modern FP methods and high unmet need, for HIV-positive and HIV-negative women, are a call to action for strengthening FP services for all women in the CBCHS' catchment area.

Acknowledgments

We thank CBCHS facilities for making their client data available for analysis, and CBCHS staff for support of this study. Christian Connections for International Health (CCIH) funded Dr. Ruark to undertake data analysis and writing of this article, and we thank CCIH for support of this work.

Contribution of authors

AR designed and carried out the data analysis and drafted the manuscript. KN and M. Babila oversaw data collection and reviewed the manuscript. SM contributed to data analysis and the manuscript. EW designed the data collection forms and contributed to the manuscript. M. Bormet contributed to the study design and reviewed the manuscript. TW contributed to the study design and data collection forms and reviewed the manuscript.

References

1. O'Shea MS, Rosenberg NE, Tang JH, Mukuzunga C,Kaliti S, Mwale M and Hosseinipour MC. Effect of HIV status on fertility desire and knowledge of long-acting reversible contraception of postpartum Malawian women. AIDS Care 2015;27(4):489-498. doi:10.1080/09540121.2014.972323. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4312510/
2. Feyissa TR, Harris ML, Melka AS and Loxton D. Unintended pregnancy in women living with HIV in sub- Saharan Africa: a systematic review and meta-analysis. AIDS Behav 2019; 23(6): 1431-1451. doi:10.1007/s10461-018-2346-4. https://www.ncbi.nlm.nih.gov/pubmed/30467712
3. Agadjanian V and Hayford SR. HIV status, fertility intentions, and contraception in the era of expanded access to antiretroviral therapy: A case study of rural Mozambique. Glob Public Health 2016; 13(5): 582-596. doi:10.1080/17441692.2016.1268188. https://www.ncbi.nlm.nih.gov/pubmed/28032523
4. Grossman D, Onono M, Newmann SJ, Blat C, Bukusi EA, Shade SB, Steinfeld RL and Cohen CR. Integration of family planning services into HIV care and treatment in Kenya: a cluster-randomized trial. AIDS 2013; 27 (Suppl 1): S77-S85. https://www.ncbi.nlm.nih.gov/pubmed/24088687
5. Cahill N, Sonneveldt E, Stover J, Weinberger M, Williamson J, Wei C, Brown W and Alkema L. Modern contraceptive use, unmet need, and demand satisfied among women of reproductive age who are married or in a union in the focus countries of the Family Planning 2020 initiative: a systematic analysis using the Family Planning Estimation Tool. Lancet 2018; 391: 870-882. doi:10.1016/S0140-6736(17)33104-5. https://www.ncbi.nlm.nih.gov/pubmed/29217374
6. National Institute of Statistics (Cameroon), ICF. Enquête Démographique Et De Santé Du Cameroun 2018. Indicateurs Clés [Cameroon Demographic and Health Survey 2018: Key Indicators Report]. Yaoundé, Cameroon and Rockville, Maryland, USA: INS and ICF; 2019. https://dhsprogram.com/publications/publication-PR116-Preliminary-Reports-Key-Indicators-Reports.cfm.
7. Ajong AB, Njotang PN, Yakum MN, Essi MJ, Essiben F, Eko FE, Kenfack B and Mbu ER. Determinants of unmet need for family planning among women in Urban Cameroon: a cross sectional survey in the Biyem-Assi Health District, Yaoundé. BMC Women's Health 2016; 16: 4.doi:10.1186/s12905-016-0283-9. https://www.ncbi.nlm.nih.gov/pubmed/26791410
8. Edietah EE, Njotang PN, Ajong AB, Essi MJ, Yakum MN and Mbu ER. Contraceptive use and determinants of unmet need for family planning; a cross sectional survey in the North West Region, Cameroon. BMC Women's Health 2018;18:171.doi:10.1186/s12905-018-0660-7. https://www.ncbi.nlm.nih.gov/pubmed/30342502
9. Family Planning 2020. Cameroon 2020 Core Indicator Summary Sheet: 2017-2018 Annual Progress Report. http://www.familyplanning2020.org/sites/default/files/Cameroon%202018%20CI%20Handout.pdf.
10. Yangsi TT, Florent FY, Ngole ME and Nelson F. Modern contraceptive choice among patients seen at the "Cameroon National Planning Association for Family Welfare" Clinic Yaoundé. Clin Med Insights Reprod Health 2017; 11: 1-6. https://www.ncbi.nlm.nih.gov/pubmed/28804250
11. Nansseu JRN, Nchinda EC, Katte J-C, Nchagnouot FM and Nguetsa GD. Assessing the knowledge, attitude and practice of family planning among women living in the Mbouda health district, Cameroon. Reprod Health 2015; 12 (92). doi:10.1186/s12978-015-0085-9. https://www.ncbi.nlm.nih.gov/pubmed/26452643
12. DeGregorio G, Manga S, Kiyang E, Manjuh F, Bradford L, Cholli P, Wamai R, Ogembo R, Sando Z, Liu Y, Sheldon LK, Nulah K, Welty T, Welty E and Ogembo JG. Implementing a fee-for-service cervical cancer screening and treatment program in Cameroon: challenges and opportunities. Oncologist 2017; 22(7): 850-859. https://www.ncbi.nlm.nih.gov/pubmed/28536303
13. Budhwani H, Hearld KR, Dionne-Odom J, Manga S, Nulah K, Khan M, Welty T, Welty E and Tita AT. HIV status and contraceptive utilization among women in Cameroon. J Int Assoc Provid AIDS Care 2019; 18(4): 232595821982659–7. doi:10.1177/2325958219826596. https://www.ncbi.nlm.nih.gov/pubmed/30776955
14. Bradley SEK, Croft TN, Fishel JD and Westhoff CF. Revising unmet need for family planning. Calverton, MD: ICF International; 2012. https://dhsprogram.com/pubs/pdf/AS25/AS25[12June2012].pdf
15. Moreau C, Shankar M, Helleringer S, and Becker S. Measuring unmet need for contraception as a point prevalence. BMJ Global Health. 2019;4(4):e001581. http://dx.doi.org/10.1136/bmjgh-2019-001581
16. Hancock NL, Chibwesha CJ, Bosomprah S, Newman J, Mubiana-Mbewe M, Sitali ES, Bolton-Moore C, Mbwili-Muleya C and Chi BH. Contraceptive use among HIV-infected women and men receiving antiretroviral therapy in Lusaka, Zambia: a cross-sectional survey. BMC Public Health 2016; 16: 392. doi:10.1186/s12889-016-3070-5.
17. Cholli P, Bradford L, Manga S, Nulah K, Kiyang E, Manjuh F, DeGregorio G, Ogembo RK, Orock E, Liu Y, Wamai RG, Sheldon LK, Gona PN, Sando Z, Welty T, Welty E and Ogembo JG. Screening for cervical

cancer among HIV-positive and HIV-negative women in Cameroon using simultaneous co-testing with careHPV DNA testing and visual inspection enhanced by digital cervicography: findings of initial screening and one-year follow-up. Gynecol Oncol 2018; 148(1): 118-125. doi:10.1016/j.ygyno.2017.11.002. https://www.ncbi.nlm.nih.gov/pubmed/29153541

18. Patel RC, Morroni C, Scarsi KK, Sripipatana T, Kiarie J, and Cohen CR. Concomitant contraceptive implant and efavirenz use in women living with HIV: perspectives on current evidence and policy implications for family planning and HIV treatment guidelines. J Int AIDS Soc. 2017; 20(1): 21396-21396. https://www.ncbi.nlm.nih.gov/pubmed/28530033.