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Human Immunodeficiency Virus Serodiscordance and Dual Contraceptive Method Use Among Human Immunodeficiency Virus-infected Men and Women in Lilongwe, Malawi

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Background: Some human immunodeficiency virus (HIV) serodiscordant couples are faced with the dual challenge of preventing HIV transmission to the uninfected partner and avoiding unintended pregnancy. Therefore, we hypothesized that serodiscordance is associated with dual method use at last sex.

Methods: We analyzed data from a cross-sectional survey of HIV-infected men and women attending 2 ante-retroviral therapy clinics in Lilongwe, Malawi. We used Fisher exact test and Wilcoxon rank sum to assess for associations between serodiscordance, covariates, and dual method use. Multivariable logistic regression was used to estimate the adjusted odds ratio (aOR) and 95% confidence intervals (CI) of dual method use at last sex, comparing serodiscordant to seroconcordant relationships. Separate analyses were conducted for men and women.

Results: We surveyed 253 HIV-infected men, of which 44 (17.4%) were in a known serodiscordant relationship and 63 (24.9%) were using dual methods at last sex. Likewise, among 302 HIV-infected women surveyed, 57 (18.9%) were in a known serodiscordant relationship, and 80 (26.5%) were using dual method at last sex. Serodiscordance was not significantly associated with dual method use at last sex for among HIV-infected men (aOR, 0.62; 95% CI, 0.27–1.44) or women (aOR, 1.21; 95% CI, 0.59–2.47).

Conclusion: Dual method use was low among all HIV-infected individuals, irrespective of their partner's HIV status. Given these findings, we

recommend greater efforts to encourage HIV providers to counsel their patients about the importance of dual method use to prevent both unintended pregnancy and sexually transmitted infections.

Sub-Saharan Africa (SSA) remains disproportionately affected by the HIV pandemic compared with other regions in the world. As the region struggles to decrease HIV-related morbidities and mortality, new infections have remained persistently high, accounting for almost two thirds of the global total of new HIV infections.¹ Unintended pregnancies are also high in this part of the world. The high rate of unintended pregnancies contributes to the high rates of unsafe abortions, maternal morbidity, and maternal mortality in the region.² Malawi, a country in SSA, has an overall HIV prevalence of 10.6%³ and unintended pregnancy rate of 41%.⁴ The high unintended pregnancy rate can be attributed to low contraceptive prevalence rate (59%) and high unmet need for family planning (19%) among Malawian women.⁴

The HIV serodiscordant couples are faced with the dual challenge of preventing HIV transmission to the uninfected partner and avoiding unintended pregnancy. The World Health Organization recommends dual (contraceptive) method use among serodiscordant couples.⁵ Dual method use entails use of condoms and another effective birth control method to avert unintended pregnancy and prevent transmission of HIV and other sexually transmitted infections (STIs) to uninfected partners. Thus, dual method use has the potential to reduce new HIV infections among serodiscordant sexual partners and prevent unintended pregnancies concurrently. Through prevention of unintended pregnancies, dual method use can also lead to reduced mother-to-child HIV transmission. These two reductions support achievement of Sustainable Development Goal number 3, which is to end the HIV/AIDS epidemic by 2030.⁶

Despite the recommendation, low rates of dual method use among people living with HIV have been reported in Brazil, Nigeria, and Thailand.^{7–9} In SSA, limited data exist on dual method use in the general population, as well as among HIV-infected men and women in serodiscordant relationships, a population at high risk of HIV transmission. Therefore, in this analysis, we used data from a cross-sectional study in Malawi to estimate the prevalence of dual method use among HIV-infected men and women and assess the association between couple serodiscordance and dual method use.

METHODS

We conducted a secondary data analysis of data from a cross-sectional study that evaluated knowledge, attitudes, and practices for reproductive health among HIV-infected men and women receiving HIV care in Lilongwe, Malawi. The cross-sectional study was approved by Malawi National Health Sciences Research Committee,

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the Emory University Institutional Review Board, and the University of North Carolina at Chapel Hill Institutional Review Board.

Details about the design and conduct of the cross-sectional study have already been described.¹⁰ In brief, the study enrolled HIV-infected individuals attending the Lighthouse Trust clinics at Kamuzu Central Hospital and Bwaila Hospital (Martin Preuss Clinic) in Lilongwe, Malawi, from September 26, 2013, to December 20, 2013. Potential participants were eligible for enrollment in the study if they¹: were between the ages of 18 and 45 years,² spoke Chichewa (the most commonly spoken local language) fluently,³ had a sexual partner within the past 6 months,⁴ had a documented HIV positive status, and⁵ were a registered client at either Lighthouse clinic. Once enrolled, the study participant completed a face to-face paper-based questionnaire administered by a trained research assistant.

The questionnaire captured information on¹: demographics,² partner HIV status,³ condom use,⁴ sexual history and current sexual behavior,⁵ fertility intent,⁶ contraceptive knowledge, attitudes, and use,⁷ disclosure of HIV status to their partner, and⁸ ante-retroviral therapy (ART) use.

Variable Definitions and Classification

Main Exposure

Our primary exposure variable was serodiscordance, defined as the participant reporting that their most recent sexual partner was known to be HIV-uninfected.

Main Outcome

The primary outcome variable was dual method use. We identified participants as dual method users if they reported using condoms and another birth control method concurrently during the last time they had sex. The other birth control methods used included the intrauterine contraceptive device, levonorgestrel or etonorgestrel implant, depot medroxyprogesterone acetate (DMPA) injectable, oral contraceptives (OC), emergency contraception, female sterilization/tubal ligation, and male sterilization/vasectomy. We then compared condom use versus modern contraceptive use among dual method users to ascertain if there was a gap in dual method use and determine whether the gap was due to lack of condoms use or lack of use of modern contraceptives.

Potential Confounders and Effect Measure Modification

Based on previous literature, we identified the following variables from the survey as potential confounders of the association between serodiscordance and dual contraceptive method use: age, education (no education, primary, secondary and > secondary), marital status (married and not currently married), partnership duration (≤ 1 year and > 1 year), number of sexual partners in the past month (none, 1, and > 1), desire for more children (yes or no), time since HIV diagnosis (< 1 year, 1–5 years, 5–10 years, and > 10 years), whether participant was on ART or not, duration on ART, partner disclosure of HIV status (yes or no), ability to refuse sex if a partner did not want to use a condom (yes or no), and house floor materials (as a measure of socioeconomic status: earth/sand/dung, cement, and other).

To reduce sparse data in multivariable model for women, we collapsed education into three categories: no education, primary, and \geq secondary. The category for number of sexual partners in the past month was also collapsed into 2: no partner and ≥ 1 partner.

The HIV-infected individuals who are on ART would have suppressed viral load and reduced risk of transmitting the HIV virus to their sexual partners. Individuals who are virally suppressed may be less willing to use a condom compared with those who are

not on ART. We therefore assessed if ART status is an effect measure modifier (EMM) of the association between serodiscordance and dual method use in this population. We also evaluated for EMM by desire for more children (fertility intent) because those that desire for more children would be thought to be less likely to use dual methods.

Statistical Analyses

Because report of contraceptive use may differ between men and women, we conducted separate analyses for men and women. In univariable analyses, we used Fisher exact test and Wilcoxon rank sum test to assess for associations between potential confounders and both serodiscordance and dual contraceptive method use. EMM was assessed using Breslow-Day test of homogeneity of the odds ratios. A priori, all variables that yielded a *P* value of 0.2 or less in the univariable analysis with either serodiscordance or dual method use were included in the multivariable model. Multivariable logistic regression was used to estimate adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for the association between serodiscordance and dual contraceptive method. All participants who had missing data on either serodiscordance status or dual method use were excluded from the analyses.

All statistical analyses were performed in Stata 14.1 (Stata Corp LP, College Station, TX).

RESULTS

Of the 562 participants enrolled, 308 (54.8%) were women. For this analysis, we excluded 2 participants (1 man and 1 woman) who had missing data for serodiscordance and 5 women with missing data for dual method use.

Among Women

We included 302 women in the analyses, who had a median age of 32 years (interquartile range [IQR], 27–37). The median time since HIV diagnosis was 4 years (IQR, 2–7). Of the 302 women, 256 (84.8%) were married, 269 (91.5%) were in a sexual partnership for more than 1 year, and 246 (83.1%) had only 1 sexual partner in the past month (Table 1). Among the 268 (88.7%) women who were on ART, 52 (17.2%) had been on ART for less than 1 year. The number of women in a known serodiscordant relationship at last sex was 57 (18.9%). There were no statistically significant differences in age, education, marital status, partnership duration, number of sexual partners in the past month, fertility intent, disclosure of HIV status to recent partner, time since HIV diagnosis, ART status and duration, partner disclosure of STI, ability to refuse sex if a partner did not want to use a condom, and house floor materials between women who were in a known serodiscordant relationship at last sex and those who were in a known seroconcordant relationship.

Eighty (26.5%) women were utilizing dual methods at last sex. Among dual method users, the DMPA injection (48.7%) and implants (27.5%) were the most commonly-used second methods used together with condoms (Table 2). Compared with women who were not using dual methods at last sex, more women who did had completed secondary education (60.0% vs 24.3%, *P* = 0.01), and more had the ability refuse sex if partner did not want to use a condom (75.0% vs 45.9%, *P* < 0.001) (Table 3). Fewer women (20.0%) who were using dual methods at last sex desired to have more children compared with those who were not using dual methods (37.8%, *P* = 0.004). More women who were on ART (159/268, 59.3%) reported that their partners used condoms than among those who were not on ART (13/34, 38.2%, *P* = 0.02). However, the effect of serodiscordance on dual method use did not significantly differ between women who were

TABLE 1. Univariable Analysis for Participant Characteristics and Serodiscordant Relationship Status—Women

Characteristics	N = 302	Serodiscordant		P
		Yes (n = 57)	No (n = 245)	
Age (IQR), y	32 (27–37)	30 (27–36)	33 (28–37)	0.11
Education				0.24
No Education	26 (8.6)	3 (5.3)	23 (9.4)	
Primary	124 (41.1)	21 (36.8)	103 (42.0)	
Secondary	142 (47.0)	29 (50.9)	113 (46.1)	
> Secondary	10 (3.3)	4 (7.0)	6 (2.5)	
Marital status				0.16
Committed to	46 (15.2)	5 (8.8)	41 (16.7)	
Married	256 (84.8)	52 (91.2)	204 (83.3)	
Partnership duration, y				0.79
≤ 1	25 (8.5)	5 (9.1)	20 (8.4)	
> 1	269 (91.5)	50 (90.9)	219 (91.6)	
No. sexual partners in the past month				0.82
None	43 (14.5)	10 (17.5)	33 (13.8)	
1	246 (83.1)	46 (80.7)	200 (83.7)	
> 1	7 (2.4)	1 (1.8)	6 (2.5)	
Desire for more children				0.53
No	202 (66.9)	36 (63.2)	166 (67.8)	
Yes	100 (33.1)	21 (36.8)	79 (32.2)	
Disclosure of HIV status to recent partner				1.00
No	19 (6.3)	3 (5.3)	16 (6.6)	
Yes	282 (93.7)	54 (94.7)	228 (93.4)	
Time since HIV diagnosis, y	4 (2–7)	4.5 (2.5–6.5)	4 (2–7)	0.98
On ART				0.82
Not on ART	34 (11.3)	7 (12.3)	28 (11.0)	
On ART	268 (88.7)	50 (87.7)	218 (89.0)	
Time on ART, y				0.88
< 1	52 (17.2)	11 (19.3)	41 (16.7)	
1–5	140 (46.4)	24 (42.1)	116 (47.4)	
5–10	68 (22.5)	14 (24.6)	54 (22.0)	
> 10	42 (13.9)	8 (14.0)	34 (13.9)	
Partner disclosure of STI				0.42
No	90 (30.3)	14 (25.4)	76 (31.4)	
Yes	207 (69.7)	41 (74.6)	166 (68.6)	
Ability to refuse sex if a partner did not want to use a condom				0.77
No	138 (46.3)	24 (43.6)	114 (46.9)	
Yes	160 (53.7)	31 (56.4)	129 (53.1)	
House floor made of				0.39
Earth	58 (19.3)	9 (15.8)	49 (20.1)	
Cement	237 (78.7)	46 (80.7)	191 (78.3)	
Other	6 (2.0)	2 (3.5)	4 (1.6)	

TABLE 2. Distribution of Modern Contraceptive Method Use Among Dual Method Users (ie, Another Method Used in Addition to Condoms)

	Women (n = 80)		Men (n = 63)	
	n (%)	n (%)	n (%)	n (%)
IUCD	3 (3.8)	2 (3.1)		
Implant	22 (27.5)	16 (25.0)		
Injection	39 (48.7)	29 (45.3)*		
Pill	8 (10.0)	7 (11.0)		
Female sterilization/tubal ligation	8 (10.0)	0 (0.0)		
Male sterilization/vasectomy	0 (0)	10 (15.6)*		

*One participant reported injection and male sterilization.

on ART (OR, 1.27; 95% CI, 0.61–2.57) and those who were not on ART (OR, 0.96; 95% CI, 0.12–12.50; *P* = 0.82). We did not find any evidence of effect measure modification of the association between serodiscordance and dual method use even when ART was categorized as 1 year or less versus ART use longer than 1 year. We also did not find evidence of effect measure modification of the association between serodiscordance and dual method use by fertility intent (*P* value of 0.97).

Among the 57 women who were in a serodiscordant relationship at last sex, 17 (29.8%) reported using dual methods at last sex. Among the 245 women who were in a seroconcordant relationship at last sex, 63 (25.7%) were using dual methods at last sex. Serodiscordance at last sex was not significantly associated with dual contraceptive method utilization among women in unadjusted analysis (OR, 1.23; 95% CI, 0.65–2.32). They were also not significantly associated after adjusting for age, education, number of sexual partners in the past month, desire for more children, ART

TABLE 3. Univariable Analysis for Participant Characteristics and Dual Method Use—Women

Characteristics	Dual Method		P
	Yes (n = 80)	No (n = 222)	
Age (IQR), y	32 (27–36)	33 (28–37)	0.20
Education			
No education	7 (8.8)	19 (8.6)	0.01
Primary	25 (31.2)	99 (44.6)	
Secondary	48 (60.0)	94 (42.3)	
> Secondary	0 (0.0)	10 (4.5)	
Marital status			
Committed to	9 (11.3)	37 (16.7)	0.28
Married	71 (88.7)	185 (83.3)	
Partnership duration, y			0.49
≤ 1	5 (6.3)	20 (9.3)	
> 1	74 (93.7)	195 (90.7)	
No. sexual partners in the past month			
None	8 (10.3)	35 (16.1)	0.11
1	70 (89.7)	176 (80.7)	
> 1	0 (0.0)	7 (3.2)	
Desire for more children			0.004
No	64 (80.0)	138 (62.2)	
Yes	16 (20.0)	84 (37.8)	
Disclosure of HIV status to recent partner			0.12
No	2 (2.5)	17 (7.7)	
Yes	78 (97.5)	204 (92.3)	
Time since HIV diagnosis	4 (3–8)	4 (2–7)	0.28
On ART			
Not on ART	5 (6.3)	29 (13.1)	0.15
On ART	75 (93.7)	193 (86.9)	
Time on ART, y			
< 1	14 (17.5)	38 (17.1)	
1–5	39 (48.7)	101 (45.5)	0.72
5–10	19 (23.8)	49 (22.1)	
> 10	8 (10.0)	34 (15.3)	
Partner disclosure of STI			0.89
No	25 (31.3)	65 (30.0)	
Yes	55 (68.7)	152 (70.0)	
Ability to refuse sex if a partner did not want to use a condom			<0.001
No	20 (25.0)	118 (54.1)	
Yes	60 (75.0)	100 (45.9)	
House floor made of			0.83
Earth	14 (17.7)	44 (19.8)	
Cement	63 (79.8)	174 (78.4)	
Other	2 (2.5)	4 (1.8)	

status, disclosure of HIV status to recent partner, and ability to refuse sex without condoms (aOR, 1.21; 95% CI, 0.59–2.47).

Among Men

We included 253 men in the analyses, who had a median age of 37 years (IQR, 33–41 years). The median time since HIV diagnosis was 3 years (IQR, 1–7 years). Of these, 236 men (93.3%) were married, 233 (92.8%) were in a sexual partnership for more than 1 year, and 208 (84.5%) had only 1 sexual partner in the past month (Table 4). Among the 221 (87.3%) men who were on ART, 61 (24.2%) had been on ART for less than 1 year. The number of men in a known serodiscordant relationship at last sex was 44 (17.4%). More men known to be in a serodiscordant relationship at last sex (65.9%) had completed secondary school than those known to be in a seroconcordant relationship (42.1%, $P = 0.003$). There were no notable differences in the other characteristics between men who were in a known serodiscordant relationship at last sex and those who were in a seroconcordant relationship.

Sixty-three (24.9%) men were in a relationship that used dual methods at last sex. Similar to women, the male dual method users reported that the DMPA injection (45.3%) and implants (25.0%) were

the most commonly used methods with condoms (Table 2). More men who were using dual methods at last sex had the ability to refuse sex if their partner did not want to use a condom (82.5% vs 68.1%, $P < 0.04$) than those who were not using dual methods (Table 5). Fewer men (17.5%) who were using dual methods at last sex desired to have more children than those who were not using dual methods (31.5%, $P = 0.04$). Among men, condom use did not differ by ART status for those on ART (151 [68.3%] of 221) versus those not on ART (19 [59.4%] of 32, $P = 0.31$). The effect of serodiscordance on dual method use also did not differ between men who were on ART (OR, 0.73; 95% CI, 0.27–1.76) and those who were not on ART (OR, 1.11; 95% CI, 0.02–23.96, $P = 0.75$). Among men, we did not find any evidence of effect measure modification of the association between serodiscordance and dual method use even when ART was categorized as 1 year or less versus ART use longer than 1 year. We also did not find evidence of effect measure modification of the association between serodiscordance and dual method use by fertility intent (P value of 0.18).

Among 44 men who were in a serodiscordant relationship at last sex, 9 (20.5%) reported using dual methods at last sex. Among the 209 men who were in a seroconcordant relationship at last sex, 54 (25.8%) reporting using dual methods at last sex.

TABLE 4. Univariable Analysis for Participant Characteristics and Serodiscordant Relationship Status—Men

Characteristics	N = 253	Serodiscordant		P
		Yes (n = 44)	No (n = 209)	
Age (IQR), y	37 (33–41)	37 (34–40)	37 (33–41)	0.80
Education				0.003
No education	10 (3.9)	1 (2.3)	9 (4.3)	
Primary	114 (45.1)	10 (22.7)	104 (49.8)	
Secondary	117 (46.3)	29 (65.9)	88 (42.1)	
> Secondary	12 (4.7)	4 (9.1)	8 (3.8)	
Marital status				0.51
Committed to	17 (6.7)	4 (9.1)	13 (6.2)	
Married	236 (93.3)	40 (90.9)	196 (93.8)	
Partnership duration, y				1.0
≤ 1	18 (7.2)	3 (7.0)	15 (7.2)	
> 1	233 (92.8)	40 (93.0)	193 (92.8)	
No. sexual partners in the past month				0.41
None	26 (10.6)	2 (4.8)	24 (11.8)	
1	208 (84.5)	39 (92.9)	169 (82.8)	
> 1	12 (4.9)	1 (2.3)	11 (5.4)	
Desire for more children				0.14
No	180 (72.3)	36 (81.8)	144 (70.2)	
Yes	69 (27.7)	8 (18.2)	61 (29.8)	
Disclosure of HIV status to recent partner				0.70
No	12 (4.8)	1 (2.3)	11 (5.3)	
Yes	240 (95.2)	43 (97.3)	197 (94.7)	
Time since HIV diagnosis, y	3 (1, 7)	5 (1, 7)	3 (1, 6)	0.31
On ART				0.32
Not on ART	32 (12.7)	3 (6.8)	29 (13.9)	
On ART	221 (87.3)	41 (93.2)	180 (86.1)	
Time on ART, y				0.72
< 1	61 (24.2)	11 (25.6)	50 (23.9)	
1–5	93 (36.9)	14 (32.6)	79 (37.8)	
5–10	61 (24.2)	13 (30.2)	48 (23.0)	
> 10	37 (14.7)	5 (11.6)	32 (15.3)	
Partner disclosure of STI				0.27
No	70 (27.9)	9 (20.5)	61 (29.5)	
Yes	180 (72.1)	35 (79.5)	146 (70.5)	
Ability to refuse sex if a partner did not want to use a condom				0.46
No	71 (28.3)	10 (22.7)	61 (29.5)	
Yes	180 (71.7)	34 (77.3)	146 (70.5)	
House floor made of				0.07
Earth	76 (30.0)	8 (18.2)	68 (32.5)	
Cement	177 (70.0)	36 (81.8)	141 (67.5)	

TABLE 5. Univariable Analysis for Participant Characteristics and Dual Method Use—Men

Characteristic	Dual Method		P
	Yes (n = 63)	No (n = 190)	
Age (IQR), y	38 (33–41)	37 (33–41)	0.71
Education			0.40
No education	2 (3.2)	8 (4.2)	
Primary	33 (52.4)	81 (42.4)	
Secondary	24 (38.1)	94 (49.2)	
> Secondary	4 (6.3)	8 (4.2)	
Marital status			0.08
Committed to	1 (1.6)	16 (8.4)	
Married	62 (98.4)	174 (91.6)	
Partnership duration, y			0.57
≤ 1	3 (4.8)	15 (8.0)	
> 1	60 (95.2)	173 (92.0)	
No. sexual partners in the past month			0.74
None	6 (9.5)	20 (10.9)	
1	53 (84.1)	155 (84.7)	
> 1	4 (6.4)	8 (4.4)	
Desire for more children			0.04
No	52 (82.5)	128 (68.8)	
Yes	11 (17.5)	58 (31.2)	
Disclosure of HIV status to recent partner			0.30
No	1 (1.6)	11 (5.8)	
Yes	62 (98.4)	178 (94.2)	
Time since HIV diagnosis	3 (1–7)	4 (1–7)	0.44
On ART			0.39
Not on ART	10 (15.9)	22 (11.6)	
On ART	53 (84.1)	168 (88.4)	
Time on ART, y			0.19
< 1	16 (25.4)	45 (23.8)	
1–5	22 (34.9)	71 (37.6)	
5–10	11 (17.5)	50 (26.4)	
> 10	14 (22.2)	23 (12.2)	
Partner disclosure of STI			0.87
No	18 (28.6)	52 (27.7)	
Yes	45 (71.4)	136 (72.3)	
Ability to refuse sex if a partner did not want to use a condom			0.04
No	11 (17.5)	60 (31.9)	
Yes	52 (82.5)	128 (68.1)	
House floor made of			0.08
Earth	13 (20.6)	63 (33.2)	
Cement	50 (79.4)	127 (66.8)	

Serodiscordance at last sex was not significantly associated with dual contraceptive method utilization among men in unadjusted analysis (OR, 0.75; 95% CI, 0.33–1.63). They were also not significantly associated after adjusting for marital status, desire for more children, time on ART, ability to refuse sex without condoms, and house floor material (aOR, 0.62; 95% CI, 0.27–1.44).

Among both women and men, a great proportion (30.5% for women, 42.3% for men) was using condoms but not modern contraceptives (Table 6). In contrast, only 17.5% of women and

12.3% men were using a modern contraceptive but not condoms. The remaining 25.5% of women and 22.5% of men were using neither condoms nor modern contraceptives.

DISCUSSION

In our HIV-infected population in Lilongwe, we found couple serodiscordance rates of 18.9% and 17.4% among women and men, respectively, and dual method use rates to be only 26.5% and 24.9%, respectively. In contrast, a study in Brazil found that 72.0% of HIV-infected women were using dual methods.⁹ However, our findings are in line with studies done in South Africa, where rates of dual method use in the general population were below 30% despite high rates of HIV.^{11,12} Serodiscordance did not have a major impact on dual method use among our study participants. Among those in a serodiscordant relationship, only 29.8% of women and 20.5% of men reported dual method use at last sex. This finding is concerning because at least 30% of new HIV-1 transmissions in Africa occur within stable serodiscordant partnerships, making HIV-1 serodiscordant couples one of the highest-risk populations for HIV-1 transmission and a key group for targeting HIV-1 prevention interventions.¹³ Encouraging these couples to use dual methods needs to be a priority for curbing the virus in a region where more than a million new infections occur every year.¹⁴

When we compared condom use with modern contraceptive method use among nondual method users in our sample, we found that more men and women used condoms alone than modern contraceptive methods alone. This finding is consistent with findings from studies done in Thailand,⁷ Brazil,⁹ and India.¹⁵ Therefore, to get more men and women to use dual methods, health workers need to remember to promote both condom use for prevention of STIs and modern contraception use for improved pregnancy protection, particularly among condom-only users who may think they are already using an effective method of contraception considering that condoms alone are not as effective at pregnancy prevention.

Our couple serodiscordance rates are similar to those reported in Nigeria,⁸ but lower than those reported in Brazil among HIV-infected women, where it was found to be 47.0%.⁹ Similar to our study, studies from Kenya and Brazil also found that dual method utilization was negatively associated with desire for more children and positively associated with ability to refuse sex if partner did not want to use a condom.¹⁶

Of particular significance is that among serodiscordant relationships in our study, 37% of HIV-infected men and 18% of HIV-infected women said that they desired more children. Safer conception strategies have been developed for serodiscordant couples in low resource settings where the risk of HIV transmission is high. Use of ART in itself by infected partners in serodiscordant relationships has already been shown to reduce viral load and risk of HIV transmission to their uninfected partners.¹⁷ Because adherence to ART is imperfect and genital shedding of HIV may occur even in the presence of suppressed plasma viral load, couples are advised to seek additional methods to reduce transmission risk.¹⁸

TABLE 6. Modern Contraceptive Method Use Versus Condom Use Among Women and Men Enrolled in the Study

Modern Contraceptive Method Used	Women (n = 302)		Men (n = 253)	
	Condom, n (%)	No Condom, n (%)	Condom, n (%)	No Condom, n (%)
Yes	80 (26.5%)	53 (17.5%)	63 (24.9%)	31 (12.3%)
No	92 (30.5%)	77 (25.5%)	107 (42.3%)	52 (20.6%)
Total	172	130	170	83

For serodiscordant couples with a seronegative female, condomless intercourse limited to the ovulation window, use of preexposure prophylaxis by the female while the male is virally suppressed on ART, STI treatment for both partners, are feasible options to reduce risk of HIV transmission while promoting safe conception in resource limited settings.^{19,20} For serodiscordant couples with a seronegative male, voluntary male medical circumcision, vaginal sperm insemination, STI treatment, and use of preexposure prophylaxis by the male have been shown to be safer and cost-effective methods for conception in resource-limited settings.^{21–25} We therefore recommend that health care providers and policy makers also promote awareness and use of these modalities to better meet reproductive health needs of serodiscordant couples in addition to broadening access to ART which is by far the most effective public health approach to prevent HIV transmission in low resource settings.

We also found some notable associations with education in our population. Among women, we did find that higher education was associated with dual method use which is in agreement with findings from studies done in Brazil, Uganda, United States, and China.^{9,12,26,27} In contrast, among men, having a higher education was not associated with dual method use. Women with higher education levels may have had greater knowledge about the benefits of dual method use or be more empowered to negotiate it than women with lower education levels. However, men's education did not influence dual method use, potentially because women are the users of the hormonal contraception rather than men.

Our study stands among a few that have analyzed dual method use in both HIV-infected men and women, particularly those in serodiscordant partnerships, a population at high risk of HIV transmission. Performing separate analyses for men and women allowed us to examine if serodiscordance had a different effect on dual method use among the two populations. However, the study participants' responses may have been affected by recall or social desirability bias. Because we did not interview couple dyads and the contraceptive and serodiscordance responses were all based on self-report, we could not verify responses. This may particularly be important in couples where women may perceive partner disapproval of contraception and thus not disclose method use. With that said, for all methods, other than sterilization, the proportions of use by method were similar by gender.

Another study limitation is that we conducted our study in an urban setting at a center of excellence for ART care, and our study population was relatively older, primary monogamous, and on ART longer than 1 year. Hence, our findings may not be generalizable to other populations, and there was likely selection bias among those who choose to participate in our study. In addition, due to small sample size, we did not use prevalence odds ratios because we anticipated having several predictors, and as a result, we were worried that we could experience problems with model convergence in the multivariable model, a common problem with risk models. We could have used prevalence rate ratios for the unadjusted estimates but for the sake of consistent reporting, we thought it would be better to report odds ratios for both unadjusted and adjusted estimates.

Finally, we were unable to assess for effect measure modification for the association between serodiscordance and dual method use by viral suppression because information on the participant's most recent viral load was not collected in the study. Instead, we assessed if ART use was an effect modifier. In addition, we were unable to ascertain from our data why the participants or their partners did or did not use dual methods. Further studies need to be done to determine why HIV-infected men and women do not use dual methods and if viral suppression affects its use, particularly those who are in serodiscordant relationships.

In conclusion, less than 20% of our HIV-infected participants reported that they were in a known serodiscordant relationship at last sex, and less than 30% reported dual method use. Serodiscordance was not associated with dual method use at last sex among either men or women. Given the low rate of dual method use in this HIV-infected population, we recommend greater efforts to encourage HIV providers to counsel their patients about the importance of dual method use to prevent unintended pregnancy, STIs, and HIV transmission.

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