

Safer Conception Among HIV-1 Sero-Discordant Couples in East Africa: Understanding  
Knowledge, Attitudes, and Experiences

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A thesis

submitted in partial fulfillment of the  
requirements for the degree of

Master of Public Health

University of Washington

2016

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Program Authorized to Offer Degree:

Epidemiology

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**Abstract**

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**Context:** Supporting people affected by HIV-1 in achieving their reproductive goals while minimizing the risk of HIV-1 transmission is a public health imperative.

**Background:** For HIV-1 serodiscordant couples, HIV-1 exposure and risk of transmission to the uninfected partner and unborn children is heightened during pregnancy attempts but safer conception strategies can mitigate risk. Understanding couples' choices and experiences with safer conception can be useful for programmatic recommendations as safer conception programs are scaled up.

**Methods:** 1013 high-risk, heterosexual HIV-1 serodiscordant couples from Kenya and Uganda were followed for two years in an open-label delivery study of integrated pre-exposure prophylaxis (PrEP) and antiretroviral therapy (ART), the Partners Demonstration Project. Annually, we assessed participant experience with safer conception strategies. Multivariate

logistic regression was used to characterize women who reported ever having used a safer conception strategy during their first annual visit.

**Results:** 859 couples were included in analysis. 66% of couples had HIV-infected women and 86% desired future children. The median age for women was 27 (interquartile range: 23-32). At the first annual visit, 32% of women reported use of a safer conception strategy ever in their life: 14% reported using ART, 16% PrEP, 3% self-insemination, and 2% STI treatment. Women who reported discussing their fertility desires with their male partners (adjusted odds ratio (aOR) = 1.91, 95% confidence interval (CI) 1.26-2.589), had no living children at the time of study enrollment (aOR = 1.71, 95% CI 1.14-2.57), and were HIV-uninfected (aOR = 1.56, 95% CI 1.11-2.20) were more likely to report having used at least one safer conception strategy.

**Conclusions:** HIV-1 prevention counseling for serodiscordant couples should integrate opportunities for couples to share their fertility desires and discuss preferences for safer conception strategies.

## INTRODUCTION

HIV-1 serodiscordant couples—stable couples in which one partner is HIV-1 infected and the other is not—are a key population for HIV-1 prevention interventions due to substantial HIV-1 exposure and high risk of transmission to the uninfected partner. In sub-Saharan Africa, clinical and mathematical modeling studies have estimated that 45-75% of HIV-1 infected individuals have an HIV-1 uninfected partner; thus HIV-1 serodiscordant couples are a sizable population<sup>1,2</sup>.

Globally, 20-50% of HIV-1 serodiscordant couples report desiring additional children and pregnancy desire is often given as a reason for engaging in condomless sex despite known HIV-1 risk<sup>3,4</sup>. Studies have also reported that among HIV-1 serodiscordant couples who became pregnant, HIV-status did not diminish desires to have children<sup>5,6</sup>. HIV-1 serodiscordant couples face a complex set of decisions about whether to satisfy their fertility desires. For couples who desire children, the sexual and perinatal transmission risks associated with conception and pregnancy can be substantially mitigated if pregnancies are planned and couples utilize “safer conception” strategies<sup>7-10</sup>.

Counseling on serodiscordancy, repeated HIV-1 testing for the uninfected partner, and antiretroviral therapy (ART) initiation and sustained use lies at the foundation of HIV-1 prevention services for HIV-1 serodiscordant couples. Counseling can be further tailored to accommodate a couple’s fertility goals, which can include delaying, avoiding or achieving pregnancy, and change frequently throughout a lifetime. When couples desire pregnancy, safer conception strategies encompass a variety of options: antiretroviral-based strategies (including ART use by the HIV-1 infected partner and pre-exposure prophylaxis [PrEP] use by the HIV-1

uninfected partner), timing condomless sex to periods with peak fertility, STI treatment, basic fertility screening, medically-assisted reproduction, and male circumcision and vaginal self-insemination when the woman is the HIV-1 infected partner<sup>9-12</sup>.

In order to scale up effective safer conception programs to HIV-1 serodiscordant couples during pregnancy attempts, it is important to understand the choices couples make regarding safer conception to inform recommendations and priorities that encompass user experiences. In a large cohort of HIV-1 serodiscordant couples in Kenya and Uganda, we assessed couples' experiences using safer conception strategies in order to inform the design of safer conception programs.

## **METHODS**

The Partners Demonstration Project is an open-label delivery study of PrEP and ART as an integrated prevention strategy among 1013 high-risk heterosexual HIV-1-serodiscordant couples in Kenya and Uganda. In this study, all HIV-1 uninfected partners were offered PrEP, HIV-1 infected partners were referred for ART initiation according to national guidelines (initially CD4 count <350ul/mL, but as of December 2013 in Uganda<sup>18</sup> and June 2014 in Kenya<sup>13</sup>, all HIV-infected individuals in a sero-discordant relationship) and PrEP discontinuation was encouraged when HIV-1 infected partners had sustained ART use for at least 6 months. Simultaneous use of PrEP and ART in a HIV-1 sero-discordant couple increases the possibility for side effects within the dyad and has not been shown to be cost-effective<sup>14,15</sup>, given the efficiency of ART at reducing HIV-1 transmission by six months<sup>16,17</sup>. At the time of study enrollment, HIV-1 infected partners were not using ART, and HIV-1 uninfected partners had normal renal function and were able to be offered PrEP. Couples selected for enrollment were

defined as high risk using an externally validated scoring tool that encompasses demographic, clinical, and medical characteristics<sup>18</sup>. The primary study results estimate that the integrated PrEP and ART strategy reduced HIV-1 transmission by 96%<sup>19</sup>.

*Data collection.*

All participants attended quarterly study visits. For HIV-1 uninfected partners, visit procedures included HIV counseling and testing, PrEP provision, PrEP adherence counseling, and at 6-month intervals, creatinine testing. For HIV-1 infected partners, visit procedures included encouragement to initiate ART based on national guidelines, and CD4 and viral load testing at 6-month intervals. For all women, pregnancy testing was conducted when clinically indicated. HIV-1 infected women were able to enroll while pregnant but HIV-1 negative women were not. Couples were encouraged to attend visits together and study staff provided safer conception counseling, including discussion of HIV-1 transmission risk during pregnancy and pregnancy attempts and methods to mitigate risk when either partner indicated fertility desires. Study staff had extensive training on safer conception strategies, however, there was no established protocol for the provision of counseling. Demographic, medical, and sexual behavior data, including participant fertility desires and intentions, were collected via interviewer-administered surveys during all visits. At enrollment and annual visits, additional data on participant knowledge, willingness to use, and experiences with safer conception practices were collected. Participants were not prompted with each possible strategy but asked to list strategies familiar to them to assess knowledge. Willingness to use and experiences were only assessed among those who indicated knowledge of a method. For this analysis, we focused specifically on the responses to the question: “What things have you done to reduce risk when trying to conceive a baby?”

### *Statistical methods.*

We used descriptive methods to summarize the study population and experience with individual safer conception strategies. Logistic regression was used to identify demographic, medical, and behavioral characteristics of women who reported using at least one safer conception method at their first annual visit. We decided *a priori* to adjust our final model for HIV-status and age of the female partner. In addition, the final model included any variables that were associated with having used at least 1 safer conception strategy (at a p-value of <0.1).

## **RESULTS**

Of the 1013 couples enrolled in the Partners Demonstration Project, 859 (85%) were included in our final analysis: 154 were excluded due to missing outcome data, primarily related to the female partner missing the first annual study visit. In the majority of couples, the female partner was HIV-infected (66%). The median age for men and women was 32 (interquartile range [IQR] 27-40) and 27 (IQR 23-32), respectively. At enrollment, 672 (78%) women had at least one living child, 241 (28%) were using highly effective contraception, and 116 (20%) of the HIV-1 infected women were pregnant. Among HIV-1 infected women, 121 (21%) were not pregnant and did not report a desire for any additional biological children. Pregnancy was an exclusion criterion for HIV-1 uninfected women and 118 (41%) reported no desire for future biological children. The HIV-infected partner, at baseline, had a median CD4 count of 436 cells/mm<sup>3</sup> (IQR 296-662) and a median viral load of 4.6 log<sub>10</sub> copies/mL (IQR 3.7-4.9).

At 1 year post enrollment, women were most knowledgeable about medication-based strategies (PrEP [59%], ART [58%]), timed condomless sex (50%), and self-insemination (23%)



(Figure 1). Less than 10% of women were knowledgeable about male circumcision (8%), artificial insemination (6%), STI treatment (8%), and sperm washing (5%). Women who were knowledgeable about a method appropriate for their HIV-status often expressed willingness to use that method (ART [91%], timed condomless sex [84%], PrEP [81%], and self-insemination [72%]). However, less than half of the women described male circumcision (3%), artificial insemination (16%), STI treatment (41%) and sperm washing (48%) as safer conception strategies they would be willing to try or suggest to their partner

Overall, 42% of couples reported experience using at least one safer conception method by the time of their first annual visit, including 274 (32%) women and 284 (34%) men. Reports of using safer conception strategies were often similar between partners but 19% of couples had one partner report use of a safer conception method while the other partner reported no usage. The most commonly cited methods used were: timed condomless sex (reported by 147 [17%] women), ART (reported by 82 [14%] HIV-1 infected women), PrEP (reported by 46 [16%] HIV uninfected women), and STI treatment (reported by 20 [2%] women). One HIV-infected male participant reported having used sperm washing and two HIV-uninfected men reported having used artificial insemination. No women reported experience with sperm washing or artificial insemination.

In our final multiple regression model, women who reported discussing fertility desires with their male partners (adjusted odds ratio (aOR) = 1.91, 95% confidence interval (CI) 1.26-2.89), were HIV-uninfected (aOR = 1.56, 95% CI 1.11-2.20), reported not earning income (aOR = 1.60, 95% CI 1.16-2.22), reported having no living children (aOR = 1.71, 95% CI 1.14-2.57), and were not using a highly effective form of birth control at study enrollment (aOR = 1.71, 95% CI 1.14-2.56) were more likely to report having used at least one safer conception method.

Women (or those with partners) with WHO stage 2 disease, experiencing symptoms of HIV infections such as recurrent respiratory infections and/or moderate unexplained weight loss<sup>20</sup>, (aOR = 1.98, 95% CI 1.41-2.77) were also more likely to report using at least one safer conception method.

## **DISCUSSION/CONCLUSIONS**

Over two-thirds of women participating in the Partners Demonstration Project reported a desire to have children in the future, yet less than half of women reported ever having used a safer conception strategy. Importantly, our results capture women's perceptions of their use of safer conception strategies, which encompasses their fertility intention and their perception of using a strategy for the purpose of prevention during pregnancy attempts. In the primary analysis from this cohort, PrEP use and ART use were very high<sup>19</sup> and may not have been recognized as providing protection from HIV-1 transmission during pregnancy attempts specifically, as it was providing general HIV-1 protection, regardless of pregnancy intention. Timed-condomless sex and ARV-based strategies were the most commonly reported safer conception strategies. Women were more likely to report use of a safer conception strategy at their annual visit if they also reported discussing fertility desires with their partner.

ART and STI treatment are already recommended for HIV-1 serodiscordant couples regardless of fertility intentions. Since pregnancy attempts necessitate condomless sex, this is an ideal period for time-limited use of PrEP, either in conjunction with additional strategies or as the primary prevention strategy to substitute for condom use and when HIV-1 viremia is unsuppressed. Among HIV-uninfected partners who recognized use of PrEP as a safer

conception strategy, acceptability was >80% for both men and women who were knowledgeable of it as a strategy. This acceptability may be higher than in the general population, as these participants had enrolled in a study that involved them and their partner using ART and PrEP. While studies have shown that concurrent use of PrEP and ART is not cost-effective, during the high risk period when trying to conceive, it may be appropriate to utilize the combination among HIV-uninfected individuals whose preference is for self-controlled prevention <sup>14,21</sup>.

In the Partners Demonstration Project, participants were asked about their fertility desires during quarterly visits. Asking about fertility desires routinely at medical appointments is easily integrated into existing workflows and provides an opening for discussion of safer conception methods. Importantly, it also normalizes the idea that couples and individuals affected by HIV have a right to satisfy their fertility desires and having biological children safely is an option to fulfill those desires. Women wanting to delay or avoid pregnancy often do not use effective contraception and fertility desires can change rapidly. Clinician driven counseling about fertility desires is one way to improve uptake of effective, reversible contraception when pregnancy is not immediately desired and promote women and men's empowerment to plan pregnancy and family building. This could be accomplished with a simple question about fertility desires, as was done in this study, or could be part of a more complex process. Other studies have shown clinician discomfort with safer conceptions as a major barrier<sup>22,23</sup>, so clinician training would likely be an aspect of successful programs.

Strengths of the study include the outcome being a self-recognized usage of a safer conception strategy, as participants were not prompted with a list of safer conception methods when asked about knowledge, acceptability, or usage. Therefore, we can be more confident that women who reported using safer conceptions methods truly had, due to the reduction in potential

for social desirability bias to occur. Future research may use pharmacy records to identify women who do not self-identify as using safer conception strategies.

Communication with providers and within couples is important for the successful uptake of safer conception strategies among HIV-1 serodiscordant couples. Clinicians were trained on safer conception as a concept and on specific strategies, but there was no algorithm to guide clinician recommendations or safer conception counseling and providers may have prioritized different messages within and between sites. Fertility desires can change rapidly and, in this study, women who were HIV-uninfected were less likely to report having used a safer conception strategy. This finding highlights the importance of repeated discussions of fertility desires and HIV-risk reduction during pregnancy attempts with all women of childbearing age in areas with high HIV prevalence. Medication-based safer conception strategies along with self-insemination and timed condomless sex were the most known and acceptable options and are also less expensive and logistically complicated. Programs seeking to support these couples to attain fertility goals can provide opportunities for couples to talk about their fertility desires, normalize these desires and feelings, and foster communication within couples about safer conception practices.

<b>Table 1: Cohort demographics at baseline</b>					
		<b>Female partner HIV-uninfected</b>		<b>Female partner HIV-infected</b>	
	<b>All</b>	<b>Women N=290</b>	<b>Men N=290</b>	<b>Women N=569</b>	<b>Men N=569</b>
	<b>N (%)</b>	<b>N (%)</b>	<b>N (%)</b>	<b>N (%)</b>	<b>N (%)</b>
<b>Age</b>					
<24 years	420 (24.45)	72 (24.8)	17 ( 5.9)	235 (41.3)	96 (16.9)
25-29 years	442 (25.73)	78 (26.9)	47 (16.2)	160 (28.1)	157 (27.6)
30-34 years	333 (19.38)	61 (21.0)	63 (21.7)	85 (14.9)	124 (21.8)
35+ years	523 (30.44)	79 (27.2)	163 (56.2)	89 (15.6)	192 (33.7)
<b>Marital status</b>					
Married	1647 (95.87)	284 (97.9)	283 (97.6)	537 (94.4)	543 (95.4)
Single	71 (4.13)	6 ( 2.1)	7 ( 2.4)	32 ( 5.6)	26 ( 4.6)
<b>Self-earned income</b>					
None	340 (19.79)	96 (33.1)	4 ( 1.4)	219 (38.5)	21 ( 3.7)
Yes	1378 (80.21)	194 (66.9)	286 (98.6)	350 (61.5)	548 (96.3)
<b>Living children</b>					
0	390 (22.7)	29 (10.0)	31 (10.7)	158 (27.8)	172 (30.2)
1	408 (23.75)	59 (20.3)	50 (17.2)	174 (30.6)	125 (22.0)
2+	920 (53.55)	202 (69.7)	209 (72.1)	237 (41.7)	272 (47.8)
<b>Living children with study partner</b>					
0	918 (53.43)	103 (35.5)	101 (34.8)	357 (62.7)	357 (62.7)
1	336 (19.56)	62 (21.4)	65 (22.4)	105 (18.5)	104 (18.3)
2+	464 (27.01)	125 (43.1)	124 (42.8)	107 (18.8)	108 (19.0)
<b>Sex acts with study partner in month prior</b>					
None	76 (4.42)	19 ( 6.6)	17 ( 5.9)	22 ( 3.9)	18 ( 3.2)
1-3	728 (42.37)	135 (46.6)	143 (49.3)	227 (39.9)	223 (39.2)
4-6	415 (24.16)	65 (22.4)	67 (23.1)	143 (25.1)	140 (24.6)
7+	499 (29.05)	71 (24.5)	63 (21.7)	177 (31.1)	188 (33.0)
<b>Condom use with study partner in prior month</b>					
100%	576 (33.53)	116 (40.00)	116 (40.00)	172 (30.23)	172 (30.23)
50-99%	228 (13.27)	32 (11.03)	32 (11.03)	82 (14.41)	82 (14.41)
<50%	844 (49.13)	125 (43.10)	125 (43.10)	297 (52.20)	297 (52.20)
No sex	70 (4.07)	17 (5.86)	17 (5.86)	18 (3.16)	18 (3.16)
<b>Contraceptive usage</b>					
None	427 (50.18)	159 (56.0)	---	268 (47.3)	---
Condoms only	77 (9.05)	25 ( 8.8)	---	52 ( 9.2)	---
Highly effective method*	239 (28.08)	100 (35.2)	---	139 (24.5)	---
Currently pregnant	108 (12.69)	0 ( 0.0)	---	108 (19.0)	---
<b>WHO staging</b>					
Stage 1	591 (68.8)	---	175 (60.3)	416 (73.1)	---
Stage 2	268 (31.2)	---	115 (39.7)	153 (26.9)	---
<b>CD4 count</b>					
<250	187 (17.91)	---	85 (29.4)	102 (18.0)	---
250-499	318 (30.46)	---	97 (33.6)	221 (38.9)	---
500-999	352 (33.72)	---	107 (37.0)	245 (43.1)	---
1,000+	187 (17.91)	---	85 (29.4)	102 (18.0)	---

<b>Table 1: Cohort demographics at baseline</b>					
		<b>Female partner HIV-uninfected</b>		<b>Female partner HIV-infected</b>	
	<b>All</b>	<b>Women N=290</b>	<b>Men N=290</b>	<b>Women N=569</b>	<b>Men N=569</b>
	<b>N (%)</b>	<b>N (%)</b>	<b>N (%)</b>	<b>N (%)</b>	<b>N (%)</b>
<b>Viral load (copies/ul)</b>					
<50	43 (5.08)	---	10 ( 3.5)	33 ( 5.9)	---
50-9,999	197 (23.29)	---	42 (14.6)	155 (27.8)	---
10,000-99,999	387 (45.74)	---	122 (42.4)	265 (47.5)	---
100,000+	219 (25.89)	---	114 (39.6)	105 (18.8)	---
<b>Perceived risk of HIV transmission to partner</b>					
High	250 (22.54)	---	57 (19.7)	193 (33.9)	---
Medium	360 (32.46)	---	140 (48.3)	220 (38.7)	---
Low	118 (10.64)	---	42 (14.5)	76 (13.4)	---
None	131 (11.81)	---	51 (17.6)	80 (14.1)	---
Unsure	250 (22.54)	---	57 (19.7)	193 (33.9)	---
<b>Fertility desires</b>					
None	461 (26.85)	118 (40.8)	109 (37.59)	121 (21.3)	113 (19.86)
Currently trying or pregnant	324 (18.87)	20 ( 6.9)	21 (7.24)	146 (25.7)	137 (24.08)
Within 3 years	546 (31.8)	87 (30.1)	91 (31.38)	172 (30.2)	196 (34.45)
In >3 years or unsure	386 (22.48)	64 (22.1)	69 (23.79)	130 (22.8)	123 (21.62)
<b>Discussed fertility desires with partner</b>					
No	367 (21.39)	70 (24.2)	51 (17.59)	131 (23.1)	115 (20.21)
Yes	1349 (78.61)	219 (75.8)	239 (82.41)	437 (76.9)	454 (79.79)

\*Highly effective contraceptive methods include birth control pills, IUDs, and hormonal injections.

**Table 2: Correlates of women reporting having used at least one safer conception strategy at the 1 year visit**

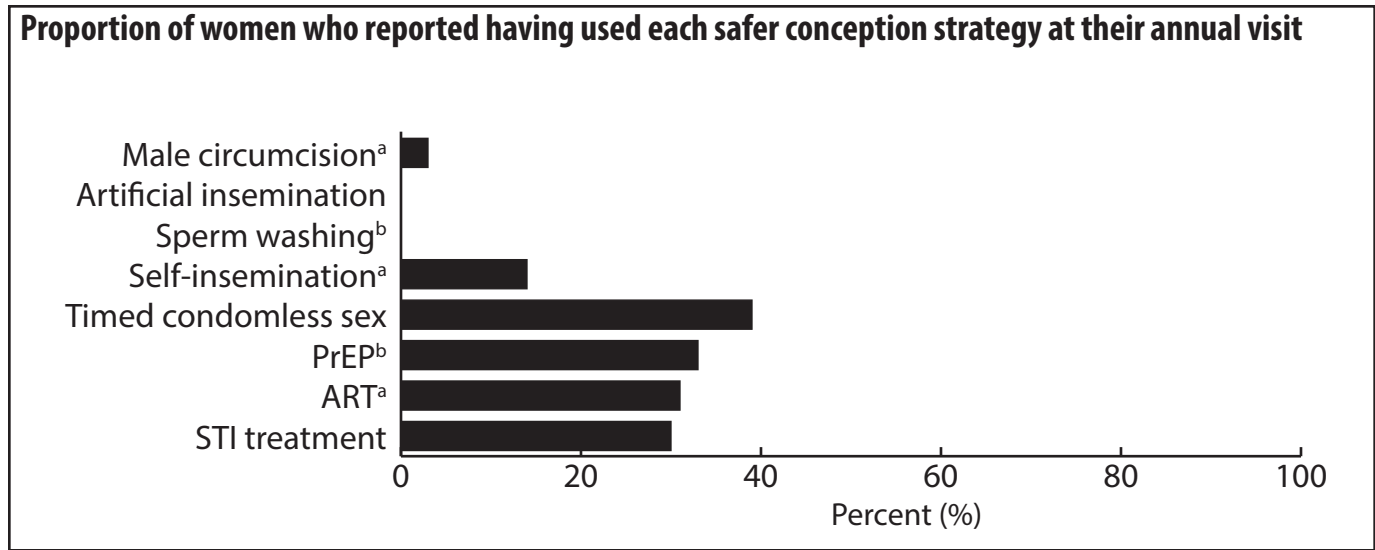
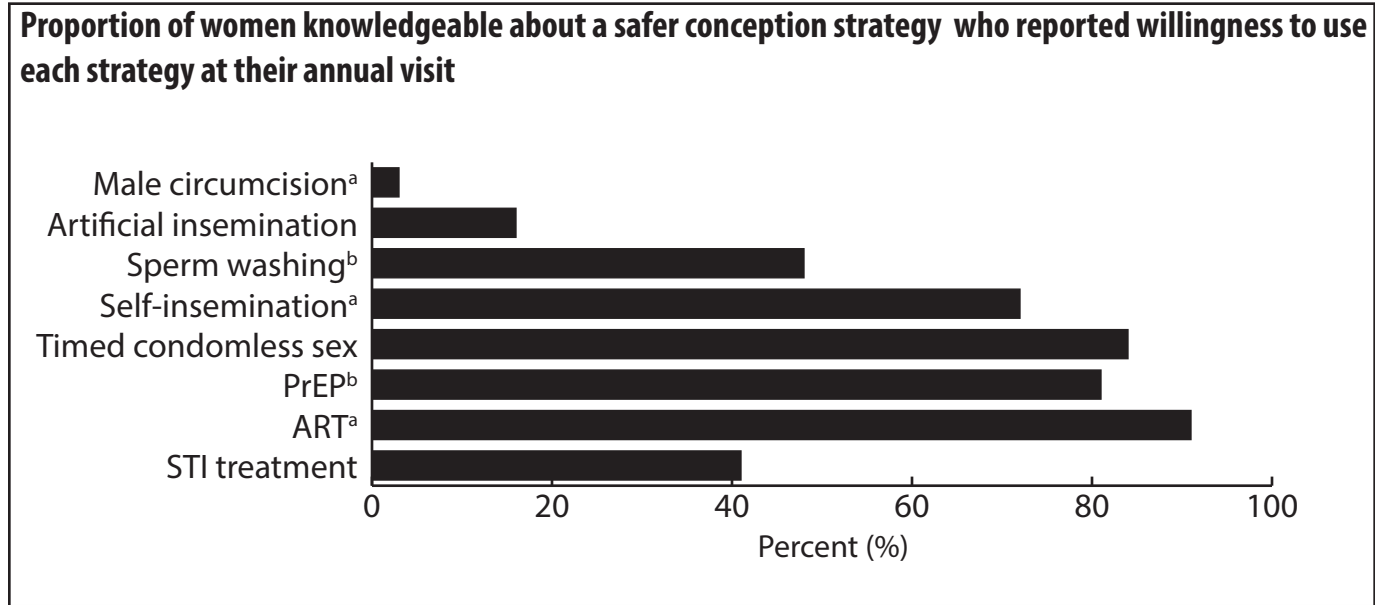
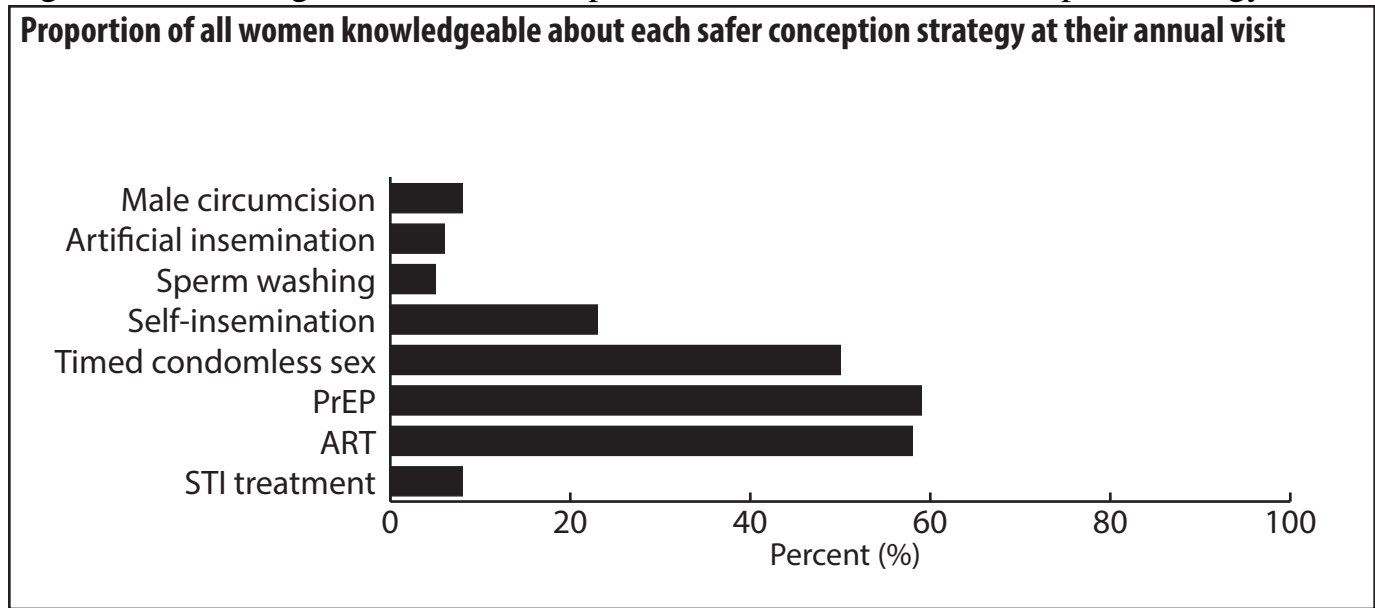
		Unadjusted		Multivariate <sup>1</sup>	
	n/N (%)	OR (95% CI)	p- value	OR (95% CI)	p- value
<b>Female partner's HIV-status</b>					
HIV-infected	99/290 (34.1)	1.00 (ref.)	---	1.00 (ref.)	---
HIV-uninfected	175/569 (30.8)	1.17 (0.86-1.58)	0.3	<b>1.56 (1.11-2.20)</b>	<b>0.011</b>
<b>Male partner's age</b>					
<24 years	44/113 (0.6)	1.00 (ref.)	---		
25-29 years	60/204 (0.7)	0.65 (0.40-1.06)	0.08		
30-34 years	69/187 (0.6)	0.92 (0.57-1.48)	0.7		
35+ years	101/355 (0.7)	0.62 (0.40-0.97)	0.04		
<b>Female partner's age</b>					
<24 years	118/307 (38.4)	1.00 (ref.)	---	1.00 (ref.)	---
25-29 years	75/238 (31.5)	0.74 (0.52-1.05)	0.09	1.05 (0.69-1.54)	0.916
30-34 years	43/146 (29.5)	0.67 (0.44-1.02)	0.06	1.12(0.64-1.75)	0.832
35+ years	38/168 (22.6)	0.47 (0.31-0.72)	<0.01	0.80 (0.44-1.26)	0.336
<b>Self-earned income</b>					
Yes	126/315 (40)	1.00 (ref.)	---	1.00 (ref.)	---
No	148/544 (27.2)	1.78 (1.33-2.39)	<0.01	<b>1.60 (1.16-2.22)</b>	<b>0.005</b>
<b>Living children</b>					
Yes (1+)	84/187 (44.9)	1.00 (ref.)		1.00 (ref.)	---
None	190/672 (28.3)	2.07 (1.48-2.89)	<0.01	<b>1.71 (1.14-2.57)</b>	<b>0.009</b>
<b>Living children with study partner</b>					
Yes (1+)	166/460 (0.6)	1.00 (ref.)	---		
None	108/399 (0.7)	1.52 (1.13-2.04)	<0.01		
<b>Unprotected sex with study partner in month prior</b>					
None	72/273 (26.4)	1.00 (ref.)	---	1.00 (ref.)	
Yes (1+)	202/586 (34.5)	1.47 (1.07-2.02)	0.02	1.26 (0.90-1.78)	0.184
<b>Contraceptive usage</b>					
Highly effective method	221/610 (36.2)	1.00 (ref.)	---	1.00 (ref.)	
None	52/241 (21.6)	2.06 (1.46-2.93)	<0.01	<b>1.71 (1.14-2.56)</b>	<b>0.010</b>
<b>WHO staging</b>					
Stage 1	163/591 (27.6)	1.00 (ref.)	---	1.00 (ref.)	
Stage 2	111/268 (41.4)	1.86 (1.37-2.51)	<0.01	<b>1.98 (1.41-2.77)</b>	<b>&lt;0.001</b>
<b>CD4 count</b>					
<250	54/187 (0.7)	1.00 (ref.)	---		
250-499	100/318 (0.7)	1.13 (0.76-1.68)	0.5		
500+	119/352 (0.7)	1.26 (0.86-1.85)	0.2		
<b>Viral load (copies/ul)</b>					
<50	10/43 (0.8)	1.00 (ref.)	---		
50-9,999	70/197 (0.6)	1.82 (0.85-3.91)	0.1		
10,000-99,999	139/387 (0.6)	1.85 (0.88-3.87)	0.1		
100,000+	54/219 (0.8)	1.08 (0.50-2.34)	0.8		
<b>Perceived risk of HIV transmission</b>					
None	74/250 (29.6)	1.00 (ref.)	---		

**Table 2: Correlates of women reporting having used at least one safer conception strategy at the 1 year visit**

		Unadjusted		Multivariate <sup>1</sup>	
	n/N (%)	OR (95% CI)	p-value	OR (95% CI)	p-value
Low-Medium	110/360 (30.6)	0.95 (0.63-1.46)	0.9		
High	50/118 (42.4)	1.28 (0.73-2.25)	0.87		
Unsure	40/131 (30.5)	1.12 (0.64-1.96)	0.4		
<b>Fertility desires</b>					
None	42/239 (17.6)	1.00 (ref.)	---	1.00 (ref.)	---
Currently trying/pregnant	62/166 (37.3)	2.80 (1.77-4.42)	<0.01	1.76 (0.98-3.17)	0.059
Within 3 years	102/259 (39.4)	3.04 (2.0-4.62)	<0.01	<b>2.20 (1.36-3.56)</b>	<b>0.001</b>
In >3 years or unsure	68/194 (35.1)	2.53 (1.62-3.95)	<0.01	<b>1.87 (1.12-3.13)</b>	<b>0.017</b>
<b>Discussed fertility desires with partner</b>					
No	39/201 (19.4)	1.00 (ref.)	---	1.00 (ref.)	---
Yes	235/656 (35.8)	2.31 (1.58-3.41)	<0.01	<b>1.91 (1.26-2.89)</b>	<b>0.002</b>



Figure 1: Knowledge, attitudes, and experiences with each safer conception strategy



a: Among HIV-infected women

b: Among HIV-uninfected women

## REFERENCES

1. Dunkle K, Stephenson R, Karita E, et al. New heterosexually transmitted HIV infections in married or cohabiting couples in urban Zambia and Rwanda: an analysis of survey and clinical data. *Lancet (London, England)*. 2008;371(9631):2183–91. doi:10.1016/S0140-6736(08)60953-8.
2. Piot P, Bartos M, Larson H, Zewdie D, Mane P. Coming to terms with complexity: a call to action for HIV prevention. *Lancet (London, England)*. 2008;372(9641):845–59. doi:10.1016/S0140-6736(08)60888-0.
3. Ngunjiri K, Mugo N, Celum C, et al. A qualitative study of barriers to consistent condom use among HIV-1 serodiscordant couples in Kenya. *AIDS care*. 2012;24(4):509–16. doi:10.1080/09540121.2011.613911.
4. Mujugira A, Heffron R, Celum C, et al. Fertility intentions and interest in early antiretroviral therapy among East African HIV-1-infected individuals in serodiscordant partnerships. *Journal of acquired immune deficiency syndromes (1999)*. 2013;63(1):e33–5. doi:10.1097/QAI.0b013e318288bb32.
5. Pintye J, Ngunjiri K, Curran K, et al. Fertility Decision-Making Among Kenyan HIV-Serodiscordant Couples Who Recently Conceived: Implications for Safer Conception Planning. *AIDS patient care and STDs*. 2015;29(9):510–6. doi:10.1089/apc.2015.0063.
6. Ngunjiri K, Baeten J, Mugo N, et al. My intention was a child but I was very afraid: fertility intentions and HIV risk perceptions among HIV-serodiscordant couples experiencing pregnancy in Kenya. *AIDS care*. 2014;26(10):1283–7. doi:10.1080/09540121.2014.911808.
7. Mmeje O, Cohen C, Cohan D. Evaluating Safer Conception Options for HIV-Serodiscordant Couples (HIV-Infected Female/HIV-Uninfected Male): A Closer Look at Vaginal Insemination. *Infectious Diseases in Obstetrics and Gynecology*. 2012. doi:10.1155/2012/587651.
8. Schwartz SR, Bassett J, Sanne I, Phofa R, Yende N, Rie A Van. Implementation of a safer conception service for HIV-affected couples in South Africa. *AIDS*. 2014;28 Suppl 3:S277–85. doi:10.1097/QAD.0000000000000330.
9. Ciaranello A, Matthews L. Safer Conception Strategies for HIV-Serodiscordant Couples: How Safe Is Safe Enough? *The Journal of infectious diseases*. 2015;212(10):1525–8. doi:10.1093/infdis/jiv275.
10. Weber S, Waldura J, Cohan D. Safer conception options for HIV serodifferent couples in the United States: the experience of the National Perinatal HIV Hotline and Clinicians' Network. *Journal of acquired immune deficiency syndromes (1999)*. 2013;63(4):e140–1. doi:10.1097/QAI.0b013e3182948ed1.
11. Cohan D, Weber S, Goldschmidt R. Safer conception options for HIV-serodiscordant couples. *American journal of obstetrics and gynecology*. 2012;206(1):e21; author reply e21–2. doi:10.1016/j.ajog.2011.08.014.
12. Gynecologists A of and. ACOG Committee Opinion number 313, September 2005. The importance of preconception care in the continuum of women's health care. *Obstetrics and gynecology*. 2005;106(3):665–6.
13. Kenyan Ministry of Health. Guidelines on Use of Antiretroviral Drugs for Treating and Preventing HIV Infection.

14. Letchumanan M, Coyte P, Loutfy M. An economic evaluation of conception strategies for heterosexual serodiscordant couples where the male partner is HIV-positive. *Antiviral therapy*. 2015;20(6):613–21. doi:10.3851/imp2956.
15. Ying R, Sharma M, Heffron R, et al. Cost-effectiveness of pre-exposure prophylaxis targeted to high-risk serodiscordant couples as a bridge to sustained ART use in Kampala, Uganda. *Journal of the International AIDS Society*. 2015;18(4 Suppl 3):20013. doi:10.7448/ias.18.4.20013.
16. Ping L-HH, Jabara CB, Rodrigo AG, et al. HIV-1 transmission during early antiretroviral therapy: evaluation of two HIV-1 transmission events in the HPTN 052 prevention study. *PLoS ONE*. 2013;8(9):e71557. doi:10.1371/journal.pone.0071557.
17. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med*. 2011;365(6):493–505. doi:10.1056/NEJMoal105243.
18. Kahle E, Hughes J, Lingappa J, et al. An empiric risk scoring tool for identifying high-risk heterosexual HIV-1-serodiscordant couples for targeted HIV-1 prevention. *Journal of acquired immune deficiency syndromes (1999)*. 2013;62(3):339–47. doi:10.1097/QAI.0b013e31827e622d.
19. Baeten J, Heffron R, Kidoguchi L, et al. Near elimination of HIV transmission in a demonstration project of PrEP and ART. In: Seattle, USA.
20. World Health Organization. WHO Case Definitions of HIV for Surveillance and Revised Clinical Staging and Immunological Classification of HIV-Related Disease in Adults and Children. 2007.
21. Hoffman R, Jaycocks A, Vardavas R, et al. Benefits of PrEP as an Adjunctive Method of HIV Prevention During Attempted Conception Between HIV-uninfected Women and HIV-infected Male Partners. *The Journal of infectious diseases*. 2015;212(10):1534–43. doi:10.1093/infdis/jiv305.
22. West N, Schwartz S, Phofa R, et al. “I don’t know if this is right ... but this is what I’m offering”: healthcare provider knowledge, practice, and attitudes towards safer conception for HIV-affected couples in the context of Southern African guidelines. *AIDS care*. 2015:1–7. doi:10.1080/09540121.2015.1093596.
23. Rahangdale L, Richardson A, Carda-Auten J, Adams R, Grodensky C. Provider Attitudes toward Discussing Fertility Intentions with HIV-Infected Women and Serodiscordant Couples in the USA. *Journal of AIDS & clinical research*. 2014;5(6):1000307. doi:10.4172/2155-6113.1000307.