Association between extra-spousal partnerships and HIV prevalence among married individuals in Rakai, Uganda

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Research Article

Keywords: Association, Extra-spousal partnerships, HIV prevalence, Married/cohabiting individuals

Posted Date: March 16th, 2022

DOI: https://doi.org/10.21203/rs.3.rs-1447885/v1

Abstract

Introduction: The association between extra-spousal partnerships and HIV in married or cohabiting individuals remains controversial. We established the association between extra-spousal partnerships and HIV prevalence among married or cohabiting individuals in Rakai, Uganda.

Methods: This secondary analysis uses data from a large cross-sectional study conducted among 2,135 married or cohabiting individuals aged 15-49 years in Rakai, Uganda, between November 2013 and February 2014. Data were collected on socio-demographic and behavioral characteristics, including extra-spousal partnerships. We used a modified Poisson regression model to assess the association between extra-spousal partnerships and HIV prevalence among married or cohabiting individuals living in three study communities with differing HIV prevalence. Stata version 14.0 was used for data analysis.

Results: Of 2,103 respondents included in the analysis, 13.4% (282/2103) reported extra-spousal partnerships; 4.5% (n=49) among females and 22.9% (n=233) among males. Of those reporting extra-spousal partnerships, 48.6% (n=137) were in their second or higher order marriage while 74.1% (n=209) reported a marital duration of six or more years. HIV prevalence was higher among those reporting extra-spousal partnerships (14.6%, 36/247) than in those who did not (7.6%, 120/1575; $P<0.0001$). In multivariable analyses, we found that engaging in extra-spousal relationships increased the risk of HIV infection by 67% (adjusted Prevalence Ratio [adj. PR] = 1.67; 95%CI: 1.16, 2.39), after adjusting for potential and suspected confounders.

Conclusion: We found that engaging in extra-spousal partnerships increased the risk of HIV infection by more than two-thirds. These findings suggest a need for targeted HIV prevention interventions for married or cohabiting individuals who report extra-spousal partnerships.

Background

Human Immunodeficiency Virus (HIV) is, without a doubt, one of the most serious global epidemics affecting the human population in the 21st century (WHO, 2021). There's a growing body of evidence suggesting an elevated risk of HIV among married/cohabiting couples in Sub-Saharan Africa (SSA) (Mtenga et al., 2015, Guthrie et al., 2007, Dunkle et al., 2008) and the HIV incidence and prevalence in this population is equally substantial (Mtenga et al., 2015, Kaiser et al., 2011). Meanwhile, close to half of adult Ugandans are living in stable marital or cohabiting heterosexual relationships and about 10% are in polygamous unions (UBOS, 2017).

Factors such as early marriage, Condomless sex, living in a high prevalence area, history of remarriage, and extra-spousal or concurrent sexual partnerships among others have been reported to shape the HIV epidemic among married or cohabiting individuals (Nabukenya et al., 2020, Kasamba et al., 2011, Carpenter et al., 1999, Guthrie et al., 2007). Literature also has it that married women's greatest risk for HIV infection is their husbands' extra-marital sexual activities (Parikh, 2007), though of late, women have picked up on such partnerships as well.

Extra-spousal partnerships are a form of sexual concurrency, defined as overlap between 2 or more sexual partners, with intercourse with one partner occurring between two acts of intercourse with another partner (UNAIDS, 2010). These partnerships increase the probability of transmitting HIV to one's official partner/s and other partners on the sexual network (Kasamba et al., 2011, Celum et al, 2010). In addition, unprotected extra-marital sex provides conduits through which HIV enters marriages facilitating faster spread of the epidemic (Kwena et al, 2014, Beauclair et al., 2015). Whereas it has been previously established that extra-spousal partnerships are a risk factor for HIV infection, literature on the extent of this risk is limited. Particularly, there are hardly any published analyses of HIV infection risk from extra-spousal relationships in varying HIV prevalence strata in a defined population.

General to SSA settings, gender inequalities, and high levels of background HIV prevalence combine to make married individuals more susceptible to HIV. Gender inequalities, such as being permissible for men to have extra-marital relationships (Auerbach et al., 2011, Genberg et al., 2008) increase the vulnerability of women to HIV transmission from their husbands (Shisana et al., 2014, WHO, 2009, Abdulazeez et al., 2008). However, the association between extra-spousal partnership and HIV in married or cohabiting individuals remains controversial. This study therefore aimed to contribute to the growing body of literature on HIV prevalence among married or cohabiting individuals by establishing the association between extra-spousal partnerships and HIV prevalence among married or cohabiting individuals in Rakai, Uganda.

Methods

Study site, design, and population

This secondary analysis uses data from a large cross-sectional study conducted among married or cohabiting individuals in Rakai district, southwestern Uganda, between November 2013 and February 2014. The methods for the large study have been described previously (Matovu et al., 2015, Matovu et al., 2016, Nabukenya et al., 2020). In brief, data were collected from married or cohabiting individuals aged 15–49 years, residents in three study regions of differing HIV prevalence within the Rakai Community Cohort Study (RCCS) enumeration area. The RCCS, implemented by the Rakai Health Sciences Program in Rakai and neighboring districts in south-western Uganda, has been described in previous publications (Wawer et al., 1998, Grabowski et al., 2018). Approximately 15,000 individuals aged 15–49 years, resident in 46 study communities across 12 study regions, have undergone continuous annual HIV surveillance since 1994. HIV prevalence in Rakai averages 12% among adults (15–49 years) with high variability across study regions (Chang et al., 2016). At the time the large cross-sectional study was conducted, the lowest HIV prevalence in the RCCS study communities was 9% while the highest was 43% (Chang et al., 2016). The study regions were thus grouped into low HIV prevalence (9-11.2%), medium prevalence (11.4–20%), or high HIV prevalence regions (21–43%) based on available HIV prevalence data from across the 12 study regions within the RCCS enumeration area. The grouping of study regions into the three strata was done in such a way as to ensure that each stratum had between 3–4 study regions. Within each stratum, one region was selected to participate in the above-mentioned large cross-sectional

study. Within each study region, four study communities were randomly selected using computer-generated random numbers for a total of 12 study communities. The study communities were already demarcated for their participation in the RCCS; so, there was no need for further demarcation. Residents in the selected communities who were aged 15–49 years and who were married or in a cohabiting relationship at the time of the study were eligible for inclusion in the study.

Data collection procedures and methods

The data collection procedures and methods have been previously described (Matovu et al., 2015, Matovu et al., 2016). In brief, we used the RCCS database to identify individuals that were in a current marital union based on the latest RCCS study visit at the time. Working with a notifier, these individuals were contacted in person and invited to participate in the study. Participation in the study required the respondents to travel to a central venue in the community (also known as a 'hub') and all those that turned up at the hub were asked to provide written informed consent before participation in the study. All consenting married individuals were separately interviewed face-to-face through interviewer-administered, paper-based questionnaires. Data were collected on socio-demographic (age, sex, education, religion) and behavioural characteristics. Behavioural data included questions on the number of sexual partners in the past 12 months, and whether or not the respondent was currently involved in a non-marital sexual relationship. To obtain HIV status data, we approached the RCCS data manager and requested to obtain the latest HIV status data (based on the latest RCCS interview that the respondents had participated in) for each married individual interviewed for the study. Interviews, on average, lasted between 45–60 minutes.

Measurement of variables

Our analysis focused on married or cohabiting individuals who were in a heterosexual relationship; i.e., those who are currently married or cohabiting with an identifiable partner of the opposite sex. Individuals were considered to be 'married' if they were officially wedded in the Church (among Christians) or the Mosque (among Muslims) or if they had ever had an introduction ceremony in which the family of the male partner takes gifts to that of the female partner as part of the marriage process that is typical in African societies (Meekers, 1992). On the other hand, individuals were considered to be 'cohabiting' if they were living together as 'husband' and 'wife' (and the community considered them as such) even if they had never wedded in the Church or Mosque or had a traditional introduction ceremony. Given that both instances involve a male partner living together with a female partner in some form of marriage, we opted to consider the two groups as one category, and hence use the term 'married or cohabiting' when referring to all the married individuals in this analysis.

Our primary outcome was HIV status (coded: 0 = HIV-negative; 1 = HIV-positive) among married or cohabiting individuals, while the main predictor variable was self-reported current extra-spousal sexual partnerships. Current extra-spousal partnerships were assessed by asking the respondent: 'Are you currently involved in any other relationship with someone else who is not your current spouse'? Individuals who responded in the affirmative were considered to have a current extra-spousal relationship.

Married or cohabiting individuals were categorized as belonging to a first, second or higher marital order based on whether or not they had ever been married or cohabited with a partner of the opposite sex. Individuals whose marriage or cohabitation was the first ever were considered to be in their first marital order; those that were in their second marriage (i.e., married for the second time after a separation/divorce or loss of a partner) were considered to be in their second marital order, and so forth. We did not, however, document reasons for re-marriage among those in their second or higher marital order. To be able to categorize the type of marriage in which a respondent was engaged, we asked men if they had more one woman that they considered as their spouse. We also asked women if their male partner had other women that he considered to be his spouses. Women whose male partner had only one woman that he considered as his spouse were categorized as being in a 'monogamous' relationship. On the other hand, women whose male partner had two or more women that he considered to be his spouses were categorized as being in a 'polygamous' relationship. Lastly, all married or cohabiting individuals were asked about how long they had been married to or cohabiting with their spouses and this was coded as '0' if one to three years, '1' if four to five years, or '2' if six or more years.

Data analysis

The dependent variable (HIV status) was binary, i.e., individuals were considered to be HIV-negative or HIV-positive, based on available HIV status data from the latest RCCS study visit prior to the current study. We computed descriptive statistics and summarized the outputs in form of frequencies and percentages. We determined the proportion of married or cohabiting individuals who reported extra-spousal partnerships and described the distribution of those reporting extra-spousal partnerships across selected background characteristics. Unadjusted prevalence ratios and their 95% confidence intervals were used to assess the association between HIV status and socio-demographic and behavioural characteristics. Variables with a p-value less than 0.2 at the bivariate analysis (extra-spousal partnerships, age-group, religion, education level, occupation, marital status, marital order, marital duration, and HIV prevalence strata) were considered for the multivariable model. At the multivariable modified Poisson regression, we assessed the association between HIV status and extra-spousal sexual partnerships, after accounting for potential and suspected confounders (age, education level, marital status) that were found to be significant at the bivariate analysis level. Given differences in the way men and women report about their sexual behaviour (Nnko et al., 2004), we included the variable 'sex' into the final model although it wasn't statistically significant at bivariate analysis. Data were analysed using STATA statistical software (version 14.0).

Results

Characteristics of married or cohabiting individuals included in the analysis

Table 1 shows the demographic characteristics of married or cohabiting individuals that were included in this analysis. The majority of the respondents were between ages 25 to 34 (46.2%, n = 972), however,

there were more females (48.3%, n = 524) than males (44.0%, n = 448) in this age category. More than half of the respondents (56.6%, n = 1190) were Catholics. Nearly half of the respondents (48.2%, n = 1014) attained upper primary (P5-P7) as the highest level of education with more females (49.3%, n = 534) than males (47.1%, n = 480) reporting that they attained this level of education. Close to two-thirds (63.8%, n = 691) of the females and nearly half of the males (48.9%, n = 498) cited agriculture as their occupation. A higher proportion of the male respondents (82.8%, n = 844) and 76.2% (n = 826) of the females reported that they were married to or cohabited with only one spouse. More than three-quarters (79.4%, n = 861) of the females were in their first marriage union compared to 52.0% (n = 530) of the males. A majority of the respondents (78.2%, n = 848) were married for six or more years. More than a quarter of all the respondents (29.2%, n = 614) lived in the high HIV prevalence stratum.

Table 1
Characteristics of married or cohabiting individuals included in the analysis

Variable	Males (N = 1084, %)	Females (N = 1019, %)	Total N = 2103, %
Characteristics			
Age-group			
15–24	261 (24.1)	53 (5.2)	324 (14.9)
25–34	524 (48.3)	448 (44.0)	972 (46.2)
35–44	267 (24.6)	419 (41.1)	686 (32.6)
45 + years	32 (3.0)	99 (9.7)	131 (6.2)
Religion			
Catholic	620 (57.2)	570 (55.9)	1,190 (56.6)
Anglican	148 (13.7)	164 (16.1)	312 (14.8)
Muslim	74 (6.8)	59 (6.0)	133 (6.3)
Pentecostal	215 (19.8)	198 (19.Table 4)	413 (19.6)
Other religion	27 (2.5)	28 (2.8)	55 (2.6)
Education level			
None	87 (8.0)	34 (3.3)	121 (5.8)
Lower primary (P1-P4)	186 (17.2)	216 (21.2)	402 (19.1)
Upper primary (P5-P7)	534 (49.3)	480 (47.1)	1,014 (48.2)
Lower secondary (S1-S4)	237 (21.9)	202 (19.8)	439 (20.9)
Upper secondary (S5-S6)	12 (1.1)	21 (2.1)	33 (1.6)
Other level	28 (2.6)	66 (6.5)	94 (4.5)
Occupation			
Agriculture	691 (63.8)	498 (48.9)	1,189 (56.5)
Trading/vending	88 (8.1)	142 (13.9)	230 (10.9)
Fishing	0 (0.0)	130 (12.8)	130 (6.2)
House work in own home	100 (9.2)	0 (0.0)	100 (4.8)
Government/clerical/ Teaching	49 (4.5)	45 (4.4)	94 (4.5)

Variable	Males (N = 1084, %)	Females (N = 1019, %)	Total N = 2103, %
Other occupation	156 (14.4)	204 (20.0)	360 (17.1)
Marital status			
Married mono	826 (76.2)	844 (82.8)	1670 (79.4)
Married poly female	257 (23.7)	0 (0.0)	257 (12.2)
Married poly male	0 (0.0)	176 (17.3)	176 (8.4)
Marital order			
First	861 (79.4)	530 (52.0)	1,391 (66.1)
Second	208 (19.2)	337 (33.1)	545 (25.9)
Third or higher	15 (1.4)	152 (14.9)	167 (7.9)
Marital duration			
1–3 years	109 (10.1)	117 (11.5)	226 (10.8)
4–5 years	127 (11.7)	129 (12.7)	256 (12.2)
6 + years	848 (78.2)	773 (75.9)	1,621 (77.1)
HIV prevalence strata			
Low	407 (37.6)	360 (36.3)	767 (36.5)
Medium	364 (33.6)	358 (35.1)	722 (34.3)
High	313 (28.9)	301 (29.5)	614 (29.2)

Self-reported extra-spousal partnerships by selected background characteristics

Table 2 shows the percentage of married or cohabiting individuals who reported extra-spousal partnerships stratified by background characteristics. Overall, 13.4% (n = 282) reported extra-spousal partnerships with a higher proportion of males (22.9%, n = 233) reporting extra-spousal partnerships than their female counterparts (4.5%, n = 49). Respondents aged 25 to 34 years reported higher proportions of extra-spousal partnerships 13% (n = 126). Extra-spousal partnerships were higher among males who attained upper primary or higher education level 26.2% (n = 53) compared to their female counterparts 5.9% (n = 14). A higher proportion of the respondents who engaged in extra-spousal partnerships reported fishing as their occupation, more than a quarter 28.9% (n = 41) of them were males and 4.6% (n = 4) were females. Extra-spousal partnerships were common among married or cohabiting individuals in their third or higher marital order (28.1%, n = 47) compared with those in their first marital order (10.4%, n = 145).

Males of a marital duration between 4–5 years reported higher proportions of extra-spousal partnerships (26.4%, n = 34) compared with their female counterparts (7.9%, n = 10). Extra-spousal partnerships were prevalent among respondents who were HIV infected (23.1%, n = 36) compared to those who were not (12.7%, n = 211). Extra-spousal partnerships increased with change in HIV prevalence strata from 11.3% (n = 87) among residents of low HIV prevalence stratum to 15% (n = 92) among those from the high HIV prevalence stratum.

Table 2
Percentage reporting extra-spousal partnerships overall and by selected background characteristics stratified by sex

Characteristics	Total	No. & % reporting extra-spousal partnerships	Males		Females	
			Total Males	No. & % reporting extra-spousal partnership	Total Females	No. & % reporting extra-spousal partnerships
All	2,103	282 (13.4%)	1,084	49 (4.5%)	1,019	233 (22.9%)
Age-group						
15–24	324	32 (10.2)	261	13 (5.0)	53	19 (35.9)
25–34	972	126 (13.0)	524	27 (5.2)	448	99 (22.1)
35–44	686	103 (15.0)	267	9 (3.4)	419	94 (22.4)
45 + years	131	21 (16.0)	32	0 (0.0)	99	21 (21.2)
Religion						
Catholic	1,190	160 (13.5)	620	30 (4.8)	570	130 (22.8)
Anglican	312	44 (14.1)	148	6 (4.1)	164	38 (23.2)
Muslim	133	17 (12.8)	74	6 (8.1)	59	11 (18.6)
Pentecostal	413	54 (13.1)	215	5 (2.3)	198	49 (24.8)
Other religion	55	7 (12.7)	27	2 (7.4)	28	5 (17.9)
Educational level						
None	402	55 (13.7)	186	7 (3.8)	216	48 (22.2)
Lower primary (P1-P4)	1,014	122 (12.0)	534	24 (4.5)	480	98 (20.4)
Upper primary (P5-P7)	439	67 (15.3)	237	14 (5.9)	202	53 (26.2)
Lower secondary (S1-S4)	33	7 (21.2)	12	0 (0.0)	21	7 (33.3)
Upper secondary (S5-S6)	94	19 (20.2)	28	1 (3.6)	66	18 (27.3)
Other level	121	12 (9.9)	87	3 (3.5)	34	9 (26.5)
Occupation						

Characteristics	Total	No. & % reporting extra-spousal partnerships	Males		Females	
			Total Males	No. & % reporting extra-spousal partnership	Total Females	No. & % reporting extra-spousal partnerships
Agriculture	1,189	128 (10.8)	691	26 (3.8)	498	102 (20.5)
Trading/vending	230	45 (19.6)	88	4 (4.6)	142	41 (28.9)
Fishing	130	29 (22.3)	0	0 (0.0)	130	29 (22.3)
House work in own home	100	11(11.0)	100	11 (11.0)	0	0 (0.0)
Government/ clerical/teaching	94	7 (7.5)	49	0 (0.0)	45	7 (15.6)
Other occupation	360	62 (17.2)	156	8 (5.1)	204	54 (26.5)
Marital status						
Married monogamous	1670	219 (13.1)	826	35 (4.2)	844	184 (21.8)
Married polygamous female	257	14 (5.5)	256	14 (5.5)	0	0 (0.0)
Married polygamous male	176	49 (27.8)		0 (0.0)	176	49 (27.8)
Marital order						
First	1,391	145 (10.4)	861	32 (3.7	530	113 (21.3)
Second	545	90 (16.5)	208	15 (7.2)	337	75 (22.3)
Third or higher	167	47 (28.1)	15	2 (13.3)	152	45 (29.6)
Marital duration						
1–3 years	226	29 (12.8)	109	8 (7.3)	117	21 (18.0)
4–5 years	256	44 (17.2)	127	10 (7.9)	129	34 (26.4)
6 + years	1,621	209 (12.9)	848	31 (3.7)	773	178 (23.0)
HIV status						
HIV-negative	1,666	211 (12.7)	882	32 (3.6)	784	179 (22.8)
HIV-positive	156	36 (23.1)	83	11 (13.3)	73	25 (34.3)

Characteristics	Total	No. & % reporting extra-spousal partnerships	Males		Females	
			Total Males	No. & % reporting extra-spousal partnership	Total Females	No. & % reporting extra-spousal partnerships
HIV prevalence strata						
Low	767	87 (11.3)	407	12 (3.0)	360	75 (20.8)
Medium	722	103 (14.3)	364	20 (5.5)	358	83 (23.2)
High	614	92 (15.0)	313	17 (5.4)	301	75 (24.9)

Association between extra-spousal partnerships and HIV positive status among married or cohabiting individuals

Table 3 shows the association between extra-spousal partnerships and HIV-positive status among married or cohabiting individuals. At the bivariate analysis, engaging in extra-spousal partnerships increased the risk of HIV infection by 91% (prevalence ratio [PR] = 1.91; 95% Confidence Interval [95%CI]: 1.35,2.71). After adjusting for potential and suspected confounders including age group, education level and marital status, we found that engaging in extra-spousal partnerships increased the risk of HIV infection by 67% (adj.PR = 1.67; 95%CI: 1.16,2.39. Other factors that increased the risk of HIV infection among married or cohabiting individuals were, engaging in trading/vending (adj. PR = 1.69; 95%CI: 1.02,2.77), fishing as an occupation (adj. PR = 2.63; 95%CI: 1.52, 4.53), being in the second (adj. PR = 2.69; 95%CI: 1.85, 3.92) or third or higher marital order (adj. PR = 3.57; 95%CI: 2.13, 5.99), and residing in the high HIV prevalence stratum (adj. PR = 2.13; 95%CI: 1.33, 3.42). Male sex (adj. PR = 0.51; 95%CI: 0.34, 0.76), Pentecostal faith (adj. PR = 0.28; 95%CI: 0.14, 0.54) and a marital duration of six or more years (adj. PR = 0.53; 95%CI: 0.37, 0.78) were protective against HIV infection.

Table 3
Association between extra-spousal partnerships and HIV-positive status among married or cohabiting individuals in Rakai, Uganda

Variable	Number reporting extra-spousal partnerships	HIV-positive (n, %)	CPR (95% CI)	P-value	APR (95% CI)	P-value
Extra-spousal partnership						
No	1,821	120 (7.6)	1.0		1.0	
Yes	282	36 (14.6)	1.91 (95%CI: 1.35–2.71)	**P < 0.0001**	1.67 (95%CI: 1.16–2.39)	**0.006**
Sex						
Male	233	73 (8.5)	1.0		1.0	
Female	49	83 (8.6)	0.99 (95%CI: 0.73–1.34)	0.950	0.51 (95%CI: 0.34–0.76)	**0.001**
Age-group						
15–24	32	33 (11.7)	1.0		1.0	
25–34	126	82 (9.5)	0.81 (95%CI: 0.55–1.18)	0.266	1.07 (95%CI: 0.71–1.60)	0.750
35+	124	41 (6.1)	0.52 (95%CI: 0.33–0.80)	**0.003**	0.89 (95%CI: 0.54–1.47)	0.657
Religion						
Catholic	160	108 (10.3)	1.0		1.0	
Anglican	44	26 (10.1)	0.97 (95%CI: 0.64–1.45)	0.8.74	1.06 (95%CI: 0.73–1.54)	0.751
Muslim	17	9 (8.2)	0.79 (95%CI: 0.41–1.52)	0.489	0.69 (95%CI: 0.42–1.14)	0.147

Variable	Number reporting extra-spousal partnerships	HIV-positive (n, %)	CPR (95% CI)	P-value	APR (95% CI)	P-value
Pentecostal	54	9 (2.5)	0.25 (95%CI: 0.13-048)	**P < 0.0001**	0.28 (95%CI: 0.14–0.54)	**P < 0.0001**
Other religion	7	4 (8.5)	0.83 (95%CI: 0.32–2.15)	0.696	0.93 (95%CI: 0.37–2.34)	0.878
Education level						
None	55	40 (11.3)	1.0		1.0	
Lower primary (P1-P4)	122	78 (8.8)	0.78 (95%CI: 0.55–1.13)	0.188	0.89 (95%CI: 0.64–1.23)	0.471
Upper primary (P5-P7)	67	18 (4.8)	0.42 (95%CI: 0.25–0.73)	**0.002**	0.66 (95%CI: 0.40–1.10)	0.112
Lower secondary (S1-S4)	7	3 (9.7)	0.86 (95%CI: 0.28–2.62)	0.789	1.42 (95%CI: 0.48–4.18)	0.527
Upper secondary or higher	31	17 (9.6)	0.85 (95%CI: 0.50–1.46)	0.561	0.90 (95%CI: 0.54–1.51)	0.694
Occupation						
Agriculture	128	39 (3.8)	1.0		1.0	
Trading/vending	45	19 (9.6)	2.50 (95%CI: 1.47–4.22)	**0.001**	1.69 (95%CI: 1.02–2.77)	**0.040**
Fishing	29	36 (28.4)	7.34 (95%CI: 4.88–11.16)	**P < 0.0001**	2.63 (95%CI: 1.52–4.53)	**0.001**
Government/clerical/teaching	7	5 (6.7)	1.74 (95%CI: 0.70–4.27)	0.231	1.61 (95%CI: 0.60–4.31)	0.348

Variable	Number reporting extra-spousal partnerships	HIV-positive (n, %)	CPR (95% CI)	P-value	APR (95% CI)	P-value
Other	73	57 (14.0)	3.64 (95%CI: 2.47–5.39)	**P < 0.0001**	1.52 (95%CI: 1.00-2.31)	0.053
Marital status						
Married monogamous	219	123 (8.4)	1.0			
Married polygamous, female	14	17 (7.5)	0.89 (95%CI: 0.55–1.45)	0.634		
Married polygamous, male	49	16 (11.8)	1.40 (95%CI: 0.85–2.28)	0.183		
Marital order						
First	145	50 (4.1)	1.0		1.0	
Second	90	78 (16.5)	3.98 (95%CI: 2.84–5.59)	**P < 0.0001**	2.69 (95%CI: 1.85–3.92)	**P < 0.0001**
Third or higher	47	28 (19.7)	4.76 (95%CI: 3.10–7.31)	**P < 0.0001**	3.57 (95%CI: 2.13–5.99)	**P < 0.0001**
Marital duration						
1–3 years	29	56 (26.4)	1.0			
4–5 years	44	27 (11.1)	0.45 (95%CI: 0.30–0.68)	**P < 0.0001**	0.77 (95%CI: 0.52–1.15)	0.200
6 + years	209	73 (5.3)	0.20 (95%CI: 0.15–0.27)	**P < 0.0001**	0.53 (95%CI: 0.37–0.78)	**0.001**
HIV prevalence strata						
Low	87	24 (3.7)	1.0		1.0	

Variable	Number reporting extra-spousal partnerships	HIV-positive (n, %)	CPR (95% CI)	P-value	APR (95% CI)	P-value
Medium	103	14 (2.5)	0.66 (95%CI: 0.35–1.27)	0.218	0.63 (95%CI: 0.33–1.19)	0.154
High	92	118 (19.3)	5.19 (95%CI: 3.39–7.94)	**P < 0.0001**	2.13 (95%CI: 1.33–3.42)	**0.002**

Discussion

In this study assessing the association between extra-spousal partnerships and HIV among married or cohabiting individuals in Rakai, Uganda, we found that engaging in extra-spousal relationships increased the risk of HIV infection by 67%. Our finding that engaging in extra-spousal partnerships increases the risk of HIV infection by more than two-thirds is consistent with previous findings on this subject. In a study conducted by Mishra and Vinod (2009) using data from 22 nationally representative surveys, HIV prevalence was 3.22 and 2.87 times higher among women and men respectively, who reported extra-marital relations in the past year than those who did not. In another study conducted by Mishra (2009) using national household surveys, women who reported extra-spousal sexual partnerships in Ethiopia had a 12.1% HIV prevalence compared with 1.6% among those who did not. Mishra (2009) reports the same pattern in Zimbabwe (39.2% vs 20.3%) and Cambodia (6.2% vs 0.6%). Collectively, these findings re-affirm previous findings which indicate that engaging in extra-spousal partnerships increases the risk of HIV infection, suggesting a need for interventions targeting prevention of infection among married or cohabiting individuals.

Evidence shows that extra-spousal partnerships are considered among the primary drivers of the HIV epidemic among married and cohabiting individuals (Nabukenya et al., 2020, Mtenga et al., 2018, Mishra and Vinod, 2009). This can be attributed to the sexual concurrency and the overlap between 2 or more sexual partners which makes spouses involved in unprotected extra-spousal sex to act as conduits through which HIV enters marriages (UNAIDS, 2010). As documented elsewhere (Kasamba et al., 2011, Beauclair et al., 2015, Ssekamatte et al., 2020, Kwena et al, 2014), this facilitates faster spread of HIV at the sexual network level in two ways; earlier partnerships begun by the index partner are later exposed to any infections transmitted by an additional partner, and the fact that time to secondary transmission is shortened because the infected person does not need to terminate one partnership before starting another. Evidence also indicates that men in extra-spousal relationships rarely use condoms especially with their official partners (Smolak, 2014). It’s therefore not surprising that individuals in our study who engaged in extra-spousal partnerships had a 67% increased risk of being HIV positive. In Rakai, Nabukenya et al. (2020) similarly established that individuals in extra-spousal partnerships were almost

twice as likely to be in an HIV infected couple relationship than those in single partner relationships. This therefore indicates the need for HIV prevention interventions targeting married and cohabiting individuals in extra-spousal partnerships as these do not benefit from abstinence, faithfulness and condom use (ABC).

Surprisingly, although a higher proportion of males than females reported engaging in extra-spousal partnerships, we found that males who engaged in extra-spousal partnerships were less likely to be HIV infected than the females. However, our review of literature found studies reporting similar findings. In a study that used national household surveys from 22 African countries, analyses showed a 10.5% difference between women who reported extra-spousal sexual partnerships and those who did not. The study, however, found similar HIV prevalence among men who reported extra-spousal partnerships and those who did not (Mishra, 2009). These findings can be explained by the biological susceptibility to HIV infection through intercourse among females as compared to males. Evidence from a majority of biological based studies conducted in different countries report the risk of acquisition of HIV infection through vaginal sex to be higher among females (Avert, 2020). In addition, vulnerabilities created by cultural, social, and economic inequalities between males and females especially in SSA play a significant role in facilitating HIV acquisition among females. Females face significant barriers in accessing health care including sexual and reproductive health services, and the majority have limited autonomy to demand for HIV preventive measures such as consistent condom use with their partners, who could be engaged in multiple sexual relationships (Avert, 2020, Türmen, 2003, Sia et al., 2016).

Besides extra-spousal partnerships and sex of respondents, our study identified other factors that increased the risk of HIV infection among married or cohabiting individuals. For instance, we found that individuals that engaged in trading or vending as an occupation were more likely to be HIV infected compared with agrarians. This is corroborated by findings from Anarfi et al. (1997) in a study conducted among female traders in Ghana. The high mobility of the traders and venders to different market places and sometimes staying for days before going back home exposes them to extra-spousal relations. In addition, the daily cash inflow could also facilitate extra-spousal sexual encounters especially among men who utilize female sex workers for their sexual needs while away from home. Salia et al. (2020) in a study conducted in southern Mozambique also reported that women traders with low-income levels were more likely to have sexual intercourse in exchange for money, goods or services such as transportation of their merchandise, thus an increased risk of HIV infection. Collectively, our findings and findings from other studies suggest that traders or vendors are at an elevated risk of HIV infection given their working conditions, therefore necessitating a need for interventions tailored towards this group.

We also found that engaging in fishing as an occupation also increased the likelihood of HIV infection among married or cohabiting individuals. Fishing communities have been identified as areas of high HIV prevalence (Smolak, 2014, Kagaayi et al., 2019) and, as our study indicates, residing in a high HIV prevalence area can increase the risk of HIV infection. Similar findings have been reported by Kaiser et al. (2011) where proportions of couples infected with HIV were highest in areas with the highest HIV prevalence in Kenya. Frequent mobility, transactional and commercial sex, multiple sexual partners, high

consumption of alcohol, poor health infrastructure, and limited access to health services are some of the documented factors shaping the HIV epidemic in this key population (Musumari et al., 2021). These findings suggest that married or cohabiting individuals in fishing communities have a higher likelihood of HIV acquisition calling for a need to promote HIV preventive measures such as condom use, PEP, among other.

Building on prior findings on this subject, we found that remarriage significantly increased the risk of being HIV positive, where individuals who reported extra-spousal partnerships, and in their second and third or higher marital order, were more than twice and thrice respectively, more likely to be HIV positive compared with those in the first marital order. These findings concur with those of earlier scholars Nabukenya et al. (2020) in Rakai, Uganda, and De Walque and Kline (2012) in 13 SSA countries of which Uganda was part. Being in a third or higher marital union indicates instability in one's previous relationships. This instability could have been caused by factors such as infidelity and HIV status. In addition, Nabukenya et al. (2020) express that individuals form new marital unions after the loss of a partner or after separation from a partner due to HIV infection but rarely do they test for HIV before forming the next union, which exposes them to the likelihood of infection. Remarried individuals are also likely to engage in behaviors typically associated with married couples, such as regular intercourse with infrequent condom use. Such behaviors, coupled with extra-spousal sexual intercourse increase the likelihood of HIV infection to the unfaithful partner who then becomes a channel for HIV spread to the HIV-negative partner. These findings imply that remarriage is substantial risk factor for HIV infection and interventions targeting remarried or individuals forming new unions are critical.

Finally, we found that individuals who reported a marital duration of six or more years were 47% less likely to be HIV infected compared to those who reported 1–3 years. These findings are collaborated by another study conducted in 13 sub-Saharan Africa countries using nationally representative datasets where longer marital durations were protective of HIV infection (De Walque and Kline, 2012). It's probable that a long duration symbolizes stability and trust in one's current relationship which prevents separations and remarriages. Remarriage, as earlier established in this study and other (Nabukenya et al., 2020, De Walque and Kline, 2012, Żaba et al., 2009), increases likelihood of being HIV infected.

Strengths and limitations

This study had several limitations that are worth noting. Firstly, as with most self-reported behavior studies, the assessment of extra-spousal partnerships is prone to recall bias as well as under-reporting and exaggerations. However, as Nnko et al. (2004) reported, under-reporting of extra-spousal partnerships is more common among single than married women, and exaggerations are more common among single than married men. Although under-reporting and exaggerations cannot be completely eliminated, this observation suggests that what was reported by respondents in this study is close to reality. Secondly, being a cross-sectional study, we cannot determine the direction of causality. We cannot establish if the individuals were already HIV positive before they started engaging in extra-spousal partnerships or

whether they got infected while on the sexual network. However, our findings still remain relevant given that cross-sectional data has previously been used to establish risk of HIV infection that comes with concurrent sexual partnerships (Mishra and Vinod, 2009). Thirdly, although we used data for married or cohabiting individuals, we were not able to link spouses into couples and It's probable that the relationship between extra-spousal partnerships and HIV infection would have been stronger had we analyzed linked spousal data. Nonetheless, couples are made up of individuals and we believe individual data can be used to assess the association and give reliable findings. Furthermore, data were collected in Rakai district, an area where HIV was first discovered in Uganda in 1982 and several interventions targeting HIV prevention have been implemented in the area. It could be argued that Information saturation due to several interventions has possibly led to tolerance where people no longer fear the infection and have fallen back to their high-risk sexual behaviors. Despite this, our study still brought out the risk involved in engaging in extra-spousal partnerships as it is in other districts and regions in the world. Therefore, our findings still remain valid and generalizable across districts in Uganda and elsewhere. Lastly, we failed to adjust for consistent condom use in our model. This was because only about 1.5% of the respondents reported consistent condom use across all partners. Although consistent condom use among casual partners increases to about 6%, the absolute number of individuals reporting consistent condom use with casual partners was too low to allow for meaningful stratified analysis let alone multi-level regressions.

The above-mentioned limitations notwithstanding, our study strengths lay in the fact that our data adjusts for differing HIV prevalence levels including low, medium and high HIV prevalence communities in the RCCS enumeration area. This mimics the reality in the world today and therefore our findings remain generalizable for different regions of the country and beyond and can inform the design of strata-specific HIV prevention interventions for married individuals. Our study contributes to current research on extra-spousal partnerships and HIV infection by establishing the extent to which such relationships can lead to infection.

Conclusion

Engaging in extra-spousal partnerships increased the risk of HIV infection by 67% among married or cohabiting individuals. These findings suggest a need for targeted HIV prevention interventions for married or cohabiting individuals who report extra-spousal partnerships.

Declarations

Competing interests: The authors declare no competing interests.

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