

# Sexual Behavior and Risk Practices of HIV Positive and HIV Negative Rwandan Women

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**Abstract** It is not well understood how infection with HIV and prior experience of sexual violence affects sexual behavior in African women. We describe factors influencing current sexual practices of Rwandan women living with or without HIV/AIDS. By design, 75 % of participants were HIV positive and ~50 % reported having experienced genocidal rape. Univariate and multivariate logistic regression models were fit to describe demographic and clinical characteristics that influenced sexual behavior in the previous 6 months, condom use, history of transactional sex, and prior infection with a non-HIV sexually transmitted disease. Respondents' age, where they lived, whether or not they lived with a husband or partner, experience of sexual trauma, CD4 count, CES-D and PTSD scores were strongly associated with risky sexual behavior and infection with non-HIV STI. HIV positive women with a history of sexual violence in the contexts of war and conflict may be susceptible to some high-risk sexual behaviors.

**Keywords** HIV/AIDS · Sexual behavior · Sexual trauma · Genocide · Rwanda

## Introduction

Sexual activity continues to be the primary route of HIV transmission in sub-Saharan Africa. Women living with HIV and AIDS and who take antiretroviral therapy (ART) as recommended can safely continue to be sexually active [1, 2]; however, infection with HIV can still greatly impact women's sex lives for physical and psychological reasons including the risk of transmitting the virus to uninfected partners [1]. Thus, the levels and determinants of sexual behavior among women living with HIV and AIDS are an important quality of life consideration.

Studies in several sub-Saharan countries suggest unsafe sexual practices persist among large proportions of women living with HIV [3–5]. Prior experience of repeated sexual violence can promote risky sexual behavior with implications

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for HIV transmission [1, 3, 5]. For instance, considerable evidence links women's previous experience of sexual coercion to sexual risk-taking, which increases susceptibility to HIV infection [6–8]. Existing literature suggests that women who experienced sexual and physical violence are subsequently more likely to have unprotected intercourse and/or not use contraception, have multiple partners, and diminished ability to effectively negotiate sexual decisions [7–9], which can increase their risk for HIV transmission [8, 10–17]. Furthermore, there is a strong association between experience of sexual trauma and post-traumatic stress disorder (PTSD) with studies concluding that victims of sexual trauma are more likely to exhibit symptoms of PTSD and engage in risky behaviors [18–20]. Similarly, situations in which sex is based on material exchange and perceptions of gender inequity involve considerable power differentials that may limit women's ability to effectively negotiate safe sex practices [21, 22]. These studies suggest the need for additional research to better understand how prior experience of sexual trauma may influence sexual decision-making and the risk of HIV infection for women.

Rwanda, one of the most densely populated countries in sub-Saharan Africa, has an HIV prevalence of about 3.2 % [23]. The Joint United Nations Program on AIDS estimates that prevalence is much higher in urban (7.3 %) than rural areas (2.2 %) and among women (4.3 %) than men (2.2 %) [23]. Recent studies of sexual risk behavior in HIV positive women in Rwanda have mostly focused on preventing transmission of the virus to others [24, 25] but none, to our knowledge, has examined how a history of sexual trauma may impact their sexual decision-making and/or risk behaviors. Understanding the role that previous sexual trauma plays in HIV risk behaviors has important implications for the effectiveness of interventions that target those at greatest risk, especially those with adverse mental health outcomes [26] arising from experiencing sexual trauma, which may further inhibit their ability to make effective sexual health decisions.

Several studies have shown evidence of a link between the experience of sexual violence, the onset of PTSD and sexual risk taking [7–10, 18–20] with implications for self-exposure to new and potentially drug resistant strain of HIV or transmitting the virus to an uninfected partner. Our study population includes women living with and without HIV and AIDS who experienced the 1994 genocide during which rape was systematically used as a weapon over a period of months that among other things led to the transmission of HIV to the victims and to the coining of the term “*genocidal rape*”. The objective of this paper therefore is to describe the associations between and the factors that influence current sexual practices and risk behavior of Rwandan women living with or without HIV who experienced sexual violence in and outside the genocide.

## Methods

The Rwanda Women's Inter-association Study and Assessment (RWISA) is a prospective observational cohort study of HIV-infected and uninfected Rwandan women. In 2005, 710 HIV-infected and 226 HIV-uninfected women recruited through grassroots women's associations and HIV clinics in Kigali enrolled in RWISA. RWISA eligibility criteria included living in Rwanda and being >15 years old during the 1994 genocide, agreeing to be tested for HIV and willingness to travel to the study site to participate in follow-up visits. The informed consent process included video and individual discussion and has been previously described [27]. The Rwandan National Ethics Committee and the Montefiore Medical Center Institutional Review Board approved the study protocol and procedures. By design approximately 75 % of recruited participants were HIV+ and ~50 % reported having experienced rape during the genocide. These women were all ART naïve as usage in Rwanda was just being initiated.

During the enrollment visit, participants provided historical information, underwent physical and gynecological examination, and provided blood, urine and gynecological specimens. Interviews were conducted in the local language Kinyarwanda by trained staff with nursing or trauma counseling backgrounds. This analysis is based on interviews conducted at study enrollment.

## Measures

Participants provided demographic, socioeconomic, medical, psychosocial and behavioral information regarding clinical status, disease stage, HIV-1 exposure risks, quality of life, symptoms of depression and PTSD, sexual behavior in the 6 months prior to data collection and genocidal sexual trauma experienced during the Rwandan 1994 genocide as well as sexual trauma experienced outside the genocide.

### *Demographic and Socioeconomic Characteristics*

Demographic and socioeconomic information obtained included marital status, age, whom the respondent lived with, number of dependents and income.

### *Sexual Behavior, HIV Status and Experience of Sexual Trauma*

We used the following variables for this analysis: HIV/CD4 status (HIV negative, HIV+ and CD4 >350, HIV+ and CD4 200–350, HIV+ and CD4 <200 cells/μl), whether or not the respondent had sex in the last 6 months, number of sex partners in the last 6 months, reported condom use at least half of the time ( $\approx 50$  %) for sex in the last 6 months,

history of transactional sex and experience of genocidal and non-genocidal sexual trauma.

### Depressive Symptoms

Depressive symptoms were measured by the 20-item Center for Epidemiological Studies-Depression scale (CES-D) categorized as CES-D <16, 16–26 and >26. A threshold score >26 represented clinically significant symptoms of depression [28]. Internal consistency reliability for the entire scale was Cronbach's alpha = 0.82.

### Post Traumatic Stress Disorder

The 40-item Harvard Trauma Questionnaire (HTQ) was used to measure trauma symptoms in the context of traumatic sexual experiences related to or outside of the genocide. For this study, 16 HTQ items that corresponded to the three categories of symptoms associated with PTSD were used [29]. The scale for each item ranged from 1 to 4, and a mean score >2 indicated that the individual had symptoms consistent with PTSD [30]. The internal consistency reliability for the subscale was Cronbach's alpha = 0.88.

### Statistical Analysis

We compared women living with HIV and women not living with HIV by categorical or categorized characteristics using exact tests for statistical significance. Univariate and multivariate logistic regression models were fit to determine unadjusted and independent associations between demographic and clinical characteristics, and other factors of interest with the following study outcomes: recent sexual activity in the past 6 months, condom use  $\geq 50$  % of the time for those who had sex in the past 6 months, a history of transactional sex and non-HIV sexually transmitted infection (STI). Multivariate models were fit to these outcomes using forward selection with  $p$  values of  $\leq 0.01$  for entry and  $\geq 0.10$  for removal. Statistical analyses were performed using SAS version 9.2.

### Results

As shown in Table 1, nearly half of the women were 30–40 years old and about 87 % of these were living with HIV. About two-thirds of the women reported living with someone else, were not living with a husband or partner and earned a monthly income less than 35,000 Rwandan Francs. Seventy-seven percent of women who experienced genocidal rape were living with HIV and the corresponding proportion among those who experienced non-genocidal rape was 86 %. Regarding mental health status, nearly half

**Table 1** Demographic characteristics by HIV status

Variable	<i>N</i>	% HIV negative	% HIV positive	<i>p</i> value by exact test*
Overall	928	24.14	75.86	
Age				
<30	190	17.37	82.63	<0.0001
30–40	449	13.14	86.86	
$\geq 40$	289	45.67	54.33	
Residence				
Own house	281	37.72	62.28	<0.0001
Parent house	71	28.17	71.83	
Someone else	558	15.23	84.77	
# People live with				
<3	215	10.70	89.30	<0.0001
3–5	457	23.41	76.59	
>5	224	32.59	67.41	
Live with husband/partner				
No	592	22.47	77.53	0.51
Yes	318	24.53	75.47	
Income				
<10 k RwF	340	27.05	72.94	0.015
10–35 k RwF	422	18.48	81.52	
>35 k RwF	129	24.81	75.19	
Experienced genocidal rape				
No	453	25.61	74.39	0.32
Yes	475	22.74	77.26	
Experienced non genocidal rape				
No	804	25.62	74.38	0.004
Yes	117	13.68	86.32	
CES-D score				
<16	193	36.27	63.73	<0.0001
16–27	412	18.93	81.07	
>27	260	18.08	81.92	
PTSD score				
$\leq 2$	362	20.72	79.28	0.06
>2	550	26.36	73.64	
Sex in last 6 months				
No	415	27.23	72.77	0.01
Yes	493	20.08	79.92	
# Sexual partners last 6 months				
0	415	27.23	72.77	0.003
1	450	21.33	78.67	
$\geq 2$	43	6.98	93.02	
History of non-HIV STI?				
No	743	26.92	73.08	<0.0001
Yes	185	12.97	87.03	
Condom use $\geq 50$ % last 6 months				
No	245	33.88	66.12	<0.0001

**Table 1** continued

Variable	<i>N</i>	% HIV negative	% HIV positive	<i>p</i> value by exact test*
Yes	246	6.10	93.40	
Ever exchanged sex for help for cash or children				
No	704	25.99	74.39	0.0006
Yes	195	14.36	77.26	

\* Fisher's exact tests

of women had CES-D scores of 16–27 and PTSD scores >2. The distribution of respondents by the study outcomes show that more than half of women reported being sexually active in the last 6 months and only half of these reported they used condoms at least half of the time. About one-third of women reported a history of a non-HIV STI and transactional sex.

Table 2 shows the distribution of respondents by four outcome variables among participant subgroups. Among women reporting sexual activity in the last 6 months, significant associations were observed with regard to age, where they live, income and number of sexual partners in the reporting period (all *p* values <0.0001 by exact test), CES-D score (*p* values 0.002 by exact test), experience of genocidal rape (*p* values 0.03), previous history of non-STI HIV (*p* values 0.03) and HIV status and CD4 count (*p* values 0.02 by exact test). The analysis of condom use (restricted to women reporting sexual activity in the previous 6 months) showed significant associations with regard to HIV status (*p* value <0.0001 by exact test), number of sexual partners (*p* value <0.0001 by exact test) and CES-D score (*p* value 0.04 by exact test). Among women with a history of transactional sex, significant associations were observed among those living with a husband or partner (*p* values <0.0001 by exact test), number of sexual partners in last 6 months (*p* values <0.0001 by exact test), where respondent lives (*p* values 0.0001 by exact test), number of people they live with (*p* values 0.0008 by exact test), previous history of a non-HIV STI (*p* values 0.0002 by exact test), age (*p* values 0.05 by exact test), experience of genocidal rape (*p* values 0.0002 by exact test), non-genocidal rape (*p* values 0.005 by exact test), CES-D (*p* values 0.02 by exact test) and PTSD scores (*p* values 0.003 by exact test). Among women with a history of non-STI HIV, significant associations were observed with regard to HIV status (*p* value <0.0001 by exact test), age (*p* value 0.05 by exact test), number of people respondent lived with (*p* value 0.05 by exact test), experience of genocidal rape (*p* value 0.0005 by exact test), CES-D score (*p* value 0.04 by exact test) and number of sexual partners in the last 6 months (*p* value 0.04 by exact test).

Tables 3, 4, 5, and 6 show univariate and multivariate logistic regression models that were fit to determine the association between respondents' demographic and clinical characteristics and study outcomes. Again, models for condom use in Table 3 included only women reporting sexual activity in the last 6 months. As the univariate models mostly reflect associations already seen in Table 2, we focus on the multivariate associations in the text.

#### Predictors of Sexual Activity in the Last 6 Months

In the multivariate model shown in Table 3, younger age, living with someone else, living with a husband and experience of genocidal sexual trauma were positively associated with higher odds of sexual activity within the last 6 months. Women who were >40 years (aOR = 0.10, 95 % CI = 0.06–0.19) were less likely to report sexual activity in the last 6 months, while women living with a husband or partner (aOR = 113.80, 95 % CI = 49.70–260.7) and those living in someone else's house (except their parent's house) (aOR = 1.89 vs. living in their own house 95 % CI = 1.11–3.21) and those who experienced genocidal rape (aOR = 1.70, 95 % CI = 1.15–2.51) were significantly more likely to engage in sexual activity in the last 6 months. While the huge aOR of 113.80 for living with partner or husband calls into question model stability, it is noteworthy that the model did mathematically converge and that the adjusted odds ratios for other variables in the model were similar to their unadjusted odds ratios in univariate models. Therefore we believe the multivariate model accurately reflects adjusted associations.

#### Predictors of Condom Use At Least 50 % of the Time in Last 6 Months

In multivariate modeling restricted to women who reported sexual activity in the last 6 months (Table 4), only HIV status was significantly independently associated with greater odds of condom use  $\geq 50$  % of the time. Women who were HIV positive with CD4 counts 200–350 cells/ $\mu$ l were nearly tenfold more likely to use condoms than HIV negative women (aOR = 9.56, 95 % CI = 4.88–18.70).

#### Predictors of Transactional Sex

In the multivariate model shown in Table 5, age, living with someone else, living with husband/partner and experience of sexual trauma were significantly associated with reporting transactional sex. The odds were significantly lower for women >40 years versus  $\leq 40$  (aOR = 0.54, 95 % CI = 0.32–0.90) and those living with a husband or partner (aOR = 0.22, 95 % CI = 0.14–0.35) whereas it was significantly higher among women who lived with someone else (aOR = 1.62, 95 % CI = 1.04–2.54) and

**Table 2** Demographic characteristics by four outcome variables

Variable	N	% Sex last 6 months	% Use condoms last sex	% Exchanged sex	% Non-HIV STI
Overall	928	54.30	50.10	21.69	19.94
HIV status					
HIV negative	224	46.70	15.31	13.27	10.71
HIV positive	704	56.61	58.78	24.27	22.87
	<i>p</i> value <sup>a</sup>	0.012	<0.0001	0.0006	<0.0001
Age					
<30	190	74.07	48.92	27.66	26.32
30–40	449	63.12	53.60	21.51	18.71
≥40	289	26.71	39.19	17.88	17.65
	<i>p</i> value <sup>a</sup>	<0.0001	0.09	0.04	0.05
Where do you live					
Own house	281	51.43	50.35	13.31	16.01
Parent house	71	30.43	33.33	19.12	16.90
Someone else	558	58.92	51.23	26.23	22.58
	<i>p</i> value <sup>a</sup>	<0.0001	0.30	0.0001	0.07
# People live with					
<3	215	52.56	58.04	30.52	26.05
3–5	457	54.87	47.18	21.16	18.60
>5	224	58.30	49.61	15.53	17.86
	<i>p</i> value <sup>a</sup>	0.48	0.16	0.0008	0.05
Live with husband/partner					
No	592	31.41	53.80	28.23	20.61
Yes	318	97.46	48.04	9.55	19.18
		0.48	0.23	<0.0001	0.67
Income					
<10 k RwF	340	42.01	46.01	23.05	18.24
10–35 k RwF	422	61.81	52.51	23.32	20.38
>35 k RwF	129	69.53	51.41	15.08	25.58
	<i>p</i> value <sup>a</sup>	<0.0001	0.46	0.12	0.21
Experienced genocidal rape					
No	453	50.46	49.32	16.36	15.23
Yes	475	57.87	50.74	26.67	24.42
	<i>p</i> value <sup>a</sup>	0.03	0.79	0.0002	0.0005
Experienced non genocidal rape					
No	804	54.51	48.95	20.26	19.15
Yes	117	53.85	58.73	32.17	26.50
	<i>p</i> value <sup>a</sup>	0.92	0.18	0.005	0.09
CES-D score					
<16	193	61.78	41.88	14.58	15.54
16–27	412	56.59	56.28	24.38	24.27
>27	260	45.77	48.74	23.62	19.23
	<i>p</i> value <sup>a</sup>	0.002	0.04	0.02	0.04
PTSD score					
≤2	362	58.43	57.49	16.48	19.06
>2	550	52.43	44.64	24.86	20.18
	<i>p</i> value <sup>a</sup>	0.09	0.006	0.003	0.74
# Sexual partners last 6 months					
0	415	–	–	15.23	17.35

**Table 2** continued

Variable	N	% Sex last 6 months	% Use condoms last sex	% Exchanged sex	% Non-HIV STI
1	450	100	47.77	21.43	20.89
≥2	43	100	74.42	83.72	39.53
	<i>p</i> value <sup>a</sup>	<0.0001	0.001	<0.0001	0.004
Previous non-HIV STI?					
No	743	50.46	49.32	16.36	15.23
Yes	185	57.87	50.74	26.67	24.42
	<i>p</i> value <sup>a</sup>	0.03	0.79	0.0002	0.0005
CD4 count					
>350	194	64.58	58.06	23.16	22.16
200–350	267	55.47	64.38	25.76	21.35
<200	241	51.05	52.07	23.71	25.31
	<i>p</i> value <sup>a</sup>	0.02	0.12	0.78	0.55

<sup>a</sup> Fisher's exact tests

those who had experienced genocidal rape (aOR = 1.86, CI = 1.30–2.66) or non-genocidal rape (aOR = 1.58, CI = 0.98–2.53).

#### Predictors of Ever Having a Non-HIV STI

In the multivariate models shown in Table 6, age, experience of genocidal rape, CES-D scores  $\geq 16$  and HIV status were significantly associated with reporting a history of a non-HIV STI. The odds of ever having a non-HIV STI was significantly lower among women aged 30–40 (aOR = 0.63, 95 % CI = 0.42–0.96) and significantly higher among women with a CES = D score 16–27 (aOR = 1.64, 95 % CI = 1.01–2.52) and those who experienced genocidal rape (aOR = 1.77, 95 % CI = 1.25–2.52).

#### Discussion

This paper describes the associations between and the factors that influence current sexual practices and risk behaviors of Rwandan women living with or without HIV and AIDS who experienced genocidal or non-genocidal sexual trauma. We highlight factors that could affect HIV transmission and/or acquisition of drug resistant strains of HIV as well as socio-demographic and clinical characteristics associated with risk behaviors among 936 Rwandan women.

We found that women who experienced genocidal sexual trauma were more likely to be sexually active in the prior 6 months, have a history of transactional sex at some point in their lives, and a greater likelihood of a history of non-HIV STI. Women who reported genocidal rape were nearly twice as likely to report having engaged in transactional sex or having had a non-HIV STI. Our finding that sexual abuse either during a period of war/conflict or in

non-conflict contexts was associated with involvement in transactional sex is consistent with studies that show women with a history of sexual trauma are more likely to subsequently engage in transactional sex and other high-risk sexual practices [31, 32]. The associations of non-genocidal rape with study outcomes tended to be similar to those of genocidal rape in univariate models. But non-genocidal rape did not remain statistically significant in multivariate models perhaps due to lower statistical power as only 15 % of the sample had experienced non-genocidal rape compared to 50 % experiencing genocidal rape. Other studies have also reported that women living with HIV who have a history of non-genocidal sexual abuse are susceptible to risky behaviors including inconsistent condom use, transactional sex, multiple partnerships and sexually transmitted infections, which may have occurred during the abuse [33–38]. Although prior experience of repeated sexual abuse particularly during childhood is associated with greater sexual risk behaviors and transactional sex [34], the influence of sexual trauma during war and conflict on subsequent risky sexual activity and transactional sex has not been well described.

Nevertheless, Rwandan women living with HIV who have a history of sexual trauma may have unique needs that should be addressed in interventions that are implemented to support them. Additional research may be needed to identify other reasons why these women may have reported continuous engagement in risky sexual behaviors that increased their vulnerability to secondary infection or non-HIV STIs.

Previous studies have established an association between sexual violence, PTSD and sexual risk taking [6–8, 37–41]. Walsh et al. [40] reported that sexual violence was associated with increased risk for lifetime PTSD and exposure to other traumas. Kuwert et al. [41] also reported that women exposed

**Table 3** Univariate and multivariate logistic regression for sex in the last 6 months

Variables	Univariate model		Multivariate model	
	OR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)	aOR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)
Age		117.22, 2, (<0.0001)		57.06, 2, (<0.0001)
<30 (Ref)				
30–40	0.60 (0.41–0.87)	7.04, 1, (0.0008)	0.46 (0.29–0.73)	10.61, 1, (0.0011)
>40	0.13 (0.08–0.19)	92.18, 1, (<0.0001)	0.10 (0.06–0.19)	55.79, 1, (<0.0001)
Where live		20.23, 2 (<0.0001)		8.50, 2, (0.01)
Own house (Ref)				
Parent's house	0.42 (0.24–0.74)	9.14, 1, (0.002)	0.99 (0.46–2.12)	0.00, 1, (0.98)
Someone else	1.37 (1.03–1.83)	4.71, 1 (0.03)	1.89 (1.11–3.21)	5.50, 1, (0.02)
People live with		1.49, 2, (0.46)		
<3 people (Ref)				
3–5 people	1.10 (0.79–1.52)	0.31, 1, (0.56)		
>5 people	1.26 (0.87–1.84)	1.46, 1, (0.23)		
Living with husband/partner				
No (Ref)				
Yes	83.78 (40.65–172.6)	144.07, 1, (<0.0001)	113.8 (49.70–260.7)	125.42, 1 (<0.0001)
Income		40.88, 2, (<0.0001)		
<10 k RwF (Ref)				
10–35 k Rwf	2.23 (1.67–2.99)	29.04, 1, (<0.0001)		
>35 k Rwf	1.77 (1.43–2.20)	26.84, 1, (<0.0001)		
Experience genocide rape				
No (Ref)				
Yes	1.35 (1.04–1.75)	5.01, 1, (0.03)	1.70 (1.15–2.51)	7.20, 1, (0.007)
Experience non-genocide rape				
No (Ref)				
Yes	0.97 (0.66–1.44)	0.02, 1, (0.89)		
CES-D score		12.68, 2, (0.002)		
<16 (Ref)				
16–26	0.88 (0.64–1.22)	0.58, 1, (0.44)		
≥27	0.57 (0.40–0.81)	9.55, 1, (0.002)		
PTSD score				
≤2 (Ref)				
>2	0.78 (0.60–1.03)	03.11, 1, (0.08)		
CD4 count		14.09, 3, (0.003)		
HIV negative (Ref)				
>350	2.04 (1.37–3.04)	12.24, 1, (0.0005)		
200–350	1.39 (0.97–2.00)	3.24, 1, (0.07)		
<200	1.17 (0.81–1.69)	0.67, 1, (0.41)		

to conflict related sexual violence often exhibit more severe symptoms of PTSD than survivors of non-conflict sexual violence. Results of our univariate models showed an association between PTSD/CESD and sexual risk taking. For example, the finding that women who exhibited symptoms of PTSD were almost twice as likely to have engaged in transactional sex is consistent with results from other studies that show the experience of rape often results in psychosocial consequences, which manifests in risk taking (or not being

able to avoid risky situations) including unprotected sex with multiple partnerships and engaging in transactional sex [37].

It is noteworthy that unlike in the univariate models, PTSD/CESD did not appear to be a strong predictor in the multivariate models. This is perhaps due to the effect of time since exposure and/or measurement error on the score including that genocidal rape survivors who now have low PTSD/CESD score in the past had more severe PTSD/CESD than other women who now have high PTSD/CESD

**Table 4** Univariate and multivariate logistic regression for condom use at least 50 % of time last 6 months

Variables	Univariate model		Multivariate model	
	OR (95 % CI)	$\chi^2$ , DF, (p value)	aOR (95 % CI)	$\chi^2$ , DF, (p value)
Age		4.90, 2 (0.089)		
<30 (Ref)				
30–40	1.21 (0.80, 1.81)	0.81, 1, (0.38)		
>40	0.67 (0.38, 1.19)	1.84, 1, (0.18)		
Where live		2.43, 2, (0.30)		
Own house (Ref)				
Parent’s house	0.50 (0.19, 1.31)	1.98, 1, (0.16)		
Someone else	1.05 (0.71, 1.55)	0.06, 1, (0.08)		
People live with		3.65, 2, (0.02)		
<3 people (Ref)				
3–5 people	0.65 (0.41–1.01)	3.62, 1, (0.06)		
>5 people	0.71 (0.43–1.19)	1.71, 1, (0.02)		
Living with husband/partner				
No (Ref)				
Yes	0.79 (0.55, 1.15)	1.53, 1, (0.22)		
Income		1.52, 2, (0.47)		
<10 k RwF (Ref)				
10–35 k Rwf	1.29 (0.86, 1.95)	1.50, 1, (0.22)		
>35 k Rwf	1.11 (0.85, 1.44)	0.55, 1, (0.55)		
Experience genocide rape				
No (Ref)				
Yes	1.06 (0.74, 1.51)	0.10, 1, (0.75)		
Experience non-genocide rape				
No (Ref)				
Yes	1.48 (0.87, 2.54)	2.08, 1, (0.15)		

**Table 4** continued

Variables	Univariate model		Multivariate model	
	OR (95 % CI)	$\chi^2$ , DF, (p value)	aOR (95 % CI)	$\chi^2$ , DF, (p value)
CES-D score		6.65, 2, (0.04)		
<16 (Ref)				
16–26	1.84 (1.20, 2.82)	7.96, 1, (0.005)		
≥27	1.36 (0.87, 2.54)	1.51, 1, (0.22)		
PTSD score				
≤2 (Ref)				
>2	0.60 (0.42, 0.86)	7.81, 1, (0.005)		
CD4 count		51.30, 3, (<0.0001)		51.30, 3, (<0.0001)
HIV negative (Ref)				
>350	6.76 (3.59, 12.72)	35.12, 1, (<0.0001)	6.76 (3.59, 12.72)	35.12, 1, (<0.0001)
200–350	8.82 (4.74, 16.44)	47.07, 1, (<0.0001)	8.82 (4.74, 16.44)	47.07, 1, (<0.0001)
<200	5.30 (0.42, 9.98)	26.76, 1, (<0.0001)	5.30 (2.82, 9.98)	26.76, 1, (<0.0001)

scores. Kuwert et al. [41] have reported how different traumas are associated with posttraumatic sequelae in sexual assault victims. While this result may warrant further investigation, it also highlights the need to better understand and treat the effects of conflict-related sexual violence.

We also found that living with a husband/partner, young age and experience of genocidal sexual trauma were strongly associated with recent sexual activity in the last 6 months. Women living with a husband/partner may experience increased sexual activities in fulfillment of conjugal expectations as well as accessibility to procure sex. As other studies suggest, younger women less than 30 years old who are living with HIV may also be more sexually active in part because of fertility intentions and/or living with a husband or partner [42, 43].

Correct and consistent condom use can prevent the transmission of HIV, other STIs and pregnancy. Existing studies of condom use are inconclusive regarding the level of consistency required to reduce the risk of disease transmission or the factors influencing consistent use [44–50]. Nevertheless, the use of a 50 % cut off in our analysis



**Table 5** Univariate and multivariate logistic regression for history of ever exchanging sex for cash or help for children

Variables	Univariate model		Multivariate model	
	OR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)	aOR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)
Age		6.23, 2, (0.04)		5.69, 2, (0.06)
<30 (Ref)				
30–40	0.72 (0.48, 1.06)	2.77, 1, (0.10)	0.71 (0.47, 1.10)	2.36, 1, (0.01)
>40	0.57 (0.37, 0.89)	6.16, 1, (0.01)	0.54 (0.32, 0.90)	5.65, 1, (0.02)
Where live		17.82, 2, (0.0001)		8.13, 2, (0.02)
Own house (Ref)				
Parent's house	1.52 (0.76, 3.04)	1.39, 1, (0.24)	0.79 (0.37, 1.67)	0.39, 1, (0.53)
Someone else	2.28 (1.54, 3.38)	17.11, 1, (<0.0001)	1.62 (1.04, 2.54)	4.55, 1, (0.03)
People live with		14.21, 2 (0.0008)		
<3 people (Ref)				
3–5 people	0.61 (0.42, 0.88)	6.84, 1, (0.009)		
>5 people	0.42 (0.26, 0.67)	13.32, 1, (0.0003)		
Living with husband/ partner				
No (Ref)				
Yes	0.27 (0.18, 0.41)	38.01, 1, (<0.0001)	0.22 (0.14, 0.35)	42.04, 1, (<0.0001)
Income		4.07, 2, (0.13)		
<10 k RwF (Ref)				
10–35 k Rwf	1.01 (0.72, 1.43)	0.01, 1, (0.93)		
>35 k Rwf	0.77 (0.58, 1.01)	3.47, 1, (0.06)		
Experience genocide rape				
No (Ref)				

**Table 5** continued

Variables	Univariate model		Multivariate model	
	OR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)	aOR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)
Yes	1.86 (1.34, 2.58)	13.81, 1, (0.0002)	1.86 (1.30, 2.66)	11.59, 1, (0.0007)
Experience non- genocide rape				
No (Ref)				
Yes	1.87 (1.22, 2.67)	8.16, 1, (0.004)	1.58 (0.98, 2.53)	3.55, 1, (0.06)
CES-D score		7.72, 2, (0.02)		
<16 (Ref)				
16–26	1.82 (1.19, 2.77)	7.76, 1, (0.0053)		
≥27	1.74 (1.10, 2.76)	5.67, 1, (0.0172)		
PTSD score				
≤2 (Ref)				
>2	1.68 (1.19, 2.36)	8.70, 1, (0.0032)		
CD4 count		11.77, 3, (0.0082)		
HIV negative (Ref)				
>350	1.99 (1.18, 3.35)	6.71, 1, (0.0096)		
200–350	2.29, (1.41, 3.72)	11.29, 1, (0.0008)		
<200	2.05, (1.25, 3.38)	7.97, 1, (0.0048)		

allows for some subjectivity in determining respondents who are more likely to be consistent users. Further, it also draws from knowledge that while retrospective self-reports of condom use may be error prone, reporting condom use at least half of the time in the last 6 months is more likely to reflect consistent use.

About half of participants who were sexually active reported using condoms at least half of the time in the previous 6 months. We also found that HIV infection was the only independent predictor of condom use among sexually active women in this study, suggesting a desire

**Table 6** Univariate and multivariate logistic regression for history of non-HIV STI

Variables	Univariate model		Multivariate model	
	OR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)	aOR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)
Age		6.16, 2, (0.0461)		4.71, 2, (0.0948)
<30 (Ref)				
30–40	0.64 (0.43, 0.96)	4.63, 1, (0.0314)	0.63 (0.42, 0.96)	4.61, 1, (0.0319)
>40	0.60 (0.39, 0.93)	5.13, 1, (0.0235)	0.79 (0.49, 1.28)	0.88, 1, (0.3841)
Where live		5.46, 2, (0.0652)		
Own house (Ref)				
Parent’s house	1.09 (0.54, 2.18)	0.06, 1, (0.8071)		
Someone else	1.56 (1.08, 2.26)	5.63, 1, (0.0177)		
People live with		5.99, 2, (0.0499)		
<3 people (Ref)				
3–5 people	0.65 (0.44, 0.95)	4.86, 1, (0.0275)		
>5 people	0.62 (0.39, 0.98)	4.27, 1, (0.0388)		
Living with husband/ partner				
No (Ref)				
Yes	0.91 (0.66, 1.29)	0.26, 1, (0.6090)		
Income		3.10, 2, (0.2123)		
<10 k RwF (Ref)				
10–35 k Rwf	1.15 (0.80, 1.65)	0.55, 1, (0.4573)		
>35 k Rwf	1.24 (0.98, 1.58)	3.10, 1, (0.0783)		
Experience genocide rape				
No (Ref)				
Yes	1.80 (1.29, 2.50)	12.08, 1, (0.0005)	1.77 (1.25, 2.52)	10.23, 1, (0.0014)

**Table 6** continued

Variables	Univariate model		Multivariate model	
	OR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)	aOR (95 % CI)	$\chi^2$ , DF, ( <i>p</i> value)
Experience non- genocide rape				
No (Ref)				
Yes	1.52 (0.97, 2.38)	3.40, 1, (0.0653)		
CES-D score		6.56, 2, (0.0378)		6.12, 2, (0.0470)
<16 (Ref)				
16–26	2.02 (1.39, 3.09)	10.73, 1, (0.0011)	1.64 (1.01, 2.65)	4.03, 1, (0.0447)
≥27	1.50 (0.94, 2.41)	2.87, 1, (0.0901)	1.11 (0.65, 1.89)	0.14, 1, (0.7086)
PTSD score				
≤2 (Ref)				
>2	1.07 (0.77, 1.50)	0.17, 1, (0.6773)		
CD4 count		16.37, 3, (0.0010)		13.08, 3, (0.0045)
HIV negative (Ref)				
>350	2.40 (1.39, 4.12)	9.99, 1, (0.0016)	2.31 (1.26, 4.21)	7.37, 1, (0.0066)
200–350	2.28 (1.37, 3.82)	9.90, 1, (0.0017)	2.23 (1.25, 3.96)	7.43, 1, (0.0064)
<200	2.85 (1.71, 4.77)	16.02, 1, (<0.0001)	2.93 (1.63, 5.25)	12.98, 1, (0.0003)

among women living with HIV to prevent transmission of virus to partners. The finding that HIV positive status regardless of CD4 count increased the odds of condom use is supported by other studies that report condoms as the preferred method to prevent pregnancy and/or disease transmission among HIV positive women [48–50]. This suggests that condom use may be undertaken to prevent HIV transmission to their partner as much as or more than to prevent acquisition of new STD or pregnancy.

We found that women who reported experience of genocidal rape, younger age and not residing with a husband/partner were more likely to engage in transactional sex. Being young and living in one’s parents or someone else’s house may indicate lack of economic independence, a factor that may encourage involvement in transactional

sex. These findings call attention to implementing interventions that address economic and psychosocial needs of sexually abused women, including economic disempowerment and unequal gender dynamics [51–56].

Some limitations warrant attention in interpreting these findings. First, we used self-reports of sexual behaviors and their consequences as the study outcomes. Self reported variables are known to be subject to recall bias or the responses could be subject to socially desirable answers depending on the cultural beliefs and norms regarding sexual behavior. For example, the association between reported condom use and HIV serostatus may be due to non-awareness of partner's status among those not reporting condom use at least half of the time in the previous 6 months. Moreover, because participants are women, gender specific stigma associated with risky sexual behavior in many cultures in Africa and elsewhere may have resulted in under-reporting these behaviors [57]. In addition, there may have been recall bias in women's self-reports of diagnosed sexually transmitted infections. Furthermore, while participants were recruited from grassroots organizations serving genocide survivors, the research incentives may have influenced women to say they experienced sexual trauma during the genocide so they could be included in the study. Finally, because the cohort was recruited through grassroots women's associations and HIV clinics in Kigali, it may not be representative of all Rwandan women.

## Conclusion

In summary, we found that the factors that influence sexual practices and risk behaviors of Rwandan women living with and without HIV include previous experience of genocidal sexual violence, exhibiting symptoms of PTSD, living with a husband/partner, younger age and CD4 status. Although there are no significant differences between women living with and those living without HIV in terms of the factors that influence short term risk behaviors, it is noteworthy that women living with HIV were more likely to use condoms to prevent the transmission of the virus to their sexual partners.

Interventions may need to address the specific needs of sexually abused women living with HIV, whose health and psychosocial needs may be different from other populations of women living with HIV but without a history of sexual violence. Moreover, it is important for programs and policy to recognize that HIV positive women with a history of sexual violence in the contexts of conflict and war may be susceptible to sexual risk taking. If so, policy and programs need to focus on building skills to help them avoid risky behaviors. The psychosocial and health impact of sexual violence and the added burden of HIV infection may have serious implications for the long term reproductive

health of women in post-conflict settings where rape is often employed as a weapon of war. Although the context of our study may be unique and thus exhibit different patterns than others where sexual violence is extensive, programs and policies that aim to mitigate the impact must identify the peculiarities of these contexts by relying on additional research to generate pertinent information for implementing effective interventions.

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