

Cango LyeC (Healing the Elephant): Gender Differences in HIV Infection in Post-conflict Northern Uganda

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Background: As previously encamped resettle, potential for rapid HIV transmission in post-conflict Northern Uganda is concerning. Women in particular may be experiencing heightened vulnerability resulting from war-related sexual violence.

Setting: Cango LyeC (Healing the Elephant) Project is a cohort involving conflict-affected people in 3 districts in Northern Uganda.

Methods: Eight randomly selected communities were mapped, and a census was conducted. Participants aged 13–49 years completed questionnaires in Luo on war-related experiences, mental health, sexual vulnerabilities, and sociodemographics. Blood samples were tested for HIV and syphilis. Baseline data from all sexually active participants was used to determine gender differences in HIV prevalence. Multivariate modeling determined correlates of HIV by gender.

Results: Among 2008 participants, HIV prevalence was higher among women [17.2; 95% confidence interval (CI): 14.7 to 19.7] compared to men (10.6; 95% CI: 8.0 to 13.2, <0.001). Among women, correlates of HIV included: war-related sexual assault [adjusted odds ratio (AOR): 1.95; 95% CI: 1.16 to 3.26]; probable depression (AOR: 2.22; 95% CI: 1.46 to 3.37); probable

post-traumatic stress disorder (AOR: 2.03; 95% CI: 1.45 to 2.84); experiencing ≥ 12 traumatic events (AOR: 2.04; 95% CI: 1.31 to 3.18); suicide ideation (AOR: 1.67; 95% CI: 1.22 to 2.28); living in a female-headed household (AOR: 2.76; 95% CI: 1.70 to 4.49); first sexual partner ≥ 10 years older (AOR: 1.69; 95% CI: 1.07 to 2.67); sex for exchange (AOR: 5.51; 95% CI: 1.76 to 17.31); having 2 (AOR: 2.54; 95% CI: 1.23 to 5.23) or 3+ (AOR: 4.65; 95% CI: 2.65 to 8.18) sexual partners; inconsistent condom use (AOR: 0.40; 95% CI: 0.29 to 0.57); genital ulcers (AOR: 3.08; 95% CI: 2.16 to 4.38); active syphilis (AOR: 4.33; 95% CI: 1.22 to 15.40); and ill health without medical care (AOR: 2.02; 95% CI: 1.22 to 3.34). Among men, correlates of HIV included no condom at sexual debut (AOR: 1.92; 95% CI: 1.30 to 2.83) and genital ulcers (AOR: 4.40; 95% CI: 1.35 to 14.40).

Conclusion: Women are disproportionately impacted by HIV, trauma, and depression in this conflict-affected population. Trauma-informed HIV prevention and culturally safe mental health initiatives are urgently required.

Key Words: HIV-AIDS, conflict-affected people, Northern Uganda, gender, sexual violence, mental health

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INTRODUCTION

Protracted war between the Government of Uganda and the Lord's Resistance Army (LRA) in Northern Uganda has resulted in widespread atrocities, human rights violations, and death. In 2002, the Ugandan government began "Operation Iron Fist," a military offensive against the LRA. As the Uganda People's Defense Force bombed encampments in southern Sudan, rebels poured back across the Ugandan border and sought revenge against the civilian population.¹ Entire communities were massacred, child abductions were rampant, and millions fled to Internally Displaced People (IDP) camps. In 2001, 480,000 IDPs were living in camps and by 2005 there were over 1.8 million, accounting for more than 90% of the region's population.^{2,3} The Cessation of Hostilities Agreement was signed in 2006, and by 2008, many IDPs had begun the process of returning to their ancestral homes.³ Currently, most IDP camps have closed and as of December 2010, more than 90% of IDPs who were encamped at the height of the conflict have returned to their ancestral homes. However, corruption allegations led to a freeze of funding allocated by the international donor community to support infrastructure and services in home villages.⁴ As a result, the post-conflict transition has remained problematic, leading some to remain in transit camps or move back and forth during rebuilding.⁵ In this post-conflict context, there are significant concerns that risk of HIV infection has been heightened as a result of disrupted community and family life, breakdown of services, IDP camp living, and exposure to sexual exploitation.⁶⁻⁸

Like other conflict-affected areas, HIV/AIDS research was not a high priority during and immediately after the Northern Ugandan conflict.^{8,9} Although focus has necessarily been on relief efforts, HIV control is increasingly considered critical in the context of war and its aftermath.⁸ However, the relationship between HIV/AIDS and conflict is complex.^{8,10} On one hand, breakdown of social services, disrupted health infrastructure, and high levels of sexual violence may *increase* HIV vulnerability.¹² On the other hand, reduction in mobility and improved social services may *decrease* HIV risk.¹⁰⁻¹² Examples from Sudan, Sierra Leone, and Angola indicate that conflict may either directly increase HIV transmission or have a protective effect by keeping people isolated.^{13,14} Antenatal surveillance early in the Ugandan conflict demonstrated an initial increase in HIV transmission directly attributable to the war, likely because of displacement and mobility; concentration of people in urban areas; and collapse of health systems.¹⁵ Subsequent analyses indicated that women living in camps were less likely to be living with HIV than those in municipal areas.¹⁶ However, in 2005, the World Health Organization and the Ugandan Ministry of Health reported excess mortality of 1000 people per week in the North, with AIDS as the second highest cause of death.² The 2011 Uganda AIDS Indicator Survey remains one of the only sources of general population-level post-conflict epidemiological data.¹⁷ In the North-Central region, which was most impacted by the conflict, overall HIV prevalence was estimated at 8.3% among 15- to 49-year-olds (10.1% among women, 7.1% among men).¹⁷

The disproportionate burden of HIV among women in sub-Saharan Africa is attributed to lack of power, coerced first sex, early marriage, limited access to reproductive health services, extreme poverty, and sexual violence.^{9,18} Conflict and post-conflict contexts exacerbate these risks,^{6,11,19} and war-related sexual violence in Northern Uganda has been well documented.^{9,20,21} Heightened vulnerability of women and children surviving IDP settings stems primarily from elevated risk of rape and sexual violence, including by armed forces.⁹ Of note, a significant percentage of boys and men were also victims of sexual violence.^{5,22} Controversy exists regarding the extent to which sexual violence increases HIV risk. In a systematic review, Spiegel et al²³ concluded that evidence does not support the hypothesis that HIV transmission is affected by sexual violence during conflict. Alternatively, Jewkes²⁴ has argued that rape and sexual violence are fueling the growing HIV epidemic in the sub-Saharan region.

Intersecting epidemics of gender-based violence, conflict-related psychological distress, and HIV risk are a growing concern. Post-traumatic stress disorder (PTSD) can enhance HIV-related vulnerability in 3 ways. First, people with PTSD are more likely to engage in risky sexual behavior, including not using condoms and multiple concurrent partnerships. Second, exposure to trauma and PTSD has been found to have a negative impact on immune function among those with HIV infection. Finally, PTSD has been found to interfere with adherence to HIV medications, resulting in more rapid progress to death.²⁵⁻²⁷ Roberts et al²² reported that 54% of adults living in Northern Ugandan IDP camps met the criteria for PTSD, with more women diagnosed than men (60% vs. 46%). These levels of PTSD are among the highest recorded globally. Evidence also suggests that children abducted by the LRA are at especially high risk for trauma.^{28,29} A study of former child soldiers aged 12-28 found that 97% met clinical criteria for PTSD diagnosis.²⁸

During the emergency and post-emergency period, nongovernmental organizations (NGOs) delivered some HIV/AIDS services in centralized locations in IDP camps and Gulu town. However, as NGOs shut down humanitarian operations in the post-conflict period, many HIV services were halted.⁶ When the Government declared an end to the emergency, donor funds designated for emergency situations dried up and HIV services were further affected. Currently, as former IDPs have returned home, delivering HIV care over a wide rural and remote area remains a challenge.³⁰ Potential for rapid progression of infection in post-conflict Northern Uganda warrants an aggressive and deliberate approach to evidence-based research and programme design. In November 2011, investigators from Uganda and Canada initiated a 5-year longitudinal cohort to determine population-wide HIV rates in districts most impacted by the conflict, identify risk factors for HIV, and examine patterns of transmission associated with the LRA insurgency. This study assessed HIV prevalence and vulnerabilities stratified by gender for men and women living in post-conflict Northern Uganda.

METHODS

Ethics

We received approvals from University of British Columbia-Providence Healthcare Research Ethics Board (Canada), Makerere College of Health Sciences-School of Public Health (Uganda), and Uganda National Council of Science and Technology (Uganda). The Office of the President of Uganda issued a letter of approval, which was signed by the Resident District Commissioner in each district.

Sample

The Congo Lye (Healing the Elephant) Project is a prospective cohort involving conflict-affected people in Nwoya, Amuru, and Gulu districts, Northern Uganda. Additional details of Congo Lye's methods have been published elsewhere.³¹ A 2-stage sampling approach was used to select study participants from each district. In the first stage, all major settlements in each district were mapped and categorized by residential stability: Amuru district (10 communities—6 permanent, 2 transient, and 2 displaced), Gulu district (16 communities—10 permanent, 2 transient, 3 displaced, and 1 pilot community), and Nwoya district (7 communities—4 permanent, 3 transient, 0 displaced). Of 32 total communities, 8 were selected as study communities. As Nwoya did not have any "displaced" communities, only 2 communities were selected from this district. Communities with populations greater than 250 adults (eg, Awach and Layibi) were subdivided into villages that were randomly selected to represent these communities and contributed household numbers proportional to size of the communities they represent as compared to the populations of other selected communities to fit within the estimated study sample size of 2400 individuals. One additional community was purposively selected to pilot survey instruments; these data are not included in study analyses. In the second stage, all households in selected study communities were mapped and a household census was completed to establish the number and demographic characteristics of all residents ($N = 6375$). All residents aged 13–49 years were invited to participate in the survey. Of 2954 eligible individuals, 2448 enrolled in the study for a participation rate of 82.9%. This study analyses baseline data from 2008 sexually active participants.

Data Collection

Participants were eligible if they were aged 13–49 years; were resident in their household for over 1 month and permission was given by the head of household; and provided informed consent. Unemancipated minors, as defined by Uganda National Council of Science and Technology, were asked to provide individual informed assent if written consent was provided by parent/guardian. In total, 2448 participants enrolled between November 2011 and July 2012. interviewer-administered questionnaires were conducted in Luo. An experienced team of health professionals worked independently to translate questionnaires through a process of forward-backward translation (English–Luo–English).

Translations were discussed and collaboratively revised in instances of significant disparity to ensure the intended meaning was achieved. Acholi study personnel were involved in design and pilot of the questionnaire, including addressing sensitivities around war-related trauma. Participants had the option to be interviewed by someone of the same sex, by someone they trust, and in a location where they felt safety and privacy. Venous blood samples were tested for HIV and syphilis. Trained nurses provided pretest/posttest counseling. Participants were invited but not required to return for test results and referrals to care. Active syphilis was treated with a single-dose of azithromycin. Honoraria were provided.

Given the sensitive nature of questions and high prevalence of mental health issues previously reported, we designed a protocol to directly refer participants with mental health concerns for care at the time of the survey. First, we consulted with team psychologists and psychiatrists with extensive experience with war-related trauma and our instruments to determine appropriate cutoffs for immediate referral. Second, we conducted an environmental scan of both NGO and health centre supports available in each of the districts. Participants were given the choice of where they wanted to go.

Measures

HIV infection was determined via 2 parallel ELISA tests, Vironostika HIV Uni-Form II plus O (Biomerieux SA, Marcy l'Etoile, France) and Murex HIV-1.2.0 (Diasorin S. P.A., Dartford, United Kingdom), with Western blot (Genetic Systems; Bio-Rad Laboratories Hercules, CA) confirmation in the event of discordant results. Samples screening positive for syphilis using the rapid plasma regain test were confirmed with a treponema pallidum haemagglutination test. Participants were also asked if they had experienced genital ulcers in the past year.

Sociodemographic characteristics included age group (categorical, 5-year increments); ethnicity; district of residence; marital status; religion; and living in a child-headed (≤ 25 year old) or female-headed household. Marriage was defined as traditional, civil, or religious, including consensual unions.

War-related experiences assessed included community displacement status and ever having been abducted by the LRA. Sexual assault within the context of the war included rape outside of abduction but related to the war, for example, gang rape in displacement camp settings or rape by armed forces.

Mental health concerns included suicide ideation, PTSD, trauma, and depression. Harvard Trauma Questionnaire (HTQ) Parts I and IV assessed exposure to trauma and probable PTSD.³² Part I included 16 yes/no questions of lifetime exposure to traumatic events; answering yes to ≥ 12 traumatic events was considered significant as this threshold has previously been shown to be an important predictor of PTSD and depression in Northern Uganda.²² Part IV included 30 questions addressing trauma symptoms measured for a 1-week recall period using a 4-point severity scale. Hopkins Symptoms Check List 25 (HSCL-25) part II assessed depression, also using a 4-point severity scale and 1-week recall period. Mean PTSD scores ≥ 2

TABLE 1. Comparison of Sociodemographic Characteristics, Sexual Vulnerabilities, War-Related Trauma, and Mental Health Factors Between Sexually Active Men and Women (n = 2008)

Variable	Female		Male		P
	n/N	Weighted %	n/N	Weighted %	
Sociodemographic characteristics					
Age group					
13–19	157/1189	12.9	165/819	20.3	<0.001
20–24	254/1189	22.9	179/819	23.0	
25–29	289/1189	25.7	167/819	21.2	
30–34	198/1189	15.5	117/819	13.2	
35–39	120/1189	9.6	87/819	10.8	
40–44	94/1189	7.9	65/819	7.1	
45–49	77/1189	5.6	39/819	4.4	
Ethnicity					
Other tribes	124/1188	12.2	69/682	13.3	0.129
Acholi	1064/1188	87.8	613/682	86.7	
District					
Amuru	319/1189	29.2	241/819	35.1	<0.001
Gulu	607/1189	58.6	367/819	49.6	
Nwoya	263/1189	12.2	211/819	15.3	
Marital status					
Never married	110/1174	9.7	213/679	34.5	<0.001
Married	829/1174	70.7	446/679	62.2	
Separated/divorced	170/1174	14.7	18/679	3.0	
Widowed	65/1174	4.9	2/679	0.3	
Religion					
Roman catholic	874/1189	73.2	525/681	76.6	<0.001
Protestant	188/1189	14.1	119/681	17.8	
Moslem	11/1189	1.0	15/681	2.3	
Other	116/1189	11.7	22/681	3.4	
Female-headed household	228/905	23.5	48/681	6.1	<0.001
Child (<25)-headed household	81/904	8.5	141/681	18.6	<0.001
War-related trauma and mental health					
Community displacement status					
Displaced	151/1189	11.4	116/819	14.2	<0.001
Transient	621/1189	60.9	378/819	51.8	
Permanent	417/1189	27.7	325/819	34.0	
Ever abducted	308/1189	23.5	267/819	27.3	<0.001
Sexual assault in context of war	191/1189	14.6	14/819	2.0	<0.001
≥12 traumatic events	126/1189	9.7	104/819	11.9	<0.001
Probable depression	270/1189	22.6	74/818	8.3	<0.001
Probable PTSD	190/1189	16.0	78/819	9.7	<0.001
Suicide ideation	218/1188	17.1	51/818	5.0	<0.001
Sexual vulnerabilities					
Age at sex debut					
18+ yrs	244/1173	21.9	235/755	32.1	<0.001
<18 yrs	929/1173	78.1	520/755	67.9	
Coerced sexual debut	249/1187	18.6	14/674	2.0	<0.001
First sex partner ≥10 yrs older	140/1076	12.0	0/656	0.0	<0.001
No condom use at sex debut	805/1180	65.4	429/677	60.9	<0.001
Sexual partners (past yr)					
0	141/1186	12.2	107/816	13.1	<0.001
1	986/1186	82.6	430/816	53.6	
2	48/1186	4.0	175/816	21.7	
3+	11/1186	1.2	104/816	11.6	

TABLE 1. (Continued) Comparison of Sociodemographic Characteristics, Sexual Vulnerabilities, War-Related Trauma, and Mental Health Factors Between Sexually Active Men and Women (n = 2008)

Variable	Female		Male		P
	n/N	Weighted %	n/N	Weighted %	
Inconsistent condom use with last 3 partners (past yr)	1085/1189	90.7	684/819	80.0	<0.001
Most recent partner is circumcised	137/1171	12.1			
Circumcised			60/681	10.2	
Sex for exchange (past yr)	11/1164	1.1	9/662	1.5	0.135
HIV and STIs					
Genital ulcers (past yr)	143/1189	12.7	64/819	8.9	<0.001
Active syphilis	59/1189	4.8	35/819	4.4	0.368
Ill health without medical care	444/1189	36.3	223/819	25.8	<0.001
HIV serostatus	199/1163	17.2	75/792	10.6	<0.001

and mean depression scores ≥ 1.75 were considered significant based on instrument standards.³³ Both outcomes were dichotomized. The HTQ and HSCL-25 have been demonstrated to be reliable and valid in several war-affected African countries.^{22,34-37} Luo versions of the HTQ and HSCL-25 developed and validated by Roberts et al²² for use in Gulu district were used. Furthermore, the same instruments have been found useful to assess trauma experiences by Roberts et al³⁸ in conflict-affected South Sudan and by Ovuga et al²⁹ within a small sample of child soldiers in Northern Uganda. Any participants whose cumulative scores were ≥ 25 (HSCL-25) or ≥ 28 (HTQ) were referred for mental health care. Participants who reported feeling hopeless about the future, thoughts about ending their life, and feelings of worthlessness were also referred immediately.

Sexual vulnerability measures included age at sexual debut (dichotomized at cohort median, 18 years), coerced sexual debut, age difference of first sex partner (≥ 10 years), and condom use at sexual debut. Sexual vulnerability measures occurring in the past year included number of sexual partners; consistency of condom use with last 3 partners; most recent partner is uncircumcised (women); being uncircumcised (men); and sex for exchange, defined as receiving money, shelter, food, gifts, or alcohol for sex.

Analysis

Pearson χ^2 test for association compared distributions of sociodemographic, sexual vulnerabilities, war-related

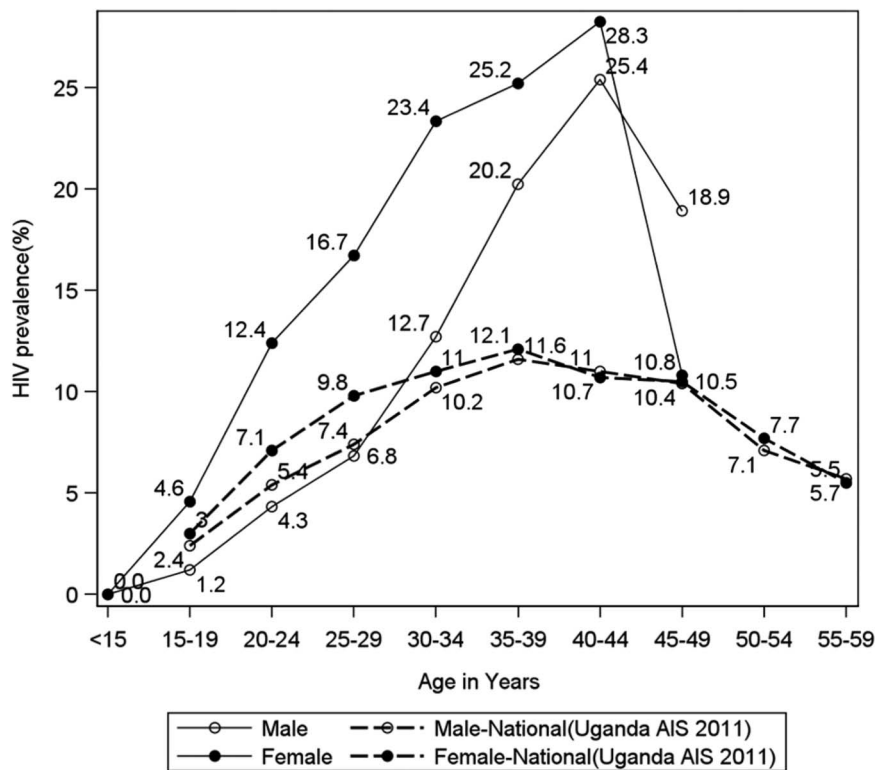


FIGURE 1. Prevalence of HIV observed in Congo Lyc compared to the national average prevalence reported in the Uganda AIDS Indicator Survey, by age and gender.

TABLE 2. Association Between HIV Status and Sexual Vulnerabilities, War-Related Trauma, and Mental Health Factors Among Women (n = 1163)

Parameter	N	HIV+ n (Weighted %)	Unadjusted		Adjusted*	
			OR (95% CI)	P	OR (95% CI)	P
Sociodemographic characteristics						
Female-headed household						
No	659	75 (10.5%)	1.00		1.00	
Yes	223	62 (29.6%)	3.57 (2.24 to 5.71)	<0.001	2.76 (1.70 to 4.49)	0.002
Missing	281					
Child (<25)-headed household						
No	801	131 (15.6%)	1.00		1.00	
Yes	80	6 (8.9%)	0.53 (0.21 to 1.31)	0.135	0.87 (0.26 to 2.86)	0.779
Missing	282					
War-related trauma and mental health						
Ever abducted						
No	858	135 (16.3%)	1.00		1.00	
Yes	305	64 (20.2%)	1.30 (0.90 to 1.90)	0.133	1.17 (0.75 to 1.84)	0.423
Sexual assault in context of war						
No	980	149 (15.5%)	1.00		1.00	
Yes	183	50 (27.6%)	2.08 (1.36 to 3.18)	0.006	1.95 (1.16 to 3.26)	0.020
≥12 traumatic events						
No	1040	162 (15.9%)	1.00		1.00	
Yes	123	37 (29.6%)	2.23 (1.58 to 3.15)	0.001	2.04 (1.31 to 3.18)	0.008
Probable depression						
No	899	127 (14.4%)	1.00		1.00	
Yes	264	72 (27.0%)	2.20 (1.49 to 3.26)	0.003	2.22 (1.46 to 3.37)	0.003
Probable PTSD						
No	979	154 (15.5%)	1.00		1.00	
Yes	184	45 (26.6%)	1.97 (1.36 to 2.87)	0.004	2.03 (1.45 to 2.84)	0.002
Suicide ideation						
Not at all	949	148 (16.1%)	1.00		1.00	
A little/quite a bit/extremely	213	51 (22.7%)	1.53 (1.13 to 2.08)	0.014	1.67 (1.22 to 2.28)	0.007
Missing	1	—	—	—	—	—
Sexual vulnerabilities						
Age at sex debut						
18+	235	28 (10.2%)	1.00		1.00	
<18	912	165 (18.7%)	2.03 (1.02 to 4.03)	0.045	2.00 (0.91 to 4.38)	0.075
Missing	16					
First sex partner ≥10 years older						
No	913	145 (16.0%)	1.00		1.00	
Yes	139	36 (23.7%)	1.63 (1.12 to 2.38)	0.019	1.69 (1.07 to 2.67)	0.031
Missing	111					
No condom use at sex debut						
No	371	52 (13.5%)	1.00		1.00	
Yes	783	146 (19.3%)	1.53 (0.83 to 2.84)	0.142	1.10 (0.54 to 2.21)	0.757
Missing	9					
Sexual partners (past yr)						
0	135	35 (26.8%)	1.00		1.00	
1	968	142 (14.7%)	0.47 (0.26 to 0.87)	0.024	0.79 (0.39 to 1.62)	0.457
2	46	17 (34.0%)	1.41 (0.68 to 2.92)	0.295	2.54 (1.23 to 5.23)	0.020
3+	11	5 (43.7%)	2.12 (1.48 to 3.01)	0.002	4.65 (2.65 to 8.18)	<0.001
Missing	3	—	—	—	—	—
Condom use with last 3 partners (past yr)						
Consistent	102	27 (26.7%)	1.00		1.00	
Inconsistent	1061	172 (16.2%)	0.53 (0.26 to 1.08)	0.073	0.40 (0.29,0.57)	<0.001

TABLE 2. (Continued) Association Between HIV Status and Sexual Vulnerabilities, War-Related Trauma, and Mental Health Factors Among Women (n = 1163)

Parameter	N	HIV+ n (Weighted %)	Unadjusted		Adjusted*	
			OR (95% CI)	P	OR (95% CI)	P
Most recent partner is circumcised						
No	1012	163 (15.8%)	1.00		1.00	
Yes	133	32 (26.9%)	1.96 (0.80 to 4.80)	0.114	1.90 (0.79 to 4.54)	0.122
Missing	18	4 (22.1%)	1.52 (0.50 to 4.61)	0.396	1.58 (0.52 to 4.81)	0.355
Sex for exchange (past yr)						
No	1127	191 (17.1%)	1.00		1.00	
Yes	11	6 (50.6%)	4.97 (2.49 to 9.93)	0.001	5.51 (1.76 to 17.31)	0.011
Missing	25					
HIV and STIs						
Genital ulcers (past yr)						
No	1025	152 (14.6%)	1.00		1.00	
Yes	138	47 (35.6%)	3.23 (2.50 to 4.17)	<0.001	3.08 (2.16 to 4.38)	<0.001
Active syphilis						
Negative	1107	179 (15.9%)	1.00		1.00	
Positive	56	20 (45.1%)	4.35 (1.65 to 11.49)	0.010	4.33 (1.22 to 15.40)	0.030
Ill health without medical care						
No	730	105 (14.1%)	1.00		1.00	
Yes	433	94 (22.9%)	1.81 (1.21 to 2.72)	0.012	2.02 (1.22 to 3.34)	0.014

*Adjusted for age, ethnicity, district, community displacement status, marital status, and religion.

trauma and mental health variables between men and women. Unadjusted and adjusted logistic regression models assessed associations between HIV status, and sexual vulnerabilities, war-related trauma, and mental health variables. All adjusted models were adjusted for age, ethnicity, district, community displacement status, marital status, and religion. All analyses were done separately for men and women using SAS 9.4 (SAS Institute, Inc., Cary, CA). All reported *P*-values are 2-sided and <0.05 was considered statistically significant. All analyses were weighted using sampling weights that incorporated selection probabilities, survey response, and HIV testing probabilities. Although the sample numbers are also presented in the tables, all the reported percentages and odds ratios are based on weighted analysis. Of 2008 sexually active participants, 53 (27 men and 26 women) had indeterminate HIV results and were excluded from the models. However, missing categories were included for all categorical independent variables to minimize list-wise deletion of observation in the models.

RESULTS

Baseline Characteristics

Between November 2011 and July 2012, 2008 sexually active participants completed a baseline questionnaire. More than half (n = 1189; 59.2%) were women and most were of Acholi ethnicity (n = 1677; 83.5%). Compared to men, women were more likely to live in Gulu district, a female-headed household, and/or a transient community (Table 1). Women were more likely to report not using a condom at sexual debut, suicide ideation, sexual assault, having experienced ill health without medical care, and genital ulcers in the past year. Furthermore, women were more likely to have probable

depression and probable PTSD. Men were more likely to have never married; live in a child-headed household; identify as Roman Catholic, Protestant, or Moslem; have been abducted; have had more sexual partners in the past year; and report ≥12 traumatic events. There were significant differences between genders in age, which may be because of large proportions of men in the 13–19 category and women in the 25–29 category.

HIV Prevalence

HIV prevalence was 14.0% overall among sexually active Congo Lyeo participants for whom HIV status was available (n = 1955). Prevalence was significantly higher among women [17.2%; 95% confidence interval (CI): 14.7 to 19.7] compared to men (10.6%; 95% CI: 8.0 to 13.2). Estimated HIV prevalence rates in Congo Lyeo are markedly higher than national averages, particularly among women (Fig. 1). Of note, gender disparities in HIV prevalence were very high in the communities of Layibi (19.7% among women vs. 12.4% among men), Awach (18.0% vs. 8.6%), and Anaka (14.5% vs. 5.8%) (data not shown).

Correlates of HIV Among Women

Correlates of HIV among women are presented in Table 2. Adjusting for age, ethnicity, district, community displacement status, marital status, and religion, we observed associations between HIV infection and living in a female-headed household [adjusted odds ratio (AOR): 2.76; 95% CI: 1.70 to 4.49]; having experienced sexual assault in the context of war (AOR: 1.95; 95% CI: 1.16 to 3.26); having experienced ≥12 traumatic events (AOR: 2.04; 95% CI: 1.31 to 3.18); and having experienced ill health without medical care (AOR: 2.02; 95%

TABLE 3. Association Between HIV Status and Sexual Vulnerabilities, War-Related Trauma and Mental Health Factors Among Men (n = 792)

Parameter	N	HIV+ n (Weighted %)	Unadjusted		Adjusted*	
			OR (95% CI)	P	OR (95% CI)	P
Sociodemographic characteristics						
Female-headed household						
No	612	49 (8.7%)	1.00		1.00	
Yes	47	4 (7.3%)	0.82 (0.23 to 2.95)	0.726	1.75 (0.51 to 6.03)	0.319
Missing	133					
Child (<25)-headed household						
No	522	48 (9.7%)	1.00		1.00	
Yes	137	5 (4.0%)	0.39 (0.22 to 0.69)	0.006	1.02 (0.38 to 2.75)	0.959
Missing	133					
War-related trauma and mental health						
Ever been abducted						
No	531	43 (9.2%)	1.00		1.00	
Yes	261	32 (14.2%)	1.63 (0.84 to 3.16)	0.124	0.97 (0.46 to 2.01)	0.917
Sexual assault in context of war						
No	778	74 (10.6%)	1.00		1.00	
Yes	14	1 (10.2%)	0.96 (0.09 to 9.79)	0.969	0.80 (0.04 to 16.17)	0.865
≥12 traumatic events						
No	688	62 (9.8%)	1.00		1.00	
Yes	104	13 (16.5%)	1.82 (0.39 to 8.63)	0.391	0.94 (0.16 to 5.38)	0.933
Probable depression						
No	718	63 (10.2%)	1.00		1.00	
Yes	73	12 (15.6%)	1.63 (0.61 to 4.34)	0.274	1.22 (0.41 to 3.62)	0.678
Missing	1	—	—	—	—	—
Probable PTSD						
No	715	70 (11.2%)	1.00		1.00	
Yes	77	5 (5.7%)	0.48 (0.11 to 2.16)	0.285	0.40 (0.07 to 2.25)	0.250
Suicide ideation						
Not at all	740	67 (10.3%)	1.00		1.00	
A little/quite a bit/extremely	51	8 (16.5%)	1.72 (1.09 to 2.70)	0.026	1.35 (0.78 to 2.36)	0.239
Missing	1					
Sexual vulnerabilities						
Age at sex debut						
18+	226	30 (14.3%)	1.00		1.00	
<18	502	41 (9.0%)	0.59 (0.47 to 0.73)	<0.001	0.87 (0.69 to 1.09)	0.194
Missing	64					
No condom use at sex debut						
No	241	14 (5.3%)	1.00		1.00	
Yes	413	53 (15.1%)	3.17 (2.29 to 4.38)	<0.001	1.92 (1.30 to 2.83)	0.006
Missing	138					
Sexual partners (past yr)						
0	100	3 (2.8%)	1.00		1.00	
1	417	38 (10.6%)	4.13 (0.49 to 34.58)	0.159	1.69 (0.26 to 10.94)	0.529
2	170	22 (15.0%)	6.16 (0.58 to 66.01)	0.113	2.12 (0.28.16.00)	0.407
3+	102	12 (11.0%)	4.32 (0.33 to 56.93)	0.222	1.53 (0.16 to 14.82)	0.673
Missing	3					
Consistent condom use with last 3 partners in the past 12 mo						
Consistent	129	6 (4.7%)	1.00		1.00	
Inconsistent	663	69 (12.1%)	2.76 (0.86 to 8.88)	0.079	0.72 (0.22 to 2.33)	0.532
Circumcised						
No	598	64 (11.9%)	1.00		1.00	
Yes	60	3 (5.7%)	0.45 (0.07 to 2.89)	0.345	0.46 (0.06 to 3.53)	0.395
Missing	134					

TABLE 3. (Continued) Association Between HIV Status and Sexual Vulnerabilities, War-Related Trauma and Mental Health Factors Among Men (n = 792)

Parameter	N	HIV+ n (Weighted %)	Unadjusted		Adjusted*	
			OR (95% CI)	P	OR (95% CI)	P
HIV and STIs						
Genital ulcers (past yr)						
No	730	57 (8.8%)	1.00		1.00	
Yes	62	18 (29.4%)	4.35 (1.54 to 12.23)	0.012	4.40 (1.35 to 14.40)	0.021
Active syphilis						
Negative	761	68 (10.2%)	1.00		1.00	
Positive	31	7 (20.8%)	2.32 (0.95 to 5.67)	0.061	2.49 (0.88 to 7.05)	0.077
Ill health without medical care						
No	575	54 (10.1%)	1.00		1.00	
Yes	217	21 (11.9%)	1.20 (0.70 to 2.05)	0.448	0.88 (0.43 to 1.78)	0.675

*Adjusted for age, ethnicity, district, community displacement status, marital status and religion.

CI: 1.22 to 3.34). Several mental health concerns were independently associated with HIV infection among women, including probable depression (AOR: 2.22; 95% CI: 1.46 to 3.37), probable PTSD (AOR: 2.03; 95% CI: 1.45 to 2.84), and suicide ideation (AOR: 1.67; 95% CI: 1.22 to 2.28).

Sexual vulnerabilities associated with HIV among women included: first sexual partner ≥10 years older (AOR: 1.69; 95% CI: 1.07 to 2.67); having 2 (AOR: 2.54; 95% CI: 1.23 to 5.23) or 3+ (AOR: 4.65; 95% CI: 2.65 to 8.18) sexual partners in the past year; inconsistent condom use with last 3 partners in the past 12 months (AOR: 0.40; 95% CI: 0.29 to 0.57); recent sex exchange (AOR: 5.51; 95% CI: 1.76 to 17.31); reporting recent genital ulcers (AOR: 3.08; 95% CI: 2.16 to 4.38); and active syphilis (AOR: 4.33; 95% CI: 1.22 to 15.40).

Correlates of HIV Among Men

Correlates of HIV among men are presented in Table 3. Adjusting for age, ethnicity, district, community displacement status, marital status, and religion, we observed associations between HIV infection and not using a condom at sexual debut (AOR: 1.92; 95% CI: 1.30 to 2.83) and reporting recent genital ulcers (AOR: 4.40; 95% CI: 1.35 to 14.40). In addition, a marginal independent association between HIV infection and active syphilis (AOR: 2.49; 95% CI: 0.88 to 7.05) was observed among men.

DISCUSSION

This study demonstrated substantial differences in HIV prevalence and correlates of HIV infection among women and men who have survived the war in Northern Uganda. Conflict-affected people living in this study region were disproportionately affected by HIV compared to people residing in other regions. Estimates of HIV prevalence in the Congo LyeC study seem notably higher than national averages, with 17.2% of women and 10.6% of men living with HIV at enrollment. National estimates from 2016 to 2017 suggest that HIV prevalence among adults in Uganda

was 6.2% overall; 7.6% among women and 4.7% among men.³⁹ Our findings underscore that Northern Ugandan women, in particular, continue to be impacted by psychological distress, war-related sexual violence, and HIV infection. Trauma-informed HIV prevention and culturally safe mental health care initiatives are urgently required.

Women were nearly 2 times more likely to be living with HIV than men. HIV-related vulnerability specific to women is rooted in cultural, economic, and power imbalances that may be exacerbated in the context of war and return migration.⁵ During the war, sexual risks for women included abduction of young girls, early pregnancy, early marriage, sexual violence, and the precarious situation of night commuting. In the current post-conflict context, 2 million Acholi people displaced during the war have left IDP camps for their ancestral homelands. As women navigate new environments outside the bush and IDP camps where they have lived most of their lives, they face new vulnerabilities.⁶ With prevailing peace in Northern Uganda, cross-border traffic with South Sudan has expanded rapidly, accompanied by increased levels of transactional and subsistence sex along the Kampala-Juba highway.⁴⁰ Women displaced by war who never learned agricultural skills may be transitioning into sex work along this new corridor and in rural areas, resulting in the emergence of HIV and STI transmission hotspots. This is particularly concerning given that sex for exchange and having a higher number of sexual partners were both associated with a substantial increase in likelihood of HIV infection among women in our study.

Sexual assault in the context of war was associated with a nearly 2-fold increase in odds of HIV infection among women. This critical finding may help resolve controversy raised by conflict epidemiologists challenging conventional wisdom regarding the role violent sex plays in enhancing risk of HIV infection, particularly for women. Spiegel et al²³ concluded that insufficient data from sub-Saharan Africa exist in the literature to support the notion that war-related sexual violence enhances HIV risk. To our knowledge, ours is the first study to support the response by Jewkes that sexual violence fuels HIV epidemics in conflict and post-conflict

settings.²⁴ Indeed, the interconnected layers of vulnerability that have emerged in post-conflict Northern Uganda have highlighted critical gendered risk and protective factors. Yet, very few interventions address this new reality and many women lack the tangible support they need to protect themselves. It is noteworthy that there were limited to no services available for women who experienced rape, including postexposure prophylaxis, during the war. Traditional HIV prevention programs focused on abstinence and condom use fail to accommodate the impact of sexual violence.^{1,5} It is essential that conflict-affected women are meaningfully involved in development of programs that support their health and wellbeing, address gendered violence, and remove barriers to care.

Mental health concerns were associated with increased likelihood of living with HIV among women but not men. Women with probable depression or PTSD were more than 2 times more likely to be living with HIV. This finding is consistent with literature demonstrating that severe mental illness may exacerbate sexual vulnerability among women in Uganda.⁴¹ The burden of psychological distress may be much higher among women living with HIV because they are more likely to have experienced significant sexual, physical, and emotional abuse both as children and adults.^{42–44} Indeed, as Northern Ugandans rebuild their lives in ancestral villages, they face a host of complex challenges, including fractured cultural and social links, limited resources and infrastructure, intensified domestic violence, and continued sexual violence and predation.⁴⁵ Furthermore, meeting the needs of conflict-affected women living with both mental illness and HIV urgently requires trauma-informed supports. Left untreated, mental health concerns may affect adherence to antiretroviral medications and progression of HIV/AIDS. Our findings support recommendations by Ugandan mental health professionals to integrate routine screening for depression⁴⁶ and culturally sensitive mental health approaches, such as group support psychotherapy,⁴⁷ into HIV care. Emerging research suggests that implementing mental health care in this setting will require significant training and capacity building, and tailoring interventions to fit the cultural context.⁴⁸

As has been well established, having an STI was associated with increased likelihood of living with HIV for both men and women.^{49,50} Women with active syphilis in this study had a more than 4-fold increased risk of HIV infection. Men who reported recent genital ulcers were more than 4 times more likely, and women more than 3 times more likely, to be living with HIV. Given these findings, it is worrisome that we observed a 12.7% prevalence of self-reported genital ulcers among women and 8.9% among men, combined with a low prevalence of circumcision (around 10%) among men. It is noteworthy, however, that women living with HIV were significantly more likely to use condoms consistently than HIV-negative women. This finding may be attributed to the Prevention with Positives program conducted nation-wide emphasizing condom use among HIV-positive people to avoid reinfection with other HIV strains and prevent

transmission. In the context of low condom use among all participants, universal access to antiretroviral therapy to prevent horizontal and vertical transmission of HIV is vital in this post-conflict setting.⁵¹

Limitations

As Congo LyeC relies primarily on self-reported data, there is potential for misclassification of exposure. Responses to historical questions may be influenced by ability to recall event(s). Social desirability may lead to an underestimation of some risk behaviors. Sensitivities around disclosing stigmatized sexual vulnerabilities and marital status may account for some missing data. For example, men may be reluctant to disclose sexual abuse. In addition, conflict and poverty have disrupted traditional approaches to marriage and may result in nondisclosure of marital status. For example, young men may be finding it difficult to raise bride price and related costs required for official marriage. Furthermore, young women who experienced abduction were highly stigmatized, contributing to a return to sexual relationships initiated in the bush. Many will not officially marry because these partnerships are unsanctioned. For some risk factors, low prevalence (eg, male circumcision) may have limited the power to detect associations. Although we cannot rule out selection bias, we are confident that because of our recruitment methods and rigorous eligibility criteria, our sample is representative of people residing in study communities. Because of the cross-sectional nature, we are unable to identify cause-effect relationships and temporal sequences. Finally, although the HTQ and HSCL-25 have been demonstrated to be both reliable and valid in this setting, they are screening tools and not diagnostic, which may lead to a conflation in levels of probable PTSD and depression.

CONCLUSIONS

There is evidence of high prevalence of HIV among both women and men in Northern Uganda. Furthermore, war-related sexual assault is strongly associated with increased risk for HIV among women. The link between the legacy of the bush war, abduction, probable PTSD, and depression signifies the continuing impact of psychological distress and mental health on HIV-related vulnerability among women. There is a clear need to address the complex intersections of historical, structural, and cultural processes that continue to influence risk. Meaningful HIV interventions must be trauma-informed and at the same time foster the resiliency that many who have survived the war and reclaimed their lives have demonstrated. Such interventions should be emotionally and culturally supportive and facilitate healing at individual, family, and community levels.

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