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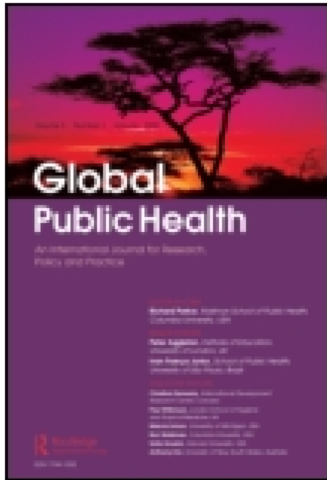

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War and HIV: Sex and gender differences in risk behaviour among young men and women in post-conflict Gulu District, Northern Uganda

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War and HIV: Sex and gender differences in risk behaviour among young men and women in post-conflict Gulu District, Northern Uganda

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Despite growing knowledge of the dynamics of HIV infection during conflict, far less is known about the period that follows cessation of hostilities and its implications for population health. This study sought to fill a lacuna in epidemiological evidence by examining HIV infection and related vulnerabilities of young people living in resource-scarce, post-emergency transit camps that are now home to thousands of displaced people following two decades of war in northern Uganda. In 2010, a cross-sectional demographic and behavioural survey was conducted with 384 transit camp residents aged 15–29 years old in Gulu District. Biological specimens were collected for rapid and confirmatory HIV testing. Separate multivariable logistic regression models by sex identified risk factors for HIV infection. HIV prevalence was 15.6% (95% confidence interval [CI]: 10.8%, 21.6%) among females and 9.9% (95% CI: 6.1%, 15.0%) among males. The strongest correlate of HIV infection among men was a non-consensual sexual debut (adjusted odds ratio [AOR] 3.24; 95% CI: 1.37–7.67), and having practiced dry sex (AOR 7.62; 95% CI: 1.56–16.95) was the strongest correlate among women. Conflict-affected men and women experience vulnerability to HIV infection in different ways than may have originally been understood. Post-conflict programme planners must therefore design and implement contextualised, evidence-based responses to HIV that are sensitive to gender and cultural issues.

Keywords: HIV infection; young people; post-conflict; sex and gender differences; epidemiology

Introduction

Over 2000 young people become infected with HIV each day. Over three quarters of the world's 5 million 15- to 24-year-olds who are living with HIV reside in sub-Saharan Africa (UNAIDS, 2012a), a region that has also been most affected by conflict and displacement. Conflicts increase the risk and impact of HIV among young people by dislocating communities and disrupting family life, breaking down basic services, creating flows of refugees and displaced persons, and rendering girls/women highly

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vulnerable to sexual exploitation (Hankins, Friedman, Zafar, & Strathdee, 2002; Machel, 1996; Mock et al., 2004).

In northern Uganda up until 2006, an over two-decade-long conflict between the Government of Uganda and the rebel force the Lord's Resistance Army (LRA) resulted in the forced displacement of more than 90% of the region's population (>1.8 million people), 70% of whom were under the age of 25, into internally displaced people (IDP) camps (Patel et al., 2012; Republic of Uganda & WHO, 2005; Women's Commission for Refugee Women and Children, 2004). The Ugandan Sero-Behavioural Survey 2004/2005 (Ministry of Health, 2006), one of the only sources of general-population-level HIV epidemiological data for northern Uganda, estimated a regional HIV prevalence rate of 8.2% among 15- to 49-year-olds (9.0% for females and 7.1% for males); these rates were notably higher than the estimated national averages of 7.5% for females and 5.0% for males (Ministry of Health, 2006).

Women and girls across the world continue to be deeply affected by HIV and account for more than half of all people living with HIV globally (UNAIDS, 2012b). In sub-Saharan Africa alone, women comprise 58% of people living with HIV and also bear the greatest burden of care (UNAIDS, 2012c). Young women aged 15–24 are especially vulnerable; as of 2010, they disproportionately account for 64% of young people living with HIV worldwide (WHO, UNAIDS, & UNICEF, 2011) and 31% of new infections in sub-Saharan Africa (UNAIDS, 2012a). These figures have been attributed to sex work, rape, incest, lower socio-economic and political status, and the limitations on access to reproductive health services associated with social and economic power imbalances that heighten women's and girls' sexual vulnerability (Jewkes, 2001; UNAIDS, 2012b, 2012c); each of these factors becomes even more pronounced during conflict and displacement (Ward & Marsh, 2006; Westerhaus, 2007). The impact of conflict on HIV among African men, however, needs to be better understood. Anecdotal accounts suggest that males are as susceptible to sexual violence as females during high-intensity conflicts (USAID, 2000). Furthermore, in most countries, rates of STIs among the heavily male-dominated military are significantly greater than those of the general population (Mabey & Mayaud, 1997; McGinn, Purdin, Krause, & Jones, 2001; Smith, 2002).

As of December 2010, four years after the signing of the Cessation of Hostilities Agreement ended Uganda's conflict with the LRA and the government encouraged IDPs to move out of primary camp settings, most of the original 1.8 million IDP population in northern Uganda had returned to their ancestral home villages, while 10% (approximately 182,000 IDPs) had relocated to post-emergency transit camps, smaller camps constructed closer to villages (Internal Displacement Monitoring Centre, 2010). The population remaining in transit camps are not yet able to transition all the way back to their ancestral homes for various reasons (e.g., land conflicts, lack of resources to rebuild homes, accessing schooling and health care services not yet available in villages). There is a lack of HIV epidemiological data for post-conflict northern Uganda, particularly in transit camps, where a substantial proportion of the original IDP population remains as they continue to rebuild their lives, and where humanitarian aid has ceased and basic necessities are lacking. While NGOs have consistently reported that HIV may be devastating the region, neither antenatal studies (Fabiani et al., 2001, 2006, 2007a, 2007b; Fabiani, Nattabi, Ayella, Ogwang, & Declich, 2005) nor the Ugandan HIV/AIDS Sero-Behavioural Survey (Ministry of Health, 2006) – the only sources of HIV epidemiological data available – identifies the most vulnerable groups or captures the conflict's legacy on HIV (Patel, Spittal, Muyinda, Oyat, & Sewankambo, 2011; Westerhaus, Finnegan, Zabulon, & Mukherjee, 2008). This lack of data frustrates post-conflict planners with

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limited funding for HIV who aim to make evidence-based HIV programming decisions but are unable to assess who is most at risk for infection.

To design and implement effective HIV interventions in post-conflict settings, it is critical to identify key populations and sex- and gender-specific risk behaviours. This study, therefore, analysed sex-disaggregated data (collected between September and December 2010) to assess the strongest correlates of HIV infection in relation to gender and risk behaviours among 15- to 29-year-olds living in transit camps in Gulu District, northern Uganda. As such, it aimed to provide evidence that would assist the Government of Uganda and NGOs in designing appropriate HIV programming for young people in post-conflict transition.

Methods

Study design and sample

A cross-sectional study design was employed to determine the prevalence and correlates of HIV infection among 15- to 29-year-old young men and women residing in Gulu District transit camps. Due to financial constraints, only two sub-counties (Awach and Ongako) were randomly selected from all Gulu District sub-counties with transit camps as of May 2010 (18/23 sub-counties) to be included in our study. Three of 5 transit camps from Awach, and 9 of 12 camps from Ongako (ranging from remote to accessible with varying degrees of resource availability) were then purposively selected, with the guidance of key informants.

A combination of proportional and non-proportional quota sampling methods identified 384 15- to 29-year-olds residing in transit camps in Ongako and Awach. This sample size allowed us to estimate a 10% prevalence rate of HIV with a precision of ±3% (with 95% confidence). The sample was proportional to each sub-county's population as reported by the 2002 Uganda Census: 216 participants for Ongako (1.50% of 14,360 people) and 168 participants for Awach (1.50% of 11,160 people). Additionally, we employed a non-proportional quota of 50% male and 50% female. Limited data on the population and the camps' unsystematic layouts prohibited random sampling methods.

Hired community members at each research site recruited participants through living quarter-based community outreach according to the study's eligibility criteria: (1) aged 15–29; (2) resident in an Awach or Ongako transit camp; and (3) provision of consent (and parental consent when applicable) for participation. Of the 385 individuals recruited for the study, 384 agreed to participate.

Interview

Participants were required to provide a blood specimen to test for HIV antibodies and to complete a comprehensive, structured face-to-face interviewer-administered questionnaire on socio-demographics, war-related experiences, sexual behaviour, HIV prevention practices and risk perception. Questionnaires were translated from English into the local language of Luo and then back translated.

Informed consent was obtained from all young people. Minors under 18 years of age required a parent/guardian's consent unless they were emancipated (i.e., married, had children, or were pregnant), and before proceeding, researchers also obtained the minor's assent. Experienced bilingual Acholi interviewers were trained and gender-matched to participants. Participants chose where the home-based interviews and tests were performed. No names or personal identifiers were recorded. Adhering to Ugandan testing

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guidelines, all participants received pre- and post-test counselling and could choose to receive their test results. Immediate psychosocial support as well as referrals for follow-up HIV care were made available. In addition, participants received UG4000 shillings (approximately US$2) as compensation for their time.

This study was approved by the Providence Health Care Research Ethics Board, University of British Columbia, Canada; the Research and Ethics Committee, Child Health and Development Centre, College of Health Sciences, Makerere University, Uganda; the Uganda National Council of Science and Technology; and the Republic of Uganda, Office of the President.

Laboratory methods

A trained nurse administered the INSTI HIV-1/HIV-2 Antibody Rapid HIV Test (bioLytical Laboratories) and an additional sample of blood was drawn through venipuncture from those who tested positive for confirmatory testing at a central laboratory in Entebbe. Two enzyme-linked immunosorbent assays (ELISA) – the Abbott Murex HIV-1/2 ELISA (Murex Biotech Limited, UK), and the Vironostika HIV Uni-Form II MicroELISA (bioMérieux, Switzerland) – were used for confirmatory testing, and a Western Blot analysis (Calypte Biomedical) was used for definitive characterisation if required.

Measures

Variables of interest were grouped into three categories: demographics and war-related experiences; sexual behaviours; and HIV prevention behaviours and risk perception. Demographic characteristics and war-related experiences considered in the analyses included age; sub-county of residence (Awach vs. Ongako); marital status; age at first marriage; school status; currently experiencing lack of food and/or water; having had enough food to eat in the previous 12 months; duration of IDP camp living (more than 10 years vs. 10 years or less); history of abduction by the rebel army; and night commuting. Marriage was defined to include traditional, civil, or religious marriages and consensual unions, while night commuting was defined as ‘leaving your family hut at night to sleep elsewhere due to security and privacy concerns’.

Sexual behaviours included a series of variables related to sexual debut, including age of sexual debut, a non-consensual sexual debut, and age of first sex partner (10 or more years older vs. same age). Other sexual behaviours/practices considered in our analyses included ever having consumed alcohol; ever having consumed alcohol before sex; ever having experienced physical, sexual or verbal abuse from sexual partners; ever having been raped and age at rape; age of perpetrator (10 or more years older vs. same age); ever having had an STI besides HIV; having STI symptoms in the previous 12 months; ever having been pregnant and age at first pregnancy; involvement in survival sex work, defined as ‘receiving food, shelter, money, or gifts for sex’; and the practice of dry sex, measured by asking participants ‘Have you ever had sex when your (partner’s) vagina was dry?’

HIV prevention behaviours and risk perception measures considered in the analyses included having ever used a condom; consistent condom use (always vs. sometimes or never); condom use at last sexual encounter; having been tested for HIV; number of times tested for HIV in lifetime; knowledge of sexual partner’s HIV status; perceived ability to protect oneself from HIV/STIs; and ability to say no to sex if one does not like it.

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Statistical analysis

Analyses were conducted using SPSS Version 19.0. Point estimates of proportions positive for HIV and corresponding 95% confidence intervals (CIs) were computed separately for females and males. In bivariate analysis, Pearson's chi-square tests, Fisher's exact tests (if one or more expected counts were less than five), and the Wilcoxon rank sum test were used to test for differences in HIV status and risk factors between males and females. Multivariable logistic regression was used to determine independent risk factors for HIV infection among sexually active participants; separate models were constructed for males and females. Variables were included for unadjusted regression analysis based on significance at the $p \leq 0.05$ level in bivariate analysis. Multivariable models included only those variables found to be significant ($p \leq 0.05$) in unadjusted analyses. Odds ratios with corresponding 95% CIs were calculated and all reported *p*-values are two-sided. Since the variables 'ever been raped' and 'non-consensual sexual debut' were correlated in both the female and male regression models, only the latter variable was entered into each model. Among females, there were correlations between the variables 'age at sexual debut' and 'age at rape' as well as 'ever had an STI' and 'STI symptoms in the past 12 months', so only the first variable of each pair was entered into the regression model for females. Among males, the variables 'marital status' and 'school status' were correlated, so only the 'school status' variable was entered into the regression model for males as it was hypothesised a priori to have a protective association with HIV infection.

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Results

Socio-demographic characteristics and war-related experiences

Participants' median age was 20. Over 80% were Roman Catholic and most were Acholi. All participants currently lived in transit camps; over 40% had lived there for 1–2 years, and more women than men anticipated living there for another 1–2 years (28.6% vs. 19.2%, $p = 0.042$; see Table 1). Twenty-five per cent of participants were in school (29.2% men vs. 20.8% women) and many more young women than men were currently living in a child-headed household (9.4% vs. 0.5%, $p < 0.001$). More women had ever married than men (72.9% vs. 47.9%, $p < 0.001$) and women had a significantly lower median age at first marriage (16 vs. 18 years old, $p < 0.001$). More men earned their living by limited agricultural cultivation (78.1% vs. 63.0%, $p < 0.001$) and only women brewed alcohol for their livelihood ($n = 12$). More women earned less than UG25,000 shillings (approximately US$12) a month (68.8% vs. 52.1%, $p = 0.023$). More men had had enough food to eat in the previous year (53.6% vs. 38.5%, $p = 0.003$), whereas more women currently lacked food and/or water (57.3% vs. 22.4%, $p < 0.001$). Many more young women than men had lived in an original IDP camp for more than 10 years (79.2% vs. 55.7%, $p < 0.001$), whereas more young men had been abducted by the LRA (33.9% vs. 21.9%, $p = 0.009$) and had night commuted – movement at night to sleep elsewhere than your family hut for security and privacy – during the war (77.1% vs. 67.7%, $p = 0.040$).

Sexual behaviours

Most participants (78.4%) reported having had sex, with no significant sex differences observed (see Table 1), although women's median age of sexual debut was significantly lower (15 vs. 17 years old, $p < 0.001$). Many more women had had a non-consensual first sexual experience (26.3% vs. 7.6%, $p < 0.001$) and a first sex partner who was at least

10 years older than them (28.8% vs. 4.1%, $p < 0.001$) and whose main occupation was a 'military/rebel soldier' (12.8% vs. 4.8%, $p = 0.011$). Seventy-eight per cent of sexually active respondents reported having sex in the previous year and of those, significantly more women had experienced STI symptoms during that time (46.9% vs. 7.6%, $p < 0.001$). More married men reported having a sex partner besides their spouse (31.3% vs. 2.0%, $p < 0.001$). Twenty-seven per cent of young men and 3.6% of young women had ever consumed alcohol ($p < 0.001$); the overall consumption rate was 15.1%. Ten per cent of sexually active participants had consumed alcohol before sex and significantly more women had done so before their last sexual experience (7.7% vs. 2.1%, $p = 0.025$). The practice of dry intercourse – sexual intercourse without foreplay or lubrication and with the aid of drying agents – was reported by half of the sexually active participants (50.5%), with no significant sex differences observed. All 152 participants who indicated ever practicing dry sex also reported practicing dry sex at their last sexual encounter, illustrating the common frequency of this practice.

Women constituted all 11 participants who had had survival sex (i.e., exchanged sex for food, shelter, money, or gifts). More women than men had been physically/sexually/verbally abused by a sexual partner (61.5% vs. 37.2%, $p < 0.001$) and been raped (28.8% vs. 9.7%, $p < 0.001$). The median age at rape was lower for women (14 vs. 16 years old) and a greater proportion of their perpetrators were at least 10 years older than them (62.2% vs. 50.0%); however, these differences were not statistically significant. Eighty-seven per cent of women had been pregnant and the median age at first pregnancy was 17 years old. Approximately 11% of females and 12% of males indicated ever having had an STI.

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HIV prevention behaviours and risk perception

More young men had ever used a condom (66.7% vs. 41.7%, $p < 0.001$) and indicated using a condom during their last sexual encounter (35.2% vs. 16.0%, $p < 0.001$; see Table 1). Of condom users, more men than women reported consistent use (i.e., always vs. sometimes or never; 32.0% vs. 18.8%, $p = 0.036$). More young women had been tested for HIV (89.1% vs. 74.5%, $p < 0.001$) and females had had a significantly higher median number of tests in their lifetime (15 vs. 11, $p = 0.010$). Only 21.9% of participants received their results from their last HIV test. More women than men knew their partner's HIV status (55.8% vs. 51.7%), although this difference was not significant. Significantly fewer females had discussed sex with anyone (47.9% vs. 66.1%, $p < 0.001$). Significantly more men perceived that they could protect themselves from HIV/STIs (92.2% vs. 74.5%, $p < 0.001$) and were able to say no to sex (99.5% vs. 74.5%, $p < 0.001$). Nearly 13% of participants considered it very likely that they had been exposed to HIV, with a significantly greater proportion being young women (18.2% vs. 7.3%, $p < 0.001$).

HIV prevalence

Forty-nine (12.8%) of 384 participants tested positive for the HIV antibody (95% CI: 9.6%, 16.5%; see Table 2). HIV prevalence was 15.6% (95% CI: 10.8%, 21.6%) among young women and 9.9% (95% CI: 6.1%, 15.0%) among young men. This difference in prevalence did not reach conventional statistical significance ($p = 0.092$).

Table 1. Comparison of socio-demographic and behavioural characteristics among female and male participants (n = 384).

Variable	No. (and %) of young women (n = 192)	No. (and %) of young men (n = 192)	p value
Socio-demographics and war-related experiences			
Age, years, median (range)	20 (15–29)	21 (15–29)	0.820
Awach sub-county	84 (43.8)	84 (43.8)	1.000
Living in transit camp for 1–2 years	90 (46.8)	76 (39.5)	0.180
Anticipate staying in transit camp for another 1–2 years	55 (28.6)	37 (19.2)	0.042
Currently living in a child-headed household	18 (9.4)	1 (0.5)	<0.001
Ever married	140 (72.9)	92 (47.9)	<0.001
Age at first marriage, years, median (range)	16 (9–22)	18 (12–25)	<0.001
In school	40 (20.8)	56 (29.2)	0.059
Main means of livelihood			
Limited cultivation	121 (63.0)	150 (78.1)	<0.001
Brewing alcohol	12 (6.3)	0 (0)	–
Monthly income <25,000 UGS	132 (68.8)	100 (52.1)	0.023
Currently experience lack of food and/or water	110 (57.3)	43 (22.4)	<0.001
Had enough food to eat past 12 months	74 (38.5)	103 (53.6)	0.003
Lived in original IDP camps >10 years	152 (79.2)	107 (55.7)	<0.001
Formerly abducted	42 (21.9)	65 (33.9)	0.009
Night commuter[a]	130 (67.7)	148 (77.1)	0.040
Sexual behaviours			
Sexually active	156 (81.3)	145 (75.5)	0.173
Age at first sex, years, median (range)	15 (6–22)	17 (8–25)	<0.001
Non-consensual sexual debut[b]	41 (26.3)	11 (7.6)	<0.001
First sex partner ≥10 years older[b]	45 (28.8)	6 (4.1)	<0.001
Occupation of first sex partner military/rebel soldier[b]	20 (12.8)	7 (4.8)	0.011
Sexually active past 12 months[b]	115 (73.7)	119 (82.1)	0.476
STI symptoms past 12 months[c]	54 (46.9)	9 (7.6)	<0.001
Currently have sex partner besides your spouse[d]	2 (2.0)	15 (31.3)	<0.001
Ever consumed alcohol	7 (3.6)	51 (26.6)	<0.001
Ever consumed alcohol before sex[b]	4 (2.6)	25 (17.2)	<0.001
Consumed alcohol before last sex[b]	12 (7.7)	3 (2.1)	0.025
Ever practice dry sex[b,e]	77 (49.4)	75 (51.7)	0.917
Practice dry sex last sexual encounter[b]	77 (49.4)	75 (51.7)	0.917
Ever survival sex work[b,f]	11 (7.1)	0 (0)	–
Ever experience physical/sexual/verbal abuse[b]	96 (61.5)	54 (37.2)	<0.001
Ever been raped[b]	45 (28.8)	14 (9.7)	<0.001
Age at rape, years, median (range)	14 (6–23)	16 (11–24)	0.087
Perpetrator ≥10 years older	28 (62.2)	7 (50.0)	0.298
Ever pregnant[b]	135 (86.5)	–	–
Age at first pregnancy, years, median (range)	17 (10–22)	–	–
Ever had STI besides HIV[b]	17 (10.9)	17 (11.7)	0.821

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Table 1 (*Continued*)

Variable	No. (and %) of young women (n = 192)	No. (and %) of young men (n = 192)	*p value*
HIV prevention behaviours and risk perception			
Ever used a condom	80 (41.7)	128 (66.7)	<0.001
Consistent condom use	15 (18.8)	41 (32.0)	0.036
Condom used last sex[b]	25 (16.0)	51 (35.2)	<0.001
Ever HIV test	171 (89.1)	143 (74.5)	<0.001
No. of HIV tests in lifetime, median (range)	15 (0–25)	11 (0–30)	0.010
Receive test results from last HIV test	37 (21.6)	32 (22.4)	0.892
Know partner's HIV status[b]	87 (55.8)	75 (51.7)	0.482
Discuss sex with anyone	92 (47.9)	127 (66.1)	<0.001
Can protect yourself from HIV/STIs	143 (74.5)	177 (92.2)	<0.001
Able to say no to sex	143 (74.5)	191 (99.5)	<0.001
Very likely to have been exposed to HIV	35 (18.2)	14 (7.3)	<0.001

[a]Leaving your family hut at night to sleep elsewhere due to security and privacy concerns.
[b]Among those reporting ever having had sex, females (n = 156), males (n = 145).
[c]Among those reporting sex partner in previous 12 months, females (n = 115), males (n = 119).
[d]Among those currently married, females (n = 102), males (n = 48).
[e]Sexual intercourse without foreplay or lubrication and with the aid of drying agents so that the vagina is dry upon penetration.
[f]Exchanging sex for food, shelter, money, gifts.

Correlates of HIV infection

Bivariate associations between HIV status and potential risk factors, by sex, are presented in Table 3. Table 4 presents independent factors identified as being significantly associated with HIV infection in separate, simultaneous multivariable logistic regressions among sexually active young men and young women. The strongest correlate of HIV infection among men was a non-consensual sexual debut (adjusted odds ratio [AOR]

Table 2. Prevalence of HIV infection among female (n = 192) and male (n = 192) study participants.

	All participants Prevalence estimate (%) [95% CI] (# Infected/total N)	
	12.8 [9.6–16.5] (49/384)	
Females Prevalence estimate (%) [95% CI] (# Infected/total n)	Males Prevalence estimate (%) [95% CI] (# Infected/total n)	p value
15.6 [10.8–21.6] (30/192)	9.9 [6.1–15.0] (19/192)	0.092

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Table 3. Comparison of socio-demographic and behavioural characteristics among HIV-positive (n = 49) and HIV-negative (n = 335) participants stratified by sex.

	Males			Females		
	HIV (+) (n = 19)	HIV (−) (n = 173)		HIV (+) (n = 30)	HIV (−) (n = 162)	
Variable	No. (%)	No. (%)	p value	No. (%)	No. (%)	p value
Socio-demographics and war-related experiences						
Age, years, median (range)	26 (15–29)	20 (15–29)	<0.001	25 (15–29)	20 (15–29)	<0.001
Awach sub-county	12 (63.2)	72 (41.6)	0.072	21 (70.0)	63 (38.9)	0.002
Ever married	17 (89.5)	75 (43.4)	<0.001	28 (93.3)	112 (69.1)	0.006
Age at first marriage, years, median (range)	17 (12–24)	18 (12–25)	0.032	16 (9–22)	16 (11–20)	0.975
In school	1 (5.3)	55 (31.8)	0.016	0 (0)	40 (24.7)	–
Currently experience lack of food and/or water	5 (26.3)	38 (22.0)	0.772	23 (76.7)	87 (53.7)	0.020
Had enough food to eat past 12 months	10 (52.6)	93 (53.8)	0.926	8 (26.7)	66 (40.7)	0.146
Lived in original IDP camps >10 years	14 (73.7)	93 (53.8)	0.097	25 (83.3)	127 (78.4)	0.541
Formerly abducted	8 (42.1)	57 (32.9)	0.423	5 (16.7)	37 (22.8)	0.453
Night commuter[a]	11 (57.9)	137 (79.2)	0.046	18 (60.0)	112 (69.1)	0.326
Sexual behaviours						
Age at first sex, years, median (range)	18 (12–23)	16 (8–25)	0.270	14 (8–18)	16 (6–22)	0.039
Non-consensual sexual debut[b]	5 (27.8)	6 (4.7)	0.002	13 (43.3)	28 (22.2)	0.001
First sex partner ≥10 years older[b]	2 (11.1)	4 (3.1)	0.100	14 (46.7)	31 (24.6)	0.004
Ever consumed alcohol	7 (36.8)	44 (25.4)	0.285	0 (0)	7 (4.3)	–
Ever consumed alcohol before sex	4 (57.1)	21 (47.7)	0.795	0 (0)	4 (57.1)	–
Ever practice dry sex[b,c]	11 (61.1)	64 (50.4)	0.076	20 (66.7)	57 (45.2)	0.001
Ever survival sex work[b,d]	0 (0)	0 (0)	–	3 (10.0)	8 (6.3)	0.383
Ever experience physical/sexual/verbal abuse[b]	8 (44.4)	46 (36.2)	0.153	19 (63.3)	77 (61.1)	0.812
Ever been raped[b]	5 (27.8)	9 (7.1)	0.006	13 (43.3)	32 (25.4)	0.005
Age at rape, years, median (range)	16 (12–17)	17 (11–24)	0.538	12 (8–15)	14 (6–23)	0.007
Perpetrator ≥10 years older	3 (60.0)	4 (44.4)	0.245	10 (76.9)	18 (56.3)	0.268

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Table 3 (*Continued*)

	Males			Females		
	HIV (+) (n = 19)	HIV (−) (n = 173)		HIV (+) (n = 30)	HIV (−) (n = 162)	
Variable	No. (%)	No. (%)	p value	No. (%)	No. (%)	p value
Ever pregnant[b]	–	–	–	27 (90.0)	108 (66.7)	0.010
Age at first pregnancy, years, median (range)	–	–	–	17 (13–21)	17 (10–22)	0.630
Ever STI besides HIV[b]	6 (33.3)	11 (8.7)	0.002	7 (23.3)	10 (7.9)	0.007
STI symptoms past 12 months[e]	1 (6.3)	8 (7.8)	0.903	19 (100.0)	35 (36.5)	<0.001
HIV prevention behaviours and risk perception						
Ever used a condom	15 (78.9)	113 (65.3)	0.232	13 (43.3)	67 (41.4)	0.840
Consistent condom use	4 (26.7)	37 (32.7)	0.773	4 (30.8)	11 (16.4)	0.252
Condom used last sex[b]	3 (16.7)	48 (37.8)	0.047	6 (20.0)	19 (15.1)	0.509
Ever HIV test	17 (89.5)	126 (72.8)	0.165	29 (96.7)	142 (87.7)	0.208
No. of HIV tests in lifetime, median (range)	5 (0–30)	11 (0–30)	0.010	7.5 (0–25)	15 (0–25)	0.024
Know partner's HIV status[b]	5 (27.8)	70 (55.1)	0.030	9 (30.0)	78 (61.9)	0.002
Can protect yourself from HIV/STIs	14 (73.7)	163 (94.2)	0.009	12 (40.0)	131 (80.9)	<0.001
Able to say no to sex	19 (100.0)	172 (99.4)	1.000	20 (66.7)	123 (75.9)	0.285

[a]Leaving your family hut at night to sleep elsewhere due to security and privacy concerns.
[b]Among those reporting ever having had sex, HIV-positive males (n = 18), HIV-negative males (n = 127), HIV-positive females (n = 30), HIV-negative females (n = 126).
[c]Sexual intercourse without foreplay or lubrication and with the aid of drying agents so that the vagina is dry upon penetration.
[d]Exchanging sex for food, shelter, money and gifts.
[e]Among those reporting sex partner in previous 12 months, HIV-positive males (n = 16), HIV-negative males (n = 103), HIV-positive females (n = 19), HIV-negative females (n = 96).

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Table 4. Determinants of HIV infection by logistic regression for sexually active male (n = 145) and female (n = 156) participants.

	Males			Females		
Variable	No. (%)	UOR [95% CI]	AOR [95% CI]	No. (%)	UOR [95% CI]	AOR [95% CI]
Age, years, median (range)	23 (15–29)	1.34 [1.16–1.55]	1.43 [1.12–1.82]	22 (15–29)	1.18 [1.08–1.29]	1.09 [0.94–1.26]
Awach sub-county	70 (48.3)	–	–	69 (44.2)	3.67 [1.58–8.51]	4.84 [1.27–11.02]
Ever married	92 (63.4)	–	–	140 (89.7)	6.25 [1.43–27.26]	2.31 [0.02–6.44]
Age at first marriage, years, median (range)	18 (12–25)	0.82 [0.67–1.01]	–	16 (9–22)	–	–
In school	16 (11.0)	0.12 [0.02–0.92]	0.17 [0.02–1.62]	9 (5.8)	–	–
Currently experience lack of food and/or water	34 (23.4)	–	–	94 (60.3)	2.83 [1.15–6.97]	1.07 [0.35–3.31]
Night commuter[a]	107 (73.8)	0.36 [0.14–0.97]	0.74 [0.33–1.64]	104 (66.7)	–	–
Age at first sex, years, median (range)	17 (8–25)	–	–	15 (6–22)	0.79 [0.65–0.95]	0.79 [0.56–1.11]
Non-consensual sexual debut	11 (7.6)	4.94 [2.69–16.70]	3.24 [1.37–7.67]	41 (26.3)	3.66 [1.60–8.39]	1.07 [0.27–4.34]
First sex partner ≥10 years older	6 (4.1)	–	–	45 (28.8)	1.36 [0.13–14.19]	–
Ever practice dry sex[b]	75 (51.7)	–	–	77 (49.4)	3.68 [1.62–8.41]	7.62 [1.56–16.95]
Ever pregnant	–	–	–	135 (86.5)	4.50 [1.31–15.50]	5.53 [0.89–14.31]
Ever STI besides HIV	17 (11.7)	6.19 [2.00–19.19]	3.21 [0.66–14.54]	17 (10.9)	4.63 [1.60–13.36]	4.02 [1.41–11.98]
Condom used last sex	51 (35.2)	0.29 [0.08–1.05]	–	25 (16.0)	–	–
No. of HIV tests in lifetime	12 (0–30)	0.91 [0.85–0.98]	0.85 [0.77–0.94]	15 (0–25)	0.94 [0.89–0.99]	0.82 [0.74–0.91]
Know partner's HIV status	75 (51.7)	0.33 [0.13–0.87]	0.40 [0.08–1.41]	87 (55.8)	0.27 [0.12–0.62]	0.57 [0.19–1.77]
Can protect yourself from HIV/STIs	133 (91.7)	0.17 [0.05–0.57]	0.24 [0.03–0.88]	107 (68.6)	0.16 [0.07–0.36]	0.29 [0.09–0.95]

[a]Leaving your family hut at night to sleep elsewhere due to security and privacy concerns.
[b]Sexual intercourse without foreplay or lubrication and with the aid of drying agents so that the vagina is dry upon penetration.

3.24; 95% CI: 1.37–7.67). Having practiced dry sex was the strongest correlate of HIV infection among women (AOR 7.62; 95% CI: 1.56–16.95). Women in Awach sub-county were 4.84 (95% CI: 1.27–11.02) times more likely to be HIV-positive than women in Ongako sub-county. HIV infection among females was also associated with ever having had an STI (AOR 4.02; 95% CI: 1.41–11.98). For men, odds of HIV infection increased by 1.43 (95% CI: 1.12–1.82) times for every one-year increase in age. For each additional HIV test taken, the odds of contracting HIV decreased by 15.0% for men (AOR 0.85; 95% CI: 0.77–0.94) and 18.0% for women (AOR 0.82; 95% CI: 0.74–0.91). In addition, both sexes were significantly less likely to be HIV-positive if they perceived that they could protect themselves from HIV/STIs (males: AOR 0.24; 95% CI: 0.03–0.88 and females: AOR 0.29; 95% CI: 0.09–0.95).

Discussion

Our results illustrate the magnitude and correlates of HIV infection among conflict-affected young men and women in northern Uganda. HIV prevalence overall was alarmingly high at 12.8%, with a higher prevalence identified among young women (15.6% vs. 9.9%), although this difference in prevalence did not reach conventional statistical significance (p = 0.092). Various studies throughout sub-Saharan Africa affirm that girls/women have a higher HIV prevalence rate compared to their male counterparts (Glynn et al., 2001; Gregson et al., 2002; Obasi et al., 2001). This, in part, is explained by their early age of sexual debut, difficulty negotiating safe sex, and exposure to coercive sex, all often female-specific sexual vulnerabilities related to social and economic power imbalances that are even more pronounced in contexts of conflict and displacement (UNAIDS, 2012b; Ward & Marsh, 2006; Westerhaus, 2007). Our study corroborates these explanations in finding that female participants compared to males had a lower median age of sexual debut; a significantly higher proportion of young women indicated inconsistent condom use, ever having engaged in survival sex work, and ever having been raped, and a significantly lower proportion of females indicated being able to say no to sex. Traditional HIV interventions that emphasise abstinence, partner reduction and condom use may actually overlook the lack of agency that undermines conflict-affected women's capacity to make safe sexual choices (Westerhaus et al., 2008). Consequently, a more holistic response is needed to address the gender inequalities that contribute to a disparity in HIV rates between young men and women in post-conflict northern Uganda. HIV responses must reach beyond traditional programming and incorporate efforts to empower young women and increase their influence in sexual decision-making; improve girls'/women's communication and negotiation skills; and change any harmful gender norms and practices related to sexual responsibility, decision-making and violence.

This study identified two similar HIV risk factors for young women and men. First, both males and females were significantly less likely to be infected with HIV if they believed that they could protect themselves. Our finding highlights the need to educate both sexually active and non-sexually active young people, in and out of school, about HIV-prevention measures. It is critical to ensure that young people have access to the knowledge and skills building that encourage them to avoid or reduce behaviours that carry a risk of HIV infection, particularly in times of post-conflict transition when efforts are often focused on rebuilding infrastructure and HIV programming offered during the conflict has either ceased or has been interrupted. Furthermore, this comprehensive information must be delivered without moral judgement. Secondly, this study identified that the number of HIV tests taken in a lifetime was also negatively associated with HIV-

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positivity among both males and females. For each additional HIV test taken, the odds of HIV infection decreased by 15.0% (95% CI: 0.77–0.94) for young men and 18.0% (95% CI: 0.74–0.91) for young women. It is difficult to determine whether the protective effect of testing for HIV can be explained by effective counselling and testing services or alternatively, whether the effect is a result of positive cases ceasing to retest after acquiring knowledge of their status, while negative cases continue to test. The role that HIV testing may have to play in preventing infection in this population should be explored in further research.

This study also identified several sex- and gender-specific risk factors for HIV infection. First, among young women, the strongest correlate of HIV infection was having practiced dry sex (females who had practiced dry sex were nearly eight times more likely to be HIV-positive compared to those who had not). Although this risk factor has not been established in Uganda before, research from other countries in sub-Saharan Africa by Myer, Kuhn, Stein, Wright, and Denny (2005), and Schwandt, Morris, Ferguson, Ngugi, and Moses (2006) corroborate our finding that dry sex is a significant risk factor for HIV infection among females. Female participants practiced dry sex, which involves no foreplay or lubrication and/or inserting a local herb called *Anyero* believed to reduce moistness in the vagina, to enhance men's sexual pleasure and demonstrate fidelity. Dry sex practices reduce vaginal secretions (containing lactobacilli, which naturally defend the body against infection), increasing the likelihood of lacerations in the vaginal wall that are susceptible to infection (Hyena, 1999). Moreover, an individual's preference for dry sex may prevent the person from using lubricated condoms (Bagnol & Mariano, 2008; Scorgie et al., 2009). In our study, 91.3% of young men who had ever practiced dry sex had never used a condom before. Qualitative research should be conducted to investigate which HIV prevention methods are acceptable to individuals who practice dry sex. Concurrently, education about the elevated risk of HIV infection associated with dry sex practices must be an integral component of prevention programming in northern Uganda.

A second risk factor for HIV infection among young women identified in this study was related to participants' geographical location of residence. Female participants residing in a transit camp in Awach sub-county (vs. Ongako) were nearly five times more likely to be HIV-positive. This may be due to the increased mobility of the population, as Awach is relatively remote and under-resourced compared to Ongako. Movement to and from neighbouring communities – to attend auctions and access mobile markets to procure household necessities – is common for young women from Awach and may be a risk factor. In addition, the literature suggests that food insufficiency in times of conflict may enhance sex-related HIV vulnerabilities, particularly among females (i.e., survival sex, intergenerational sex, coerced sex; Oyefara, 2007; Weiser et al., 2007) and in this study, young women from Awach reported greater food insufficiency than women residing in Ongako (57.3% vs. 35.2% reported a current lack of food and/or water; 62.1% vs. 34.6% reported going hungry in the past year). Further research examining individual- and community-level factors is required to arrive at a better understanding of why young women in some communities in Gulu District seem to be at a higher risk than others, and tools to rapidly identify higher risk areas should be developed so that preventative interventions can be directed to where they are most needed.

A final risk factor for HIV infection identified among young women in this study was having had an STI. Female participants who had had an STI were four times more likely to be HIV-positive than those who had not. Established literature suggests that some STIs act as cofactors in HIV transmission, including both ulcerative (syphilis and HSV-2) and

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non-ulcerative (chlamydia, gonorrhoea, and trichomoniasis) infections (Carpenter et al., 2002; Gray et al., 1999; Mermin et al., 2008). It must be noted that STIs were self-reported in this study, which fails to capture asymptomatic infections and may be subject to recall error. Nonetheless, our finding indicates that post-conflict HIV interventions must consider the influence of STIs on HIV transmission and efforts must be increased to improve STI diagnoses and increase young people's access to STI treatment.

Among male participants in this study, significant elevations in HIV risk were demonstrated among young men who were of older age and among men who had experienced a non-consensual sexual debut. In Uganda and the rest of sub-Saharan Africa there is little evidence of a relationship between a forced sexual debut and HIV among young men (Zablotska et al., 2009), but in this study, a non-consensual first sexual experience was identified as the strongest correlate for HIV infection among males (young men whose sexual debut was forced were three times more likely to be HIV-positive than males whose sexual debut was consensual). The majority of research on sexual violence and HIV infection in times of war focuses on women and girls even though it has been suggested that during high-intensity conflicts, boys/men are as susceptible to sexual violence as women (USAID, 2000). Hankins et al. (2002) propose that IDP camps or rebels' barracks are settings conducive to male/male rape or other non-consensual sexual penetration. Furthermore, unprotected anal intercourse is a more effective means of HIV transmission than most other forms of sexual activity as the lining of the rectum can be damaged and bleed easily, providing HIV-infected sexual fluids or blood with a direct route of transmission (Baggaley, White, & Boily, 2010). The association our study found between a non-consensual sexual debut and HIV-positivity for young men highlights the importance of recognising that although sexual violence against women is one of the most widely used weapons of war, men are also victims. In northern Uganda few organisations are currently assisting male survivors of sexual violence, focusing instead on sexually abused women; however, in this study, 47% of sexually experienced male participants reported having been raped or sexually abused. Our findings clearly indicate that there is a need for the scale-up of post-conflict assistance for male survivors of sexual violence. Programme planners must recognise that males are also victims and therefore responses must be designed that are sensitive to their needs and experiences.

Our study has several potential limitations. First, non-random sampling methods may have compromised the generalisability of our findings. However, given that the majority of Gulu District's population was encamped during the war, we believe that study participants are characteristically similar to other conflict-affected young people living in the district and that our study results can therefore be generalised to this larger population. Second, due to the cross-sectional nature of the study, we are unable to identify cause-and-effect relationships and the identified HIV-positivity risk factor associations do not reveal relative temporal sequences. Third, the self-reported data may be limited by social desirability bias leading to an underestimation of certain HIV risk behaviours. Finally, although we did not find a statistically significant difference in HIV prevalence between male and female participants, limitations associated with significance tests and the interpretation of p values in relation to the significance of findings must be noted (Sterne & Smith, 2001). The study's relatively small number of HIV-positive individuals had the potential for Type II error in that the study's power may not have been adequate to detect a 'true' difference in HIV prevalence between males and females at $p < 0.05$.

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Conclusion

This study demonstrated that conflict-affected young men and women experience vulnerability to HIV infection in different ways than may originally have been understood. Consequently, post-conflict HIV programme planners must collect and use sex-disaggregated data to design, target, monitor, and evaluate programming; allocate resources to addressing gender inequalities and other contextual factors that make it difficult for young women to implement behaviour change; and involve young people in the development and design of HIV programming that addresses their sex- and gender-specific vulnerabilities and prevention needs.

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