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HIV Infection Among Internally Displaced Women and Women Residing in River Populations Along the Congo River, Democratic Republic of Congo

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Abstract We conducted a reproductive health assessment among women aged 15–49 years residing in an internally displaced persons (IDP) camp and surrounding river populations in the Democratic Republic of Congo. After providing informed consent, participants were administered a behavioral questionnaire on demographics, sexual risk, reproductive health behavior, and a history of gender based violence. Participants provided a blood specimen for HIV and syphilis testing and were referred to HIV counseling and testing services established for this study to learn their HIV status. HIV prevalence was significantly higher among women in the IDP population compared to women in the river population. Sexually transmitted infection symptoms in the past 12 months and a history of sexual violence during the conflict were associated with HIV infection the river and IDP population, respectively. Targeted prevention, care, and treatment services are urgently needed for the IDP population and surrounding host communities during displacement and resettlement.

Keywords HIV · Sexually transmitted infections · Displacement · Conflict

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Introduction

The first case of HIV infection in the Democratic Republic of Congo (DRC) was detected in 1983. Since then the HIV epidemic has continued to spread in the general population, primarily through heterosexual transmission. Overall, the country has maintained relatively low HIV prevalence compared to the rest of sub-Saharan Africa (<2 vs. 5.7%, respectively) though the eastern regions of the DRC have reported higher rates of HIV infection than the country as a whole, reaching levels up to 5% in pregnant women attending antenatal clinics (UNAIDS 2008a, b). Although it is commonly implied that conflict in the eastern regions of the DRC has contributed to high HIV prevalence in the region, there is no epidemiologic evidence to support this assumption.

From 1998 to 2003, a multi-country conflict in the DRC known as "Africa's first world war" led to an estimated 3.9 million deaths and 2.2 million internally displaced persons (IDP) in the DRC (Coghlan et al. 2006; OCHA 2002). In conflict affected settings women are particularly vulnerable to increased risk for sexual violence, leading to further morbidity including psychological trauma, unwanted or complications in pregnancy, sexually transmitted infection (STI), and HIV infection. Basic health services to appropriately respond to the needs of women during crises are often challenged, disrupted, or unavailable. As a result, women's health can be severely diminished during conflict, with disease and transmission further exacerbated both during and after the conflict.

No data currently exist on the prevalence of and risks for HIV infection among female IDP and their female counterparts residing in surrounding host communities in the DRC. Yet these baseline data are needed to assess the epidemic level in this population and target programs to improve reproductive, sexual, and psychosocial health services for women in conflict affected regions. This report describes the results of an analysis of HIV, STI, and sexual risk as part of a larger reproductive health assessment conducted after the conflict in the DRC among adult females residing in an IDP camp and host communities along the Congo River, near the capital city of Kinshasa.

Methods

From February to April 2005, we conducted a two-stage random sample household survey among adult women of reproductive age residing in one IDP camp and two surrounding river communities along the Congo River. Households were randomly selected from existing community records that listed the total number of the households in the community and the total number of people living in the household. One woman per household, aged 15–49 years, was randomly selected and invited to enroll in the survey at a central location within the survey sites. Sample sizes were calculated using the following formula: $N = \frac{Z^2 \times pq}{e^2}$, where $N =$ sample size, $Z =$ critical z score value at 95% confidence level (1.96), $p =$ estimated HIV prevalence (5%), $q = 1-p$, and $e =$ desired level of precision (2%). Sample sizes were adjusted for an anticipated refusal rate of 20% in the IDP camp and 30% in the river communities.

At the site, potential participants were provided a detailed explanation of the purpose and procedures for the study, including blood specimen collection for anonymous HIV and syphilis testing and an interviewer-administered questionnaire. Women were informed that participation was entirely voluntary and were free to take part in either the questionnaire, blood draw, or both. All women were provided a copy of the consent form and allowed time to make a decision on participation.

The questionnaire collected information on demographic characteristics, reproductive health behavior, sexual behavior within the past 12 months, STI symptoms (e.g., abdominal pain, vaginal discharge, foul smelling discharge, burning pain on urination, genital ulcers, sores, rash, swelling in the groin area, or genital itching) in the past 12 months, and a history of forced vaginal or anal sex during the conflict (hereafter termed "history of sexual violence during the conflict") and/or after the conflict by persons outside of the family such as soldiers, militia, police officers, and guards. The time period during the conflict was defined as any time between 1998 and the June 2003 Peace Accord. Women were informed that syphilis results would be returned from on-site rapid testing, and HIV test results would not be returned. All participants received referral vouchers for free voluntary counseling and HIV testing (VCT) services at temporary VCT sites established by this project at local health facilities within the survey sites. Participants were strongly encouraged to use these services, which were available during and 2 weeks after the survey.

HIV test results from the survey could not be returned for several reasons. All data collected for the survey were anonymous and unlinked to personal identifiers; therefore participants could not be located after data collection. In addition, VCT centers could provide high quality counseling services and referrals, and others in the participant's household could avail themselves of these services if desired. Further, in DRC there is a high risk of HIV-infected persons being stigmatized both at home and in the community should others inadvertently discover their HIV-infected status. Finally, the current policy of the DRC National AIDS Control Program during the time of the study (and still in effect today) does not require patients who test for HIV infection in research activities to receive their test results.

Specimens were tested on-site for *Treponema pallidum* antibodies using Determine (Abbott, IL, USA) rapid syphilis test, and treatment was provided for reactive tests. Rapid plasma reagin (RPR) and *T. pallidum* particle agglutination (TPPA) testing were conducted at the national reference laboratory, after completion of data collection. Active syphilis infection was defined as positive RPR and TPPA serologies. Specimens only positive by TPPA were defined as having history of syphilis infection. HIV antibodies were detected in an off-site laboratory using the Determine HIV-1/2 (Abbott, IL, USA) and Unigold HIV 1/2 (Trinity Biotech, Dublin, Ireland)) rapid tests in parallel. Specimens were classified as HIV positive if dually reactive. Discordant results were tested by the Oraquick rapid test (Orasure, PA, USA) and classified as HIV positive if reactive.

Study participants were assigned a sampling weight to account for differences in selection probabilities. Bivariate analysis was conducted to assess potential associations between select variables and HIV infection. Variables associated with HIV infection at a 0.2 significance level or deemed to be important confounders were tested in multivariate analysis. Variables that remained associated with HIV infection at a 0.05 significance level in the multivariate analysis were reported as significant correlates of HIV infection. Ninety-five percent confidence intervals (CI) for proportions, odds ratios, and adjusted odds ratios (AOR) were calculated using a binomial exact distribution. All analyses were controlled for sampling design and sampling weights. To account for sample sizes that were close to the population size, the finite population correction factor was applied to adjust the standard errors for seroprevalence estimates for the river population and the IDP population.

Results

The first river community had 3,114 households ($N = 20{,}602$ persons); 569 (18.3%) households were selected, from which 495 women (87.0%) completed interviews, and 494 (86.8%) provided blood samples (Table 1). The second river community had 3,758 households ($N = 13{,}278$ persons), of which 581 (15.5%) were selected; 568 women (97.8%) completed interviews, and 565 (97.2%) provided blood samples. The IDP camp had 345 households ($N = 1{,}226$ persons), of which 245 (71.0%) were selected from which 225 (91.8%) completed interviews and provided blood samples. There were no significant differences in reported demographics (age, marital status, education, and residency status), sexual risk behavior, STI symptoms in the past 12 months, and serology results between the two river communities; therefore, results for the two river communities were combined and hereafter referred to as the river population.

Participants in the river population were slightly younger than women in the IDP population (median age: 26 vs. 28 years). The majority of participants in the river and IDP population reported being currently married or living with a man (95.4 vs. 84.7%, respectively); however, married participants in the IDP population were more likely to report not living with their husbands compared to married participants in the river population (13.9 vs. 6.2%, $P < 0.01$). No significant differences were observed in the reported number of years of education in the river and IDP population.

In the river population, 0.4% (CI 0, 0.8) self-reported being a refugee from another country and 4% (CI 2.8, 5.1) reported being an IDP (Table 2). However, respondents from the IDP population predominately reported being an IDP [75.6% (CI 70.0, 81.2)] compared to refugees from other countries [24.4% (CI 18.8, 30.1)]. Most IDP reported their original residency as Equateur or Orientale province located in the northern region of the DRC, while nearly all refugees in the IDP population (98%) originated from Sudan. The median length of stay in the IDP population was 5 years (interquartile range (IQR) 5–5) and 1 year (IQR 0–3) in the river population.

No significant differences were observed in the reported age of sexual debut, number of sexual partners in the past 12 months, and proportion reporting condom use at last sexual intercourse in the river and IDP population. However, participants in the IDP population were more likely to report a history of sexual violence during the conflict compared to the river population (11.1 vs. 1%, $P < 0.01$). In addition, reported STI symptoms in the past 12 months were higher in the IDP population compared to the river population (60.4 vs. 52.2%, $P = 0.02$).

HIV prevalence was 3.1% (CI 2.1, 4.1) in the river population and 7.6% (CI 4.1, 11.0) in the IDP population. VCT uptake was 20 and 90% among participants from the river and IDP population, respectively. Active syphilis was detected in 0.5% (CI 0.1, 0.9) of the river population and 4.0% (CI 1.4, 6.6) of the IDP population. Two participants in the study with reactive rapid syphilis tests refused treatment. In a sub analysis of participants in the IDP population who reported being refugees from another country ($n = 55$), HIV infection was detected in 7.3% (CI 0, 14.1) and active syphilis infection was detected in 1.8% (CI 0, 5.3). In the IDP population, the proportion of women who reported a history of sexual violence during the conflict was lower among refugees compared to IDP (1.8 vs. 14.2%, $P = 0.01$).

After controlling for age, age of sexual debut, number of sexual partners in the past 12 months, residency status (local resident, refugee, or IDP), original residence, history of sexual violence during the conflict, past history of syphilis infection, active syphilis infections, and any STI symptoms in the past 12 months, we found any STI symptoms in the past 12 months (AOR = 3.9; CI 1.6, 9.9;

Table 1 Sample size, DRC reproductive health and seroprevalence survey 2005

Site	Households	Population size	Attempted contacts	Completed interviews	Provided blood for testing
River population 1	3,114	20,602	569	495	494
Rover population 2	3,758	13,278	581	568	565
IDP camp	345	1,226	245	225	225
Total				1,288	1,284

Table 2 Proportion of select demographic, sexual risk, and biologic variables among women residing in river and internally displaced populations and associations with HIV infection, DRC reproductive health seroprevalence survey 2005

Select variables	River population (N = 1,063)						Internally displaced population (N = 225)					
	N	Proportion (95% CI)	HIV positive N (%)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value	N	Proportion (95% CI)	HIV positive N (%)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value
Demographic variables												
Age group												
15–24 years	456	43.1 (40.1, 46.1)	10 (2.2)	1.0	1.0	–	83	36.9 (30.6, 43.2)	5 (6)	1.0	1.0	–
25–34 years	391	37.0 (34.1, 39.9)	16 (4.1)	1.9 (0.9, 4.2)	1.7 (0.7, 4.0)	0.23	84	37.3 (31.1, 43.6)	9 (10.7)	1.9 (0.6, 5.8)	1.1 (0.3, 3.9)	0.81
35–49 years	211	19.9 (17.6, 22.4)	7 (3.3)	1.5 (0.6, 4.1)	1.3 (0.4, 3.8)	0.64	58	25.8 (20.0, 31.5)	3 (5.2)	0.8 (0.2, 3.7)	0.5 (0.1, 2.7)	0.66
Residency status												
Local resident	1,011	95.6 (94.4, 96.9)	30 (3.0)	1.0	1.0	–	0	–	0	NA	NA	–
Repatriated refugees	4	0.4 (0, 0.8)	0	NA[b]	NA	0.99	55	24.4 (18.8, 30.1)	13 (7.7)	0.1(0.3, 3.0)	1.3 (0.4, 4.5)	0.81
IDP	42	4.0 (2.8, 5.1)	3 (7.1)	2.5 (0.7, 8.6)	2.8 (0.8, 10.1)	0.12	170	75.6 (70.0, 81.2)	4 (7.3)	1.0	1.0	–
Sexual risk variables												
Age at first sex												
<15 years	171	18.0 (15.5, 20.4)	3 (1.8)	1.0	1.0	–	50	23.2 (17.5, 28.8)	1 (2.0)	1.0	1.0	–
15–24 years	778	81.7 (79.3, 84.2)	27 (3.5)	2.0 (0.6, 6.7)	2.4 (0.7, 8.0)	0.17	166	76.8 (71.2, 82.5)	16 (9.6)	5.2 (0.7, 40.4)	5.6 (0.7, 45.0)	0.09
25 + years	3	0.3 (0, 0.7)	0	NA	NA	0.99	0	–	0	NA	NA	–
Number of partners in the past 12 months												
0 partners	54	5.5 (4.1, 7.0)	4 (7.7)	1.0	1.0	–	25	11.6 (7.3, 15.8)	0	NA	NA	–
1 partner	825	84.9 (82.6, 87.1)	25 (3.0)	0.4 (0.1, 1.1)	0.4 (0.1, 1.4)	0.16	157	72.7 (66.7, 78.6)	15 (9.6)	1.0	1.0	–
2 + partners	93	9.6 (7.7, 11.4)	3 (3.3)	0.4 (0.1, 1.9)	0.4 (0.1, 2.0)	0.23	34	15.7 (10.9, 20.6)	2 (5.9)	0.6 (0.1, 2.7)	0.5 (0.1, 2.7)	0.95
History of sexual violence during the conflict												
No	1,050	99.0 (98.4, 99.6)	33 (3.2)	1.0	1.0	–	200	88.9 (84.8, 93.0)	12 (6.0)	1.0	1.0	–
Yes	11	1.0 (0.4, 1.7)	0	NA	NA	0.99	25	11.1 (7.0, 15.2)	5 (20.0)	3.9 (1.3, 12.3)	4.2 (1.03, 16.9)	0.05
History of any STI symptoms in the past 12 months												
No	506	47.8 (44.7, 50.7)	8 (1.6)	1.0	1.0	–	89	39.6 (33.2, 45.9)	4 (4.5)	1.0	1.0	–
Yes	554	52.2 (49.3, 55.3)	25 (4.5)	3.0 (1.3, 6.6)	3.9 (1.6, 9.9)	<0.01	136	60.4 (54.1, 66.8)	13 (9.6)	2.2 (0.7, 7.1)	1.8 (0.5, 6.2)	0.81
Biological variables												
Active syphilis infection[c]												
No	1,055	99.5 (99.1, 99.9)	33 (3.1)	1.0	1.0	–	216	96.0 (93.4, 98.6)	15 (6.9)	1.0	1.0	–
Yes	5	0.5 (0, 0.9)	0	NA	NA	0.99	9	4.0 (1.4, 6.6)	2 (22.2)	3.8 (0.7, 20.1)	3.0 (0.3, 31.3)	0.28
Lifetime exposure to syphilis infection[d]												
No	1,030	97.2 (96.2, 98.2)	31 (3.0)	1.0	1.0	–	192	88.3 (80.7, 90.0)	12 (6.3)	1.0	1.0	–
Yes	30	2.8 (1.8, 3.8)	2 (6.7)	2.3 (0.5, 10.1)	3.1 (0.7,14.4)	0.15	33	14.7 (10.0, 19.3)	5 (15.2)	2.7 (0.9, 8.2)	1.5 (0.3, 7.3)	0.68

Table 2 continued

Select variables	River population (N = 1,063)						Internally displaced population (N = 225)					
	N	Proportion (95% CI)	HIV positive N (%)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value	N	Proportion (95% CI)	HIV positive N (%)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value
HIV infection												
No	1,026	96.9 (95.9, 97.9)	–	–	–	–	208	92.4 (89.0, 95.9)	–	–	–	–
Yes	33	3.1 (2.1, 4.1)					17	7.6 (4.1, 11.0)				

[a] Adjusted for age; age of sexual debut; number of partners in the past 12 months; residency status; original residence; history of sexual violence during the conflict; past history of syphilis infection; and any STI symptoms in the past 12 months

[b] *NA* Not applicable

[c] Specimens with positive RPR and TPPA serologies were defined as active syphilis infections

[d] Specimens with positive TPPA serologies were defined as having a past history of syphilis infection

P value < 0.01) to be significantly associated with HIV infection in the river population and a history of sexual violence during the conflict (AOR = 4.2; CI 1.03, 16.9; P value = 0.05) to be significantly associated with HIV infection in the IDP population.

Because a history of sexual violence during the conflict was associated with HIV infection for female IDP we further explored causality by assessing whether a dose response relationship existed between the number of reported forced sex events during the conflict and HIV infection. A dose response relationship was not observed in the bivariate analysis ($P > 0.2$); therefore the number of forced sex events was not included as a variable in the final model for the IDP population.

Discussion

HIV prevalence among participants residing in the river population was similar to national HIV prevalence estimates reported by UNAIDS among adults living in the DRC during the same time period (3.2%; UNAIDS 2006). In contrast HIV prevalence among female IDP was over two times higher. Absolute estimates of HIV prevalence among adults in the DRC were lower than rates observed in neighboring countries of Angola (3.7%), Congo (5.3%), Tanzania (6.5%), Uganda (6.7%), Central African Republic (10.7%), and Zambia (17.0%; UNAIDS 2006). Prolonged conflict in the DRC may have minimized HIV acquisition on a population level through reductions in mobility and sexual contact with these outside communities (Mock et al. 2004; Spiegel 2004; Spiegel et al. 2007). However, the higher HIV prevalence detected among female IDP in this survey underscores a potential for increased transmission among women in the context of displacement in the DRC. Potential contributing factors to higher prevalence observed in female IDP compared to females in the river population may include population movement from higher prevalence areas from which IDP originate to lower prevalence host communities, sexual mixing and unprotected sex between IDP and new social networks in host communities, and increased HIV transmission through conflict-related sexual violence towards female IDP (Amowitz et al. 2002; Mock et al. 2004; Spiegel 2004; Spiegel et al. 2007).

This survey found that a history of sexual violence during the conflict among female IDP was significantly associated with HIV infection. It is difficult to infer a causal association given that a dose-response relationship was not observed for the association. In addition the survey was cross-sectional in design, and there may have been possible confounding by higher HIV prevalence in the respondent's native regions. Still, the worrisome rate of sexual violence (approximately one women in ten affected) during the conflict among female IDP punctuates the urgent need for targeted services for prevention, treatment, psychological support and protection against sexual violence for all women in conflicted afflicted countries.

In the river population, self-reported symptoms of STI in the past 12 months was significantly associated with HIV infection. Though causality is also not possible to determine for this association, the finding highlights the vulnerability of women with symptoms of STI, irrespective of HIV status. HIV positive women may be more likely to experience genital symptoms which can facilitate HIV transmission; whereas HIV negative women with untreated symptomatic STI are at increased risk for HIV acquisition. HIV prevention programs targeting general populations should therefore include key messages on the link between STI and HIV infection and encourage treatment of STIs to help prevent transmission and acquisition of HIV infection.

VCT is an important intervention for HIV prevention and serves to link HIV-positive persons to care and treatment. Since VCT services were unavailable for the surveyed populations prior to the study, we established temporary VCT services in local health facilities in the three survey sites. Uptake of VCT services was high among IDP (90%), demonstrating a need to offer VCT services during displacement and strong desire of IDP to be tested. Poorer uptake in the river population (20%) could be possibly due to longer travel distance to receive services or a low level of concern for HIV and STI in the general population. Since the survey's completion, the IDP camp has now closed, and there are currently five VCT sites supported by international donors that are integrated into existing health care facilities serving the river population. In 2006, these sites counseled 2,387 persons; 1,990 were HIV tested, and 1,710 received results. As local policies adopt requirements to return HIV results to persons tested and the community de-stigmatizes HIV testing, the return of HIV test results routinely during surveys will be possible. As peace progresses, challenges to VCT provision for IDP during resettlement remain. The successful implementation of mobile VCT that provide services for hard to reach populations offers one possible solution (Liang et al. 2005).

DRC has a limited number of HIV antiretroviral treatment (ART) programs and, at the time of the survey, none currently existed in Equateur or Orientale provinces, where most IDP have returned. Given limited access to ART programs and anticipated challenges in maintaining ART after resettlement, programs targeted to the needs of IDP during and after displacement should be included in national HIV/AIDS strategic plans, particularly as country-wide ART programs continue to expand.

The findings of this study are subject to the following limitations. Behaviors were self-reported; therefore social desirability bias may have influenced responses to sensitive questions on sexual behavior and gender-based violence, leading to underreporting of certain behaviors. While symptoms of STI can be used as a proxy for STI, inaccurate self reporting of these symptoms is common, thereby obscuring potential associations observed with this variable. Only one IDP camp was selected for the study; therefore, these results cannot be generalized to female IDP residing in other camps along the Congo River, female IDP in East Congo, and female IDP in other countries. According to the United Nations High Commissioner for Refugees, most IDP were camped north of the survey site along a 1,000 km-long stretch of the Congo River along the western border of Equateur Province (OCHA 2005). Finally, the cross-sectional design obscured temporality between potential risk factors and HIV infection observed in the analysis. In addition, it is possible that the higher HIV prevalence observed in female IDP may not have been caused by situations experienced as IDP, but may be due to a higher baseline HIV prevalence of this group given that most originated from regions in the country with higher levels of HIV infection compared to the river communities surveyed. Without prospective data to determine temporality, the true causes for HIV infection can not be determined.

Conclusions

Despite these limitations, this study has brought to the forefront the heightened vulnerability of females in the DRC, particularly female IDP, to HIV infection and highlights the potential role of conflict-related sexual violence and risk for HIV infection at an individual level. Recent data from conflict affected nations in Africa have concluded that sexual violence, such as widespread rape in these countries during conflict, does not appear to affect HIV prevalence on a population level (Anema et al. 2008; Spiegel et al. 2007); however, sexual violence could potentially increase risk for HIV infection on an individual level. Although this analysis was based on data from countries affected by conflict, too little data were available to draw any conclusions on the effect of sexual violence and risk of HIV infection among IDP populations specifically. Significantly, in our study, we found that refugees living in the IDP population reported lower levels of sexual violence during the conflict compared to IDP alone but had similar levels of HIV infection. Though the sample size for the refugee population was small, these data suggest that potential risk factors for HIV infection may vary between the two populations though further comparisons are needed.

Factors which may contribute to the high HIV prevalence rate observed among female IDP are at best multifaceted and interrelated; therefore prospective epidemiological studies among this population and surrounding host communities are needed to better ascertain independent risk factors for HIV infection among IDP both during and after conflicts. Meanwhile, practical interventions for IDP including improved surveillance coverage and targeted prevention, care, and treatment programs are still urgently needed during displacement and resettlement and should be included in strategic plans for HIV programs in the country. Services should have long-term funding and be accessible for surrounding host populations.

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