War-Related Abduction and History of Incarceration Linked to High Burden of HIV Among Female Sex Workers in Conflict-Affected Northern Uganda

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Objective: Sex workers (SWs) in sub-Saharan Africa face a disproportionate HIV burden and growing concerns of severe human rights violations. Given the dearth of evidence on the burden and correlates of HIV among SWs in sub-Saharan Africa, particularly within conflict-affected settings, we examined the relationship between structural determinants (eg, war-related abduction, incarceration) and HIV infection among conflict-affected SWs in Northern Uganda.

Design: Cross-sectional community-based research study among female SWs in conflict-affected Gulu, Northern Uganda.

Methods: Interview questionnaires and voluntary HIV testing were conducted with participants recruited through SW/peer-led outreach and time–location sampling from 2011 to 2012. HIV prevalence was calculated, and bivariable and multivariable logistic regression was used to identify independent associations with HIV seroprevalence.

Results: Of 400 SWs, 135 (33.75%) were HIV seropositive; of whom one-third were new/previously undiagnosed HIV infections. In multivariable analysis, after adjusting for age of sex work entry and education, lifetime incarceration (adjusted odds ratio: 1.93, 95% confidence interval: 1.17 to −3.20) was independently associated with HIV seroprevalence, and history of wartime abduction (adjusted odds ratio: 1.62, 95% confidence interval: 1.00 to 2.63) was marginally associated ($P = 0.051$).

Conclusions: This study documented a high rate of undiagnosed HIV infections and associations between war-related human rights violations, incarceration, and a heavy HIV burden among SWs in conflict-affected Northern Uganda. These findings highlight the serious harms of conflict and criminalization of marginalized women in sub-Saharan African contexts. SW-led interventions that address conflict experiences and policy shifts to promote a rights-based approach to HIV prevention and care remain critically needed.

Key Words: sex work, HIV, conflict, structural determinants, humanitarian emergencies, sub-Saharan Africa, Uganda

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INTRODUCTION

Globally, women in sex work face disproportionately high rates of HIV, violence, stigma, and criminalization.[1] A systematic review across 50 countries recently documented an overall HIV prevalence of 11.8% among female sex workers (SWs), corresponding to a 13.5-fold higher odds of HIV compared with the general population of women. Wide intraregional ranges were noted, with the highest burden of HIV (36.9%) among SWs in sub-Saharan Africa.[1]

Within sub-Saharan Africa, a region heavily impacted by armed conflict and population displacement, there remains limited research on the burden and determinants of HIV among conflict-affected SWs. Armed conflicts are associated with severe health and social impacts, including mass displacement, widespread human rights violations, the collapse of livelihoods and health systems, family separation, and a breakdown of traditional social structures, all of which may enhance HIV vulnerability.[2–10] The humanitarian literature has documented important gendered effects of conflict for women and girls, including sexual violence, other human rights abuses (eg, forced marriage, sexual slavery), and sex work engagement.[2,7,9,10] In conflict-affected communities, young women may engage in sex work to meet economic needs, particularly in the context of severe poverty, food insecurity, and loss/separation from spouses; furthermore, enhanced demand for sexual services in conflict settings has been linked to structural changes including the influx of peacekeepers and military, family separation, and a breakdown of traditional social structures and controls moderating sexual relationships.[9,10]

In Northern Uganda, a 2-decade-long conflict between the Lord's Resistance Army (LRA) and the Governments' Ugandan Peoples Defense Forces led to the displacement of >1.8 million people to internally displaced persons (IDP) camps.[11] Over the course of the conflict, extensive human rights violations were reported, including large-scale abductions of young people and children into the LRA.[12] However, there remains a significant dearth of evidence regarding the burden and determinants of HIV among SWs within conflict-affected settings in sub-Saharan African settings, including Northern Uganda.

Although global evidence elucidates the importance of structural determinants of HIV among marginalized populations, including SWs (eg, violence, criminalization, working conditions),[13–24] little research has investigated conflict-related rights violations or criminalization among SWs in sub-Saharan Africa. Recent research clearly demonstrates the critical impact of structural factors on HIV risks between SWs and their clients, through both individual and partner-level risk pathways, yet identified a concerning dearth of evidence from sub-Saharan Africa.[25] Recent studies with SWs in Togo, Burkina Faso, Uganda, and Mali have documented sociodemographic factors (eg, age, nationality, education), co-infection with sexually transmitted infections, and sex work history (eg, age at SW entry, SW duration, forced sex) as correlates of inconsistent condom use with clients[26,27] and HIV prevalence.[28,29] Although some studies have begun to examine structural determinants of HIV among SWs in sub-Saharan Africa,[26,30–33] few report on conflict-related displacement or violence. For example, in the Democratic Republic of Congo and Mali, structural factors such as access to HIV programs (eg, testing, condoms) and mobility patterns have been associated with condom use[27] and HIV prevalence[28] among SWs. Qualitative evidence shows that in sub-Saharan Africa, SWs are highly vulnerable to criminalization (~27 countries in the region, including Uganda, have legislation criminalizing sex work[34]) and human rights abuses (eg, violence by police, clients, or military; unlawful arrest and detention) and often have little access to justice or health services.[32] Among the few quantitative studies undertaken in conflict-affected settings, very low rates of condom use at last sex exchange (24%)[35] and consistent condom use (11.5%)[36] were reported by SWs in Somalia and Afghanistan, suggesting potential gaps in HIV programming in humanitarian settings.

Given the dearth of quantitative evidence on HIV vulnerability and structural determinants among SWs in conflict-affected sub-Saharan African settings, our objective was to determine the HIV burden and associations with structural factors (eg, war-related abduction, incarceration) in Gulu, Northern Uganda.

METHODS

Questionnaire and HIV serological data were collected through a community-based cross-sectional study conducted with 400 female SWs in Gulu, Northern Uganda (May 2011 to January 2012). The study was conducted in partnership with The AIDS Service Organization (TASO) Gulu, SWs, and other community-based organizations and was also informed by extensive engagement with community stakeholders (eg, nongovernmental organizations, health services). The research team involved SWs and nonexperiential staff (ie, service providers). The study was approved by the University of British Columbia and TASO Ethics Review Boards and was registered at the Ugandan National Council for Science and Technology.

Data Collection

As previously described,[37] participants were recruited through peer/SW-led outreach to sex work venues including bars/nightclubs, lodges, hotels, and truck stops. Using a sampling frame informed by ethnographic mapping and outreach planning by SW/peer and TASO, time–location sampling was used to enroll members of this hidden population at times and places of congregation; physical spaces rather than individuals were the primary sampling unit. This was supplemented by outreach to former IDP camps, TASO Gulu Clinic, and community agencies (eg, Gulu Refugee Committee). The response rate was >95%. Eligible women were ≥14 years and engaged in the commercial exchange of sex for money or other commodities (eg, food, shelter) with a client in the previous month.[25,38] Youth 14–18 years old were eligible if they were self-supporting (ie, emancipated minors) and completed an enhanced youth-focused consent process.

Consultations with SWs and service providers gathered extensive feedback on study measures; questionnaire administration was pilot-tested with SWs before implementation. During informed consent, women received a detailed explanation of the study and a copy of the consent form. Participants provided written informed consent or a thumbprint for those with limited literacy. After obtaining informed consent, female Acholi interviewers administered questionnaires in Luo at the TASO Gulu Clinic or at a confidential, private location of the participant's choosing (eg, home, workplace). To protect confidentiality, each participant was assigned a unique study ID number; consent forms were securely and separately stored from questionnaires.

Measures

The questionnaire gathered information on lifetime sociodemographics (eg, age, education, tribe, number of children, birthplace) and SW history (eg, sex work entry, duration in sex work), and current patterns of substance use (eg, used drugs or alcohol use when working) and partner-level risks (eg, drug/alcohol use by customers; all/most clients intoxicated on dates; types of partners; inconsistent condom use, defined as "usually," "sometimes," "occasionally," or "never" using condoms for vaginal/anal intercourse with one-time or regular clients) within the last 6 months. Lifetime structural exposures included conflict-related experiences including history and duration living in IDP camps; history, duration, year, and age of wartime abduction; and other war-related violent (eg, witnessing killing, raped, forced marriage)

and nonviolent exposures (eg, relocation).[39] Lifetime incarceration was assessed by asking "In your lifetime, have you ever been in detention, prison, or jail overnight or longer?" with follow-up questions on age at incarceration, number of incarcerations, and reasons. Work environment within the last 6 months included places of soliciting and servicing clients (eg, bar/club, lodge, highway/truck stop, clients place, own place); sex work income; intimate partner violence (ie, World Health Organization–standardized Intimate partner violence scale)[40]; verbal, physical, and sexual violence by clients, police, and military (eg, verbally assaulted/humiliated, physically assaulted, property taken, propositioned, coerced into sexual favors); rushing client negotiations because of police presence; and working with third parties (ie, paying a manager, administrator, or someone else). Other structural variables included difficulty accessing condoms, exposure to condom demonstrations, and HIV/sexually transmitted infection testing.

Serological Testing

Participants were offered voluntary HIV counseling and testing through peer/SW-led outreach and TASO, or for confirmed HIV-positive women already receiving care, through informed consent to link to their most recent test result. Testing followed the Ugandan Ministry of Health HIV testing algorithm.[14] Rapid testing was conducted using the Alere Determine HIV-1/2 test; for positive results, confirmatory testing was performed using STAT PAK. For discordant results between rapid and confirmatory testing, the Unigold confirmatory test was used.

All participants were offered condoms, HIV prevention information, and referrals to health and social services, including sexual and reproductive health, Papanicolaou (pap) tests, and food security programs. Those who tested HIV seropositive and were not receiving HIV care were immediately linked to treatment and care at TASO or referred to the provider of their choice. Participants received a 10,000 UGX ($4CAN) honorarium, in line with previous studies.

Data Analysis

HIV prevalence was calculated as the proportion of HIV-seropositive women. Descriptive statistics were calculated for individual, partner-level, and structural variables, stratified by HIV-serostatus. Bivariable and multivariable logistic regression was performed to identify factors associated with HIV. Structural variables and potential individual and partner-level confounders hypothesized a priori to be related to HIV infection (eg, sociodemographics, age at SW entry, condom use and substance use with clients, work environment, HIV program exposure, conflict-related exposures, criminalization) and with a significance level of $<5\%$ in bivariable analysis were considered for multivariable analysis. The final multivariable model was constructed using a backward model selection process. Akaike Information Criterion was used to determine the most parsimonious model, as indicated by the lowest Akaike Information Criterion value. Variance inflation factors were computed, and no collinearity was detected in the model.

RESULTS

Of 400 participants, 135 (33.8%) were HIV seropositive at baseline, of whom 45 (33.3%) were new/previously undiagnosed HIV infections. Among previously diagnosed women, the median duration since their HIV-positive diagnosis was 1.4 years [interquartile range (IQR): 0.5–3.3]. Of the total sample, 65.8% were born in Gulu, and 34.2% were migrants to Gulu (Table 1). The median age was 21 years (IQR: 19–25), and women living with HIV were significantly older [median: 25 vs. 20, odds ratio (OR): 1.24, 95% confidence interval (CI): 1.17 to 1.31] than HIV-seronegative women. SWs living with HIV were also more likely to have children (86.7% vs. 68.3%, $P < 0.001$) and to have less than primary-level educational attainment (76.3% vs. 57.7%, $P < 0.001$). The median age at sex work entry was 17; women living with HIV were significantly older when they initiated sex work (median: 20 vs. 17 years old, OR: 1.21, 95% CI: 1.14 to 1.28) and worked in the sex industry for longer (median: 4 vs. 3 years, $P = 0.002$) than HIV-negative women.

Participants' median weekly client volume was 7 (IQR: 4–12). In comparison with their HIV-seronegative peers, women living with HIV reported significantly lower weekly income from sex work (70,000 vs. 89,000 Ugandan shillings, $P = 0.025$), despite the fact that there were no differences in the number of clients seen. Nearly all (94.8%) had an intimate partner, and women living with HIV were less likely to have an intimate partner (91.1% vs. 96.6%, $P = 0.025$). Inconsistent condom use with clients in the previous 6 months was high (83.8%), with no significant differences by HIV serostatus or by types of clients (eg, one-time vs. repeat). In the last 6 months, 64% of participants worked under the influence of drugs/alcohol, and 31% reported that all/most of their clients were intoxicated during dates, which were not significantly different by HIV serostatus.

Places of soliciting clients in the previous 6 months included bars/clubs (90.8%), public places (ie, street/public, highway, truck stop, tent/market stand) (65.0%), and brothels, lodges, and hotels (50.8%) (Table 2). Almost a quarter (23.5%) of SWs had a manager, which was less likely among those living with HIV (15.6% vs. 27.6%, $P = 0.008$). Violence perpetrated by clients, intimate partners, and the police/military in the previous 6 months was measured at 78.5%, 16.5%, and 9.3%, respectively, with no significant differences by HIV serostatus.

A large proportion of participants reported conflict-related exposures; 32.3% (n = 129) had been abducted by the LRA, with a median age of 13 years old at abduction (IQR: 11–14); almost two-thirds (59.7%) had been abducted for ≤ 2 months, 17.1% for between 2 months and 1 year, and 23.3% for longer than 1 year. Historical abduction was significantly more likely among women living with HIV (39.3% vs. 28.7%, OR: 1.61, 95% CI: 1.04 to 2.49), compared with those who were HIV negative. Most women (86.3%) had been relocated as a result of the war. Two-thirds (66.5%) had lived

TABLE 1. Bivariable Analyses of Individual and Partner-Level Determinants and HIV Infection Among Female Sex Workers in Conflict-Affected Gulu, Northern Uganda (N = 400, 2011–2012)

Variable	HIV Positive, n (%) (n = 135)	HIV Negative, n (%) (n = 265)	Total, n (%) (n = 400)	Unadjusted Odds Ratio (95% CI)	*P*
Sociodemographics					
Age, in yrs (median, IQR)	25 (22–27)	20 (18–23)	21 (19–25)	1.24 (1.17 to 1.31)	**<0.001**
Born in Gulu	83 (61.5)	180 (67.9)	263 (65.8)	0.75 (0.49 to 1.16)	0.200
Acholi tribe	120 (88.9)	249 (94.0)	369 (92.3)	0.51 (0.25–1.08)	**0.077**
Has children	117 (86.7)	181 (68.3)	298 (74.5)	3.02 (1.72–5.28)	**<0.001**
Educational attainment: ≤incomplete primary school	103 (76.3)	153 (57.7)	256 (64.0)	2.36 (1.48 to 3.75)	**<0.001**
Sex work experiences					
Age at first sex work, in yrs (median, IQR)	20 (17–24)	17 (15–19)	17 (16–20)	1.21 (1.14 to 1.28)	**<0.001**
Duration in sex industry, in yrs (median, IQR)	4 (2–6)	3 (2–5)	3 (2–5)	1.11 (1.04 to 1.19)	**0.002**
Weekly income from sex work,* in 1000 Ugandan shillings (median, IQR)	70 (40–110)	89 (45–150)	80 (45–137)	1.00 (0.99 to 1.00)	**0.025**
Sexual and drug risks					
Has an intimate partner*	123 (91.1	256 (96.6)	379 (94.8)	0.36 (0.15 to 0.88)	**0.025**
Average weekly client volume* (median, IQR)	7 (4–12)	7 (4–12)	7 (4–12)	0.99 (0.97 to 1.01)	0.431
Inconsistent condom use*					
Any client (regular/one-time combined)	114 (84.4)	221 (83.4)	335 (83.8)	1.08 (0.61 to 1.91)	0.788
One-time clients	106 (78.5)	198 (74.7)	304 (76.0)	1.24 (0.75 to 2.03)	0.400
Regular clients	106 (78.5)	211 (79.6)	317 (79.3)	0.94 (0.56 to 1.56)	0.797
Worked under the influence of alcohol/drugs*	81 (60.0)	175 (66.0)	256 (64.0)	0.77 (0.50 to 1.18)	0.235
All/most clients intoxicated on dates*	45 (33.3)	79 (29.8)	124 (31.0)	1.18 (0.76 to 1.84)	0.472

*In the previous 6 months.
P values in bold denote significant associations at $P \leq 0.10$.

in an IDP camp, among whom one-quarter (n = 96, 24%) spent >5 years in an IDP camp, which was more likely among HIV-positive women (28.2% vs. 21.9%, $P = 0.075$).

Participants reported high rates of criminalization, with 26.5% (n = 106) reporting lifetime incarceration. Women living with HIV were significantly more likely to have been incarcerated (33.3% vs. 23.0%, OR: 1.67, 95% CI: 1.06 to 2.64). Among previously incarcerated participants, most experienced 1–2 incarcerations, and the median age at incarceration was 19 years (IQR: 17–23). Primary reasons for incarceration included direct sex work–related charges (n = 26, 24.5%) and charges related to public disorder (eg, idle behavior) (n = 43, 40.6%). In the last 6 months, over one-third (37.3%) of participants rushed client negotiations because of policing; over half (55.5%) reported experiencing difficulty accessing condoms. Only 70.3% had ever received a condom demonstration. There were no significant differences in HIV program exposure by HIV status.

In a multivariable model, after adjusting for age of sex work entry and education, lifetime incarceration (adjusted odds ratio: 1.93, 95% CI: 1.17 to 3.20) was independently associated with HIV seroprevalence and wartime abduction (adjusted odds ratio: 1.62, 95% CI: 1.00 to 2.63) was marginally associated ($P = 0.051$) (Table 3).

DISCUSSION

This study documented an extremely high HIV burden among SWs, consistent with other estimates in sub-Saharan Africa.[1] Of major concern, one-third of HIV infections were new/undiagnosed, which likely suggests substantial gaps in the HIV continuum of care for conflict-affected SWs. HIV prevalence in this study was much higher than the national HIV prevalence of 8.51% in the general population of women of reproductive age,[1] and the 12.8% prevalence measured among young IDPs in 2 Gulu subdistricts in 2010.[41] A UNAIDS report recently identified Uganda as 1 of 9 countries with an HIV prevalence among SWs that is higher than the highest national value in the general population,[42] indicating the urgent need to scale-up SW-tailored HIV prevention services. Moreover, the fact that almost one-third of HIV cases were new/previously undiagnosed highlights the critical need to enhance access to HIV services, including voluntary and respectful HIV testing and treatment, for SWs in this setting. Unfortunately, most HIV and sexual and reproductive health programs for SWs in sub-Saharan Africa have a limited scale, scope, and coverage (eg, local-level condom distribution, occasional offers of HIV testing),[43] and despite the demonstrated effectiveness of community-based programs in western Africa, few countries have scaled-up such initiatives.[44]

Because assessments of HIV vulnerabilities in sex work within conflict-affected settings are few, this study represents an important first step in understanding patterns and correlates of HIV prevalence for women in sex work in Northern Uganda. Of particular concern, historical war-related abduction was reported by ~40% of SWs living with HIV, most of whom had been abducted at age 13, and was associated with HIV after adjustment for other factors. The LRA is reported to have abducted an estimated 52,000–75,000 children and adults to serve as soldiers, porters, and sex slaves, in addition

TABLE 2. Bivariable Analyses of Structural Exposures and HIV Infection Among Female Sex Workers in Gulu, Northern Uganda (N = 400, 2011–2012)

Variable	HIV Positive, n (%) (n = 135)	HIV Negative, n (%) (n = 265)	Total, n (%) (n = 400)	Unadjusted Odds Ratio (95% CI)	*P*
Work environment					
Solicitation venue*					
Entertainment venue (bar/club)	121 (89.6)	242 (91.3)	363 (90.8)	0.82 (0.41 to 1.65)	0.581
Public place (street, highway, truck stop, tent/ market stand)	82 (60.7)	178 (67.2)	260 (65.0)	0.76 (0.49 to 1.16)	0.203
Brothel, lodge, or hotel	68 (50.4)	135 (50.9)	203 (50.8)	0.98 (0.65 to 1.48)	0.914
Has manager (paid a third party)*	21 (15.6)	73 (27.6)	94 (23.5)	0.48 (0.28 to 0.83)	**0.008**
Exposure to violence*					
Physical or sexual violence by customers	103 (76.3)	211 (79.6)	314 (78.5)	0.82 (0.50 to 1.35)	0.444
Verbal, physical, or sexual violence by intimate partner	20 (14.8)	46 (17.4)	66 (16.5)	0.83 (0.47 to 1.47)	0.517
Verbal, physical, or sexual violence by police/ soldiers	13 (9.6)	24 (9.1)	37 (9.3)	1.07 (0.53 to 2.18)	0.852
Conflict-related exposures					
Abducted into the LRA†	53 (39.3)	76 (28.7)	129 (32.3)	1.61 (1.04 to 2.49)	**0.033**
Lived in an IDP camp†	97 (71.9)	169 (63.8)	266 (66.5)	1.45 (0.92 to 2.28)	0.106
Criminalization and policing					
Incarceration†	45 (33.3)	61 (23.0)	106 (26.5)	1.67 (1.06 to 2.64)	**0.028**
Rushed client negotiations because of police presence*	50 (37.0)	99 (37.4)	149 (37.3)	0.99 (0.64 to 1.52)	0.950
HIV program exposure					
Difficulty accessing† condoms*	78 (57.8)	144 (54.3)	222 (55.5)	1.15 (0.76 to 1.75)	0.513
Received a condom demonstration†	98 (72.6)	183 (69.1)	281 (70.3)	1.19 (0.75 to 1.88)	0.465

*In the previous 6 months.
†Lifetime.

to killing, torturing, or mutilating thousands of civilians. Abductees were exposed to extreme violence and forced to commit atrocities as part of the indoctrination process into the LRA, and younger women are believed to have been targeted for abduction because of the belief that they would be more likely to be virgins and unexposed to HIV.[45] Although it is not possible to determine the timing of HIV infection, given the historical nature of war-related abduction and high rates of new/undiagnosed or recently diagnosed infections, the association between abduction and HIV infection could be related to exposure to sexual violence (eg, rape, sexual slavery) and other rights violations (eg, forced marriage, physical violence, torture) commonly reported by abductees. Research in Uganda has found that participation in armed groups is associated with exposure to extreme violence, with a higher prevalence of trauma and mental illness among abductees compared with their nonabducted peers,[46] and exposure to trauma and sexual violence are well-established risk factors for HIV among women.[47–50] For example, a systematic review and modeling exercise recently demonstrated the significant role of sexual violence (eg, genital trauma, rape, condom refusal) in HIV transmission in conflict settings.[51] Whereas our team previously examined access to reintegration programs among previously abducted women,[52] to our knowledge this is the first study to document links between conflict-related abduction and HIV among SWs. Although some epidemiological studies have been conducted with SWs in conflict-affected environments (eg, Somalia, Afghanistan),[35,36] these have not explicitly examined associations between war-related human rights violations and HIV infection. There remains a need for further research, including studies conducted postconflict, to better elucidate the potential causal pathways between conflict-related rights violations and HIV vulnerability.

Over one-quarter of participants in this study experienced lifetime incarceration, and this represented the strongest association with HIV. This finding is important given

TABLE 3. Multivariable Logistic Regression of Factors Associated With HIV Infection Among 400 Female Sex Workers in Northern Uganda

Variable	Adjusted Odds Ratio	95% CI
Educational attainment: none or incomplete primary school	2.00	1.22 to 3.29
Age at first sex work (per year older)	1.20	1.13 to 1.28
Abducted into the LRA*	1.62	1.00 to 2.63
Incarceration*	1.93	1.17 to 3.20

Other variables adjusted for, which were not retained in the final multivariate model after the model selection process, included inconsistent condom use with clients, having a manager, and having children.
*Lifetime.

increasing criminalization of key populations, including SWs, in numerous sub-Saharan African countries. Although incarceration remains challenging to measure in epidemiology, consistent links between incarceration and HIV among SWs have been documented outside sub-Saharan Africa, with strong associations between punitive law enforcement practices and HIV vulnerability.[21,25,42,53–56] While previous studies on incarceration and HIV among SWs in sub-Saharan Africa are sparse, our findings are supported by research in Rwanda and Canada documenting associations between incarceration and HIV positivity.[17,19,56,57] Many countries in sub-Saharan Africa, including Uganda, have harsh criminal laws affecting key populations, including SWs, and such criminalization has intensified in recent years.[58] Sex work represents a criminal offense in Uganda, and SWs regularly face police harassment, discrimination, and human rights violations including arbitrary arrest, degrading treatment, and violence.[32,59] As in other contexts, our study found that SWs in Northern Uganda are criminalized under sex work–specific laws, and on other allegations/charges relating to SWs' ability to operate outdoors (eg, public disorder, loitering).

There are numerous potential explanations for the observed association between incarceration and HIV, and further research involving conflict-affected SWs remains critical to investigate these.[60] Criminalization can undermine an effective HIV response by driving marginalized populations underground, away from HIV programs, and can create conditions in which abuses of human rights are more prevalent (eg, arbitrary arrest, sexual abuse).[25,53,60] Previous work has documented strong associations between various criminalization measures—including rushing client negotiations because of police presence or moving work locations to avoid police—and reduced engagement with HIV prevention and sexual and reproductive health-care among SWs.[17,19,37,57] Incarceration has been shown to potentially elevate HIV transmission risk through a lack of access to condoms, harm reduction supplies, or antiretroviral medicines and through increased vulnerability to human rights violations or sexual assault/abuse during detention.[55,57,58,61,62] It is also possible that incarceration could be indirectly linked to HIV vulnerability—for example, incarcerated women may be more likely to experience debt after imprisonment and be more vulnerable to offers of unprotected sex for higher pay.

Although our findings highlight important potential links between war-related violence and HIV vulnerability among SWs, our cross-sectional design does not permit causal inferences. However, as many of our exposures (eg, abduction) are by nature historical, in combination with evidence on the average timing of these experiences in relation to participants' HIV-positive diagnoses, we feel that we can offer these associations with confidence in terms of their potential direction. Future longitudinal and mixed-methods studies examining detailed conflict-related measures (eg, displacement experiences, forced marriage, sexual violence) and HIV are needed to inform an appropriate programmatic response and ensure that the health and human rights of the most marginalized young women are protected in humanitarian emergencies. As criminalization is a very challenging exposure to measure in epidemiology, with incarceration often used as a proxy measure, future studies are recommended to better disentangle the potential causal pathways through which exposure to different forms of criminalization (eg, arrest, police harassment, incarceration) may impact HIV-related risks (eg, condom use, substance use) and HIV acquisition among SWs in sub-Saharan Africa. As we did not document significant associations between work environment and HIV infection, given international evidence that work environments can be complex and exert a powerful influence on HIV prevention among SWs,[25,63,64] future qualitative research examining work environment features shaping SWs' health in sub-Saharan Africa is recommended.

IMPLICATIONS

In this study, historical exposure to war-related abduction during armed conflict and incarceration were associated with an elevated HIV burden among SWs in Northern Uganda. Collectively, these results call for attention critical need to better understand and address conflict-related human rights and criminalization among marginalized SWs in conflict-affected settings. These findings underscore the importance of program and policy efforts to comprehensively address and support the health and human rights needs of SWs in conflict-affected settings. These may include *preparedness efforts* to integrate HIV and sex work into planning, *emergency response efforts* including outreach, HIV and sexual and reproductive health services, and broader health and social supports (eg, shelter, food); and *long-term efforts* to reduce vulnerability and address structural issues, including supporting SW-led approaches, addressing human rights violations, and ensuring comprehensive, sustained access to HIV and sexual and reproductive health.[7,65] In particular, although tailored interventions that address structural determinants (eg, conflict-related trauma, criminalization) should be explored within HIV and sexual and reproductive health programs in conflict-affected settings, programming efforts to ensure long-term sustainability remain essential.[65]

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