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SAN DIEGO STATE UNIVERSITY

Communicable Diseases and Gender Norms in the Sierra Leone Armed Forces

A dissertation submitted in partial satisfaction of the requirements for the degree
Doctor of Philosophy

in

Public Health (Epidemiology)

by

Audrey Marie-Delphine Djibo

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2015

The Dissertation of Audrey Marie-Delphine Djibo is approved, and it is acceptable in

quality and form for publication on microfilm and electronically:

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Chair

University of California, San Diego

San Diego State University

2015

DEDICATION

This dissertation is dedicated to all who have supported me along this enlightening journey, especially to my husband Alex, and my sisters Felicia and Olivia.

EPIGRAPH

Whatever you do will be insignificant, but it is very important that you do it.

Mahatma Ghandi

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LIST OF ACRONYMS

AIDS	Acquired immunodeficiency syndrome
AOR	Adjusted odds ratio
ARSD	Alcohol-related sexual disinhibition
AUDIT	Alcohol use disorder identification test
CI	Confidence interval
CU	Condom use
FGM/C	Female genital mutilation/cutting
GBV	Gender-based violence
HIV	Human immunodeficiency virus
IPV	Intimate partner violence
IRB	Institutional review board
JSS	Junior secondary school
NCO	Non-commissioned officer
NHRC	Naval Health Research Center
OR	Odds ratio
PEPFAR	President's emergency plan for aids relief
RSLAF	Republic of Sierra Leone Armed Forces
SAS	Statistical analysis software
SSS	Senior secondary school
STI	Sexually transmitted infection
SYPH	Syphilis

UNAIDS	United Nations
UNGASS	United Nations General Assembly
WHO	World Health Organization
WO	Warrant officer

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Finally, I would like to thank my parents for encouraging my curiosity for science, and letting me break apart microscopes, among other things. I will forever be grateful for the values they have instilled in me and for the thirst to understand the world.

Chapter 2, in full, is currently being prepared for submission for publication of the material. Djibo, Djeneba Audrey; Sahr, Foday; McCutchan, J. Allen; Jain, Sonia; Araneta, Maria Rosario G.; Brodine, Stephanie K.; Shaffer, Richard A. Prevalence and risk factors for human immunodeficiency virus (HIV) and syphilis infections among

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ABSTRACT OF THE DISSERTATION

Communicable Diseases and Gender Norms in the Sierra Leone Armed Forces

by

Audrey Marie-Delphine Djibo

Doctor of Philosophy in Public Health (Epidemiology)

University of California, San Diego, 2015
San Diego State University, 2015

Professor Richard A Shaffer, Chair

BACKGROUND: Communicable diseases affecting military personnel in sub-Saharan Africa impact the overall health of soldiers and their contacts, and include human immunodeficiency virus (HIV) and syphilis infections. Understanding the risks of acquisition and transmission of sexually transmissible infections, particularly of HIV, is critical in shaping effective prevention interventions among soldiers in Sierra Leone. Sexual behaviors including partner types and condom use, as well as other behaviors such as alcohol use and gender-specific beliefs surrounding female genital mutilation/cutting (FGM/C) were investigated in order to determine their influence on HIV and syphilis transmission risk.

METHODS: This cross-sectional study recruited soldiers from the Sierra Leone Armed Forces using random systematic sampling in 2013. Participants were individually

interviewed using a structured computer-assisted questionnaire. The seroprevalence of HIV and syphilis was assessed using rapid testing algorithms. Alcohol-related sexual disinhibition (ARSD) was examined among male soldiers living in Eastern Sierra Leone. Opinions towards the influence of FGM/C on partner selection, STI protection, and condom use were evaluated. Demographic and behavioral characteristics associated with these beliefs were analyzed.

RESULTS: We found that female gender, unplanned sex after alcohol use, using a condom at last sex, having multiple concurrent sexual partnerships, and HIV testing outside of military clinics were positively associated with HIV status ($p<0.05$). Positive syphilis serology was associated with older age, and HIV-infection. Secondly, ARSD was significantly associated with cohabitating with a sexual partner, paying for sex, no previous HIV testing, and acquiring an STI. Overall, 1 in 6 men believed that FGM/C affected their choice in sexual partner, that the practice was protective against STIs and the justification for unprotected sex. Similarly, 1 in 4 women reported the same beliefs. Attitudes on partner selection were associated with lower education and low knowledge of HIV transmission pathways among men. Among women participants, believing that FGM/C protected from STIs was positively associated with being HIV-positive.

CONCLUSION: This research demonstrated several behaviors and beliefs that expose soldiers to STIs. These behaviors should be addressed among soldiers through integrated interventions covering education on HIV transmission, alcohol use reduction, and sensitization on the adverse outcomes of FGM/C.

CHAPTER 1.

Literature Review and Objectives

INTRODUCTION

The findings presented in this dissertation stem from a cross-sectional multi-site study among members of the Republic of Sierra Leone Armed Forces (RSLAF). Data were collected from April-May 2013. The study was conducted in part to help the military tailor better HIV prevention programs in order to continue supporting public health efforts among their service members. The RSLAF supported this study in collaboration with the United States Department of Defense HIV/AIDS Prevention Program, based at the Naval Health Research Center (NHRC) in San Diego, California. The information used in this dissertation was composed of 3 parts: a structured computer-assisted questionnaire, HIV rapid testing, and syphilis rapid testing. Institutional Review Boards (IRBs) located at NHRC, the Sierra Leone Ministry of Health and Sanitation, and at San Diego Sate University approved this study.

COUNTRY PROFILE

The sub-Saharan country of Sierra Leone has approximately 6 million inhabitants. It is a developing country with extremely limited public and government resources including access to safe drinking water. The development of public infrastructures was hindered by a decade long brutal civil war that ended in 2002. Concerning national public health, the country's population has a high burden of many infectious diseases such as malaria, cholera, HIV, and tuberculosis [1].

The country's military, the RSLAF, includes 3 branches (Army, Navy, and Air Force) and includes approximately 8500 members. Because the military represents a snapshot of the population that has increased monetary means through steady

employment and intrinsic behavioral characteristics, studying this population in terms of risk factors and gender norms is of great interest.

HIV AND SYPHILIS

The overall prevalence of HIV among Sierra Leonean adults aged 15-49 years old is 1.5% (95% confidence interval 1.2-2.0%), equaling to approximately 57000 people living with HIV, in country of less than 6 million inhabitants [2]. The national prevalence of syphilis in Sierra Leone is unknown as there are no nationwide surveillance systems in the general population. However, reports for antenatal clinics have indicated an approximately 1.4 % rate among pregnant women [3]. This biased population sample can underestimate the true prevalence of syphilis in this population.

HIV and syphilis are both diseases that are mainly sexually transmitted, but can also be vertically transmitted from a mother to a child; therefore increasing the pool of individuals at risk. In Sierra Leone, HIV is mostly transmitted through heterosexual contact, particularly by having transactional sex with a sex worker, or by having multiple concurrent sexual partnerships [4, 5]. The HIV prevalence rate among sex workers has been found to be more than five times higher (8.5%) than that of the general population according to data collected in 2010 [6]. Moreover, commercial sex workers often report inconsistent condom use with clients [7, 8].

In Africa, specific determinants inherent to the armed forces can change the risk profile for sexually transmitted infections (STIs). In low-resource countries, military employment allows for greater financial resources and job stability. This monetary capital is often lacking for the public at-large, making military personnel attractive for sexual

transactions [9]. For instance, the Armed Forces in Sierra Leone have been documented to be at increased risk for acquiring HIV compared to their general population. Specifically, HIV prevalence in members of police forces and military were found to be 2-4 times higher than that in the general population [10, 11]. Several observational studies performed in various sub-Saharan African military settings have found that increased financial resources among officers were correlated with increased number of sexual partners compared to lower ranking personnel [9, 12]. Other characteristics affecting the risk profile in this type of military population include less educational attainment and less knowledge on harm-reducing sexual practices, especially among the enlisted ranks [9, 12].

It has been previously established that syphilis infections are more prevalent among patients with other STIs because of their similar transmission modes [13, 14]. In addition, genital ulcers caused by primary syphilis promote the transmission of HIV [15, 16]. Moreover, the presence of HIV and syphilis co-infections can confirm the non-consistent use of condoms and increased number of sexual partners [13].

ALCOHOL-RELATED SEXUAL BEHAVIORS

The transmission of STIs is further enhanced by a combination of high-risk behaviors. The risk of acquiring HIV and/or syphilis increases exponentially through injection drug use, early onset of sexual intercourse, elevated number of sexual partners, and multiple and concurrent sexual partnership [17, 18]. Moreover, alcohol consumption has been shown to be positively associated with the risk for HIV through many cross-sectional or retrospective cohort studies [19, 20]. More precisely, frequent heavy

drinking, binge drinking and other alcohol use disorders have been shown to highly correlate with the acquisition of HIV and other STIs [21, 22].

Alcohol use has also been shown to trigger behavioral disinhibition, more particularly decreased sexual risk perception. Thrill seeking, impulsivity, or socially stigmatized behaviors tend to occur more frequently when alcohol is consumed [23]. The range of alcohol-related disinhibitory sexual behaviors use is varied, however these behaviors represent determinants of HIV transmission risk. These include sex with recently met casual partners, non-monogamous sexual partnerships, unprotected sex, seeking services of sex workers and other types of transactional sex, and unintended sex [20, 24–27]. Understanding alcohol-related sexual disinhibitory behaviors is important in order to better understand the transmission of HIV in this population.

FEMALE GENITAL MUTILATION

In Sierra Leone, female genital mutilation/cutting (FGM/C) occurs during coming of age rituals, during which a clitoridectomy with or without excision of the labia minora is performed [28, 29]. This ritual leads to the initiation of women into a culturally and politically powerful secret society referred to as Bondo. The prevalence of FGM/C in Sierra Leone is estimated between 90-94% among women aged 15-49 years old [30, 31]. In this West African region, the neighboring country of Guinea has a similarly high rate of FGM/C practiced (96%) [31]. Other countries in Africa where the practice of FGM/C is highly prevalent include Sudan, Egypt, Mali, and Ethiopia [31].

The question of the practice of FGM/C is important especially surrounding maternal health and disease transmission. In addition to vaginal trauma caused by

FGM/C, using unsanitary equipment during the practice may facilitate the transmission of many infections [32]. More specifically concerning HIV, hypothesis have been developed citing that FGM/C could also directly contribute to HIV transmission modes [33, 34]. There are several morbid conditions linked to FGM/C such as with genital pain, bleeding and sores. Moreover, FGM/C is correlated with a number of severe maternal and fetal health outcomes such as obstructed labor, fetal distress, perineal tear, and post-partum hemorrhage [35, 36]. However, the causal connection between FGM/C and HIV has yet to be demonstrated in part due to the difficulty of studying a practice surrounded with such secrecy.

In today's society where awareness of the negative effects of the practice has increased, lack of education and ingrained beliefs likely contribute to the perpetuation of FGM/C [30, 37]. Furthermore, the link between FGM/C and high-risk sexual behaviors is raising increasing interest. Prior research has been mostly focusing on selected community opinions of the practice and less on its influence on sexual behaviors. There is qualitative evidence that the FGM/C status of women can affect marriageability, sexual pleasure, and faithfulness according to men interviewed [37, 38]. In addition, other surveys have found that beliefs surrounding social acceptance within the community at-large and hygiene were also affected by FGM/C status [39]. Advocacy programs aimed at sensitizing the population about women rights and maternal health have been steadily implemented in the past decades. These included community-wide engagement in order to support the end of the practice [40].

OBJECTIVES

The purpose of this dissertation is the (1) estimate the prevalence of HIV and syphilis in an adult sexually active population, (2) identify behavioral risk factors affecting the risk for these STIs, (3) estimate the prevalence of unplanned or unprotected sex among men after alcohol consumption, (4) determine factors associated with unplanned or unprotected sex, and (5) examine the association of FGM/C on high-risk sexual behaviors linked to HIV transmission.

The results from this dissertation study will add to the understanding of risky behaviors for STIs among the members of the Sierra Leone military, and provide evidence for targeted interventions to reduce the risk of horizontal HIV transmission due to alcohol consumption. These results will also close the gap in knowledge of the relationship between female genital mutilation and sexual behaviors including condom use, partner selection, and the belief of the practice granting protection for STIs.

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CHAPTER 2.

Prevalence and Risk Factors for Human Immunodeficiency Virus (HIV) and Syphilis

Infections among Military Personnel in Sierra Leone

ABSTRACT

Context: HIV and syphilis infections are common in military personnel in sub-Saharan Africa, which impact combat preparedness and increase demands on the military health care system. The prevalence of HIV is estimated to be about 1.5% among the general population of Sierra Leone aged 15-49. We examined the prevalence and risk factors for these two common sexually transmitted infections in the Sierra Leone military personnel.

Methods: This cross-sectional study examined 1157 randomly selected soldiers from the Sierra Leone Armed Forces from April to May 2013 using computer assisted personal interviews and rapid testing algorithms. Descriptive statistics and logistic regression methods were implemented to identify risk factors for HIV and syphilis separately.

Results: The mean age among participants was 38 years old, 11.1% were female, and 86.5% were married. The seroprevalence of HIV and syphilis were 3.3% (95% CI: 2.3-4.3%) and 7.3% (95% CI: 5.9-8.8%), respectively. In univariate analysis, lower educational attainment in women, multiple sexual partners, unintended sex after alcohol use, and use of condoms were associated with HIV status (p<0.05). In multivariable models, HIV infection was associated with female gender, unintended sex after alcohol use, using a condom at last sex, having multiple concurrent sexual partnerships, and HIV testing history at military facilities (p<0.05). Age, HIV status, and current region of residence were the only factors associated with syphilis. Deployment away from their home base, number of sexual partners, history of transactional sex, or partner types were not associated with HIV status (p≥0.05).

Conclusion: The prevalence of sexually transmitted infections among military personnel was higher than in the general population of Sierra Leone. Several high-risk sexual behaviors that expose soldiers to HIV and syphilis could be addressed through prevention interventions.

INTRODUCTION

Sexually transmitted infections (STIs) such as the Human Immune-deficiency Virus (HIV) and syphilis potentially impact the Republic of Sierra Leone Armed Forces (RSLAF) by reducing their effectiveness and increasing the need for medical care. The RSLAF, which unites Army, Air Force, and Navy was established in 2002 after more than a decade of national civil war. It is tasked with protecting borders and national security. After a peak of around 13,000 troops in 2007, the strength of the force was reduced to approximately 8,500 members in 2010, by disbanding specific battalions and uniting others.

In 2012, the national adult prevalence of HIV among 15-49 years old in Sierra Leone was estimated at 1.5% (95% confidence interval 1.0-2.1%), with an incidence of approximately 1.2 new infections per 1000 persons [1]. Mostly transmitted through heterosexual contact, principal risk factors for HIV transmission have been identified as having sex with a commercial sex worker and multiple sexual partnerships [2, 3]. Only 2% of new infections are believed to be attributed to male-to-male sexual contact, and 1% to injection drug use [2]. The prevalence of HIV varies regionally within Sierra Leone. The most populated region (Western) has a population HIV prevalence of 2.7%, followed by the Eastern region at 1.4%, and the Southern and Northern regions with 1.1% prevalence each [4]. In addition, specific subpopulations such as commercial sex workers (8.5%) and fishermen (3.8%) have higher HIV prevalence than the general population [5].

Specific behaviors and factors increase the risk of sexually transmitted infections in African military personnel. The armed forces in Sierra Leone have been documented to be at increased risk for acquiring HIV compared to their general population. Specifically, HIV prevalence in members of police forces (5.8%) and military (3.3%) are 2-4 times higher than that in the general population [6, 7]. Several observational studies performed in Sub-Saharan African military settings have found that officers have more sexual partners than junior enlisted, probably because of increased financial resources. These studies also found less education and knowledge on harm-reducing sexual practices among the enlisted ranks [8, 9]. Moreover, soldiers often use the services of commercial sex workers who in turn report inconsistent condom use with clients [10, 11].

As expected from their shared mode of transmission, syphilis infections are more prevalent among patients with other STIs [12, 13]. Genital ulcers caused by primary syphilis promote the transmission of HIV [14, 15]. In Sierra Leone, the general population prevalence of syphilis is estimated to range from 1.5 to 5.2% [16]. In 2007, a prevalence of 1.9% was reported among Sierra Leone military members [7]. In another Sub-Saharan Africa setting such as Zambia where the national HIV prevalence is estimated at 17%, the prevalence of syphilis is about 4.2% [17, 18]. HIV and syphilis co-infections can reveal a persistent pattern of riskier sexual behaviors, most notably the non-consistent use of condoms, and a large number of sexual partners [12].

The lack of detailed epidemiological evidence on sexual risk behaviors in the military population of Sierra Leone has hampered opportunities for prevention programs. This study describes the prevalence of HIV and syphilis in a stratified random sample of the 8,500 members of the RSLAF and identifies behavioral risk factors for these STIs.

METHODS

Study description

Data was collected from April to May 2013 on 13 military sites across Sierra Leone for this cross-sectional bio-behavioral study. Sites were randomly selected to represent the diversity of military brigades and battalions, with agreement from the military hierarchy to access the sites and to conduct the study. The applied methodology has been described in full length elsewhere [19].

Geography of study sites

Study sites were categorized into the geographical regions of Sierra Leone. The Western region included the Western Area Rural and Western Area Urban districts; the Eastern region included the districts of Kono, Kenema, and Kailahun; the Northern region included the districts of Port Loko, Tonkolili, Koinadugu, Bombali, and Kambia; and the Southern region included the districts of Moyamba, Bo, Bonthe, and Pujehun. In the Western Area Urban district, four sites were selected, and one from the Western Area Rural district, see Table 2.1. One military site was selected from each of the following districts Kambia, Bombali, Koinadugu, Kono, Kailahun, Bo, Kenema, and Pujehun.

Study population

Male and female Sierra Leone military members over the age of 18 assigned to the study sites were eligible to be included in the study. From the troops roster, individuals were randomly selected based on the military rank distributions (junior/senior officers, warrant officers/senior NCO, privates/junior NCO), and all available women were invited to participate. Consenting participants responded to a structured computerized personal interview performed by a trained study interviewer and were then tested for HIV and syphilis. HIV testing was performed in series according to the national guidelines using Alere Determine HIV-1/2 (Alere Medical Co., Ltd., Tokyo, Japan), and Uni-Gold Recombigen HIV (Trinity Biotech, Bray, Co Wicklow, Ireland). Syphilis status was assessed using ChemBio DPP Screen and Confirm Assay (Chembio Diagnostic Systems Inc, Medford, United States). Of the 1,193 consenting participants, the analysis was restricted to those with both syphilis and HIV test results and a completed questionnaire (n=1,157; 97.0% of the original sample).

STI testing

HIV infection was diagnosed if both rapid tests performed in series were positive, and a HIV-negative status was determined if the first test of the algorithm was negative. A positive syphilis diagnosis required treponomal antibodies only regardless of reaginic antibody results and indicated either past or current syphilis infection.

Study questionnaire

The questionnaire surveyed general demographics such as age, birth district (categorized into regions), gender, marital status, and military characteristics, in particular military rank (private, junior NCO, senior NCO/warrant officer, junior officer/senior officer), and deployment history within the last two years. The second part of the questionnaire evaluated sexual behaviors, HIV testing history and utilization of testing services, and alcohol use. Sexual intercourse was defined as vaginal and/or anal sex and did not include oral sex. Participants provided information on the number of sexual partners over their lifetime, history of concurrent sexual partnerships (if they had ever had multiple sexual partners within the same week), partner types in the last 12 months, and transactional sex defined by trading goods or money in exchange for sex. Casual partners were non-committed sexual relationships, excluding spouses, girlfriends or boyfriends. Condom use at last sex (Yes/No) was combined for regular partners and casual partners, summarized into four categories: Yes if a condom was used at last sex with any partner type, No if no condom was used with any partner, and inconsistent condom use if it differed by partner type. Alcohol use was reflected by the Alcohol Use Disorder Identification Test (A.U.D.I.T.) [20], and categorized as none for scores of 0, low use from 1-7, and scores of 8 and above were categorized as harmful or hazardous use.

Statistical analysis

Frequencies for categorical variables and means/standard deviations for continuous variables were calculated for all participants and stratified by sex, and HIV status. Chi-square or Fisher's exact tests were used to compare categorical variables, and one-way analysis of variance (ANOVA) compared continuous variables by HIV status. P-values less than 0.05 were considered statistically significant. Simple logistic regression was used to identify factors associated with positive HIV and syphilis serologies. Variables associated bivariately with HIV or syphilis seropositivity at p≤ 0.2 were included in the multivariable logistic regression models. No variables were included in the multivariable models based on a priori knowledge. No adjustments were made for multiple testing. All analyses were performed in SAS (Version 9.3, Gary NC), and all statistical tests were two-tailed.

Ethical considerations

All participants enrolled in the study provided informed consent. In order to ensure complete comprehension of the study purpose and procedures, the consent form was read to the group in English and Krio (the local dialect understood by all) prior to the individual meeting with an interviewer to accept or decline participation. This research has been conducted in compliance with all applicable federal and local regulations governing the protection of human subjects in research and was approved by the appropriate institutional ethics review boards (Naval Health Research Center, Sierra Leone Ethics and Scientific Review Committee, San Diego State University Human Research Protection Program).

RESULTS

Demographics of the study population

The average age of the participants was 38.5 years (95% CI: 38.0-38.9) and 43.3% were born in districts of the Northern region of Sierra Leone (Table 2.2). Most participants came from study sites in the Western region (n=503), 25.4% from the Northern region, 20.7% from the Eastern region, and 10.4% from the Southern region. A third had no formal schooling or only reached a primary school level. Most (86.5%) were currently married or living with a partner and 56.7% reported being Muslim. Privates represented 41.1% of the sample, 40.1% were junior non-commissioned Officers (NCO), and 18.8% were of higher ranks.

Prevalence and regional distributions of HIV and syphilis

The overall HIV prevalence was 3.3% (95% CI: 2.3-4.3%) among the study participants, and the syphilis prevalence was 7.3% (95% CI: 5.9-8.8%). Among participants who were HIV-positive, 18% were also co-infected with syphilis (n=7). The highest HIV prevalence was recorded in the Kailahun district (6.8%, 95% CI: 1.4-12.2%) in the Eastern region, while the highest syphilis prevalence was in the Koinadugu district (18.4%, 95% CI: 10.1-26.7%) in the Northern region, see Table 2.1. The HIV prevalence in the urban area of the Western region, 3.2% (95% CI: 1.5-4.9%), was similar to the overall HIV prevalence of the study population.

Demographics of HIV-infected persons

A few demographic characteristics of HIV-infected persons varied by sex (Table 2.2). The power to detect differences in women was limited by the small number of HIV-infected women in our study (7/129 = 5.4%). Age, study site, religion were not associated with HIV infection in either in men or women. Education strongly correlated with HIV seropositivity in women, as those with only primary school educations were more likely to be positive than those with higher education levels (14.8% vs. 2.9%, p=0.03). Men born in the Western and Southern regions were more likely to be HIV-positive while no women born in the same regions screened positive. Men in the higher ranks (Senior Non-commissioned Officers and Officers) were more likely to be HIV-positive (5.1%) compared to men designated as privates (3.1%, p=0.08). In contrast, no women of higher military ranks were HIV-positive while 4.9% of women privates were infected. HIV prevalence was observed to be higher among women (5.4%) than among men (3.0%).

Risk behaviors influencing HIV infection

Subjects who ever had multiple concurrent sexual partnerships were 2.3 times more likely to be HIV-positive (95% CI 1.1 - 4.7), (Table 2.3). Military deployment as defined by assignment away from their home base for at least 6 months was not associated with HIV status. Among those who never had been tested for HIV (n=236), 3.4% screened HIV-positive during the study. Participants that had previously been tested for HIV only at civilian facilities were 3.1 times more likely to be HIV-positive compared to those who had never been tested prior to the study (95% CI 1.1-8.9). However, the number of times participants were screened for HIV since joining the

military was not associated with their HIV status. Among those with low levels of alcohol use (n=317), 4.7% were HIV-positive compared to 3.4% among heavier users. The lifetime number of sexual partners was not associated with HIV infection in this population. Having both regular and casual sex partners in the last year was associated with HIV status compared to those with no sex partners. Only a small fraction (9.5%) had ever traded goods or money in exchange but this was not associated with HIV status (p=0.44). Having unintended sex resulting from alcohol drinking increased the likelihood of a positive HIV status 3.9 times (95% CI 1.5-9.6). Condom use at last sex with regular or casual partners was significantly associated with HIV status as those who used a condom at last sex were 2.5 times more likely to have HIV compared to those that did not use a condom (95% CI: 1.2-4.9).

The final logistic regression model found five primary factors associated with the odds of HIV seropositivity: female gender, HIV testing history outside military, condom use, concurrent sexual partnerships, and unplanned sexual encounters after a drinking session, see Table 2.4. Marital status did not significantly affect HIV status after considering the factors mentioned above.

Factors associated with syphilis status

Syphilis seropositivity was increased by older age, HIV infection and the geographical location where the participants were posted (Table 2.5). In the multivariate model, one-year age increment increased the likelihood of being syphilis positive by 4% (95% CI 1-7%). Also, those who were HIV-positive were 3.4 times more likely to be syphilis positive as well in contrast to those who were HIV-negative (95% CI: 1.4-8.3),

after adjusting for age and location. Compared to the military members posted in the Western region, those posted at rural sites in the Northern, Eastern, and Southern regions combined were 6.1 times more likely to test positive to syphilis (95% CI 3.2-11.8).

DISCUSSION

The overall prevalence of HIV in the RSLAF study participants is more than twice that of the general population (3.3% vs. 1.5%). The HIV prevalence found in this study is similar to the results from the study performed among the RSLAF in 2007 [7]. The 2007 study and the present study (2013) only had 5 sites in common. These were located in the districts of Bo, Bombali, Kambia, Pujehun, and Western area urban. HIV prevalence decreased in the 5-year interval between that and our study at all of these repeat sites. Nonetheless, this reduction in prevalence did not change the overall HIV prevalence rate, possibly due to the increased coverage achieved in the current study. This study found differences in the age-specific HIV prevalence with the one performed in 2007. For instance, we saw the highest HIV prevalence among 20-39 year-olds whereas 40-59 year-olds had the highest HIV prevalence among those surveyed in 2007. There are a number of possible explanations for this difference including different sampling methodologies. Primarily, only 700 soldiers were sampled at a limited number of sites in 2007. Secondly, 45% of the participants studied here were 40-59 years old (n=423), but the same age group only represented 23% of the sample in 2007 (n=163).

Compared to the regional differences in the 2013 national HIV prevalence described earlier, the highest HIV prevalence among soldiers in this study was not observed in Western region, but in the rural Eastern region. Unstudied factors favoring sexual transmission of HIV specific to these localities may account for this difference. While not studied in our survey, rural regions have fewer jobs, making soldiers with steady incomes attractive for sexual partnerships. Furthermore, the Eastern region of the country has a common border with the Northern Liberia and Southeastern Guinea where the regional HIV prevalence are higher, especially among adult women [21, 22].

Risk factors for HIV infection included having multiple concurrent partnerships, being female, having HIV tests outside of military health facilities, unplanned sex after a drinking session, and using condoms. Properties intrinsic to the military environment such as deployment within the national territory and cohort effects, rank for instance, did not appear to affect HIV status. The military of Sierra Leone has only been in its present organization since 2010, and the combination of restructuring and reshuffling caused by the civil war may have diluted the cohort effects typically seen in other military environments [23]. Only a few higher-ranking officers had been on an international deployment in the last 2 years, to destinations with lower HIV prevalence than Sierra Leone, such as East Timor, Sudan, and Lebanon. A larger proportion of older male higher-ranking officers was HIV-positive compared to younger privates and junior NCOs (5.1%, 3.3%, 1.8%, respectively), a finding previously reported in similar contexts [24, 25]. Similar to the United States, the RSLAF has been testing new recruits for HIV before entry since 2004, does not discharge HIV-positive soldiers and provides continued

care [26]. However routine force-wide testing is not feasible for current military personnel in this limited resource setting. The majority of testing is done passively through contact with healthcare providers or over the course of HIV testing campaigns.

In this study, the association of HIV status and condom use at last sexual intercourse was found to be opposite to the established pattern in the literature. Barrier prevention has been found to consistently reduce transmission of HIV and other STIs [27, 28]. Potential confounders such as marital status, age, and partner types which have been shown to influence condom use behavior elsewhere, did not change the magnitude nor the direction of the association with HIV status in this study [8, 29, 30]. However, the non-consistent condom use observed in the current study has been reported in a similar military context [31]. In a survey of Nigerian soldiers, consistent condom use regardless of partner type was reported among less than 20% of participants [31]. One reason for our findings may be that HIV-positive soldiers may have increased condom use after realizing their increased risk. In addition, we found that after adjustment for knowledge of HIV status, those who used consistently used condoms were no longer more likely to be HIV positive (data not shown). We observed a higher HIV prevalence in the Eastern region, which also coincided with the region where the highest proportion of participants had never taken an HIV test in the past (32%). HIV testing counseling has been shown to lower risky behaviors, even among HIV-negative individuals [32]. It is therefore possible that previous HIV testing and counseling may have lead to behavior change and consistent condom use among HIV-positive and HIV-negative participants.

We did not find increased high-risk behavior such as higher number of sexual partners among HIV-positive condom users. While only 7 participants reported knowing that they were HIV-positive (data not shown), the data collection by personal interview could increase reluctance to disclose their HIV status. The HIV prevention messaging and campaign spread among the troops could also have had an impact. The military should continue to emphasize consistent condom use, especially when multiple concurrent partnerships are involved with possibly steady or casual partners.

The study results found those who obtained HIV testing previously at civilian clinics only were more likely to be HIV-positive than those who had been tested at military facilities. Additionally, 1 in 5 study participants had not previously taken an HIV test and of these about 3.4% were HIV-positive. The perceived lack of confidentiality and the persistent stigmatization of HIV likely represent the primary barriers testing among military members [33]. Issues with available military HIV testing structures could explain this observation. For instance, some participants cited the unavailability of test kits and mistrust of counselors as deterrents from using military HIV testing services (data not shown). Other additional reasons not studied could lead to testing outside of the military environment. The reasons for barriers to HIV testing warrant further research to facilitate case finding and improve care.

We found the prevalence of syphilis in our study population to be 7.3%. Risk factors for syphilis included older age, positive HIV status, and rural geographic location. Our findings revealed a much higher rate of syphilis infection than that previously

reported in this population (1.9%) [7]. To our knowledge, this study is the first detailed

description of risk factors for syphilis in an adult population in Sierra Leone. Our

correlates are consistent with previous studies describing increased risk of HIV

transmission among patients with syphilis [34, 35]. Moreover, past studies performed in

other sub-Saharan Africa, have also shown that syphilis was more prevalent in rural

regions compared to the urban environments, probably because of reduced access to

health care and education [36].

Strengths and Limitations

     This study had several strengths. Random multi-level sampling of military

personnel from throughout the country seems to have resulted in a representative sample

and increase its applicability to the entire military population of Sierra Leone. The use of

computer assisted personal interview may have helped reduce bias in recalling private

sexual behaviors and increase data quality using automated audits for inconsistent

responses [37, 38]. Study limitations were related to its cross-sectional design and the

relatively low prevalence of these two infections. We relied on self-reported sexual

behaviors over either a one-year or two year period (during military deployments). We

were unable to determine the time of infection from serological data, therefore do not

know which sexual behavior was concurrent with the time of infection. Recall time

frames were limited to the last 12 months; some participants may have changed their

behavior if they acquired an STI more than a year ago. A low prevalence of HIV and

syphilis limited the precision of our estimates and our power to detect risk factors for

these infections. We did not address the issue of sexual coercion and rape that might contribute to increased risk in lower ranking women.

CONCLUSION

In summary, HIV prevalence among members of the Sierra Leone military remains about twice that of the general population, and those with syphilis have also a high HIV prevalence. Outreach efforts should target the highest risk subsets of the population such as low-ranking female soldiers and male officers. These efforts should encourage behavior changes aimed at reducing high-risk sexual behaviors such as reduction in numbers of contemporaneous sexual partners and moderation in alcohol use.

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Table 2.1. Prevalence of HIV and Syphilis among study participants by district of residence, Sierra Leone, 2013

Site District	Total	HIV +		Syph +	
		n	(%)	n	(%)
Eastern region					
Kailahun	88	6	(6.8)	11	(12.5)
Kenema	73	3	(4.1)	11	(15.1)
Kono	79	2	(2.5)	6	(7.6)
Northern region					
Bombali	110	0	(0.0)	13	(11.8)
Kambia	97	3	(3.1)	4	(4.1)
Koinadugu	87	2	(2.3)	16	(18.4)
Southern region					
Bo	34	1	(2.9)	5	(14.7)
Pujehun	86	2	(2.3)	8	(9.3)
Western region					
Western Area Rural	96	6	(6.3)	0	(0.0)
Western Area Urban	407	13	(3.2)	11	(2.7)
Total	1157	38	(3.3)	85	(7.3)

Table 2.2. Demographic characteristics by HIV status among men and women participants, Sierra Leone, 2013

	Total	Men (n=1028)			Women (n=129)		
		HIV -	HIV +	p-value	HIV -	HIV +	p-value
	N (%)	n (%)	n (%)		n (%)	n (%)	
Age (years)^				0.29			0.83
Mean (SD)	38.5 (7.9)	39.1 (7.7)	40.6 (6.5)		33.2 (7.8)	33.9 (4.1)	
Birth Region ^				0.99			0.11
Western	161 (13.9)	115 (11.5)	4 (12.9)		41 (33.6)	0 (0.0)	
Southern	198 (17.1)	178 (17.9)	14 (45.2)		15 (12.3)	0 (0.0)	
Eastern	296 (25.6)	262 (26.3)	5 (16.1)		24 (19.7)	2 (28.6)	
Northern	501 (43.3)	440 (44.2)	8 (25.8)		42 (34.4)	5 (71.4)	
Education				0.65			0.03
None/Primary school	386 (33.4)	347 (34.8)	12 (38.7)		23 (18.9)	4 (57.1)	
JSS and beyond	771 (66.6)	650 (65.2)	19 (61.3)		99 (81.1)	3 (42.9)	
Religion				0.89			0.70
Muslim	656 (56.7)	591 (59.3)	18 (58.1)		44 (36.1)	3 (42.9)	
Christian	501 (43.3)	406 (40.7)	13 (41.9)		78 (63.9)	4 (57.1)	
Current Relationship Status				0.08			0.63
Single	103 (8.9)	64 (6.4)	0 (0.0)		38 (31.1)	1 (14.3)	
Married or Living with a partner	1001 (86.5)	898 (90.1)	28 (90.3)		70 (57.4)	5 (71.4)	
Widowed/Divorced/Separated	53 (4.6)	35 (3.5)	3 (9.7)		14 (11.5)	1 (14.3)	
Military Rank				0.08			0.22
Private	475 (41.1)	381 (38.2)	13 (41.9)		77 (63.1)	4 (57.1)	
Junior NCO	464 (40.1)	430 (43.1)	8 (25.8)		23 (18.9)	3 (42.9)	
Senior NCO/WO/Junior Officer/Senior Officer	218 (18.8)	186 (18.7)	10 (32.3)		22 (18.0)	0 (0.0)	
Site Location				0.25			0.57
Eastern	240 (20.7)	220 (22.1)	11 (35.5)		9 (7.4)	0 (0.0)	
Western	503 (43.5)	407 (40.8)	13 (41.9)		77 (63.1)	6 (85.7)	
Southern	120 (10.4)	104 (10.4)	2 (6.5)		13 (10.7)	1 (14.3)	
Northern	294 (25.4)	266 (26.7)	5 (16.1)		23 (18.9)	0 (0.0)	
Total		997 (97.0)	31 (3.0)		122 (94.6)	7 (5.4)	

^n=1156; p-value from Chi-square or Fisher's exact test; JSS: junior secondary school; NCO: non-commisioned officer; WO:warrant officer

Table 2.3. Univariate odds of having a seropositive status by risky behaviors among study participants, Sierra Leone, 2013

	Total	HIV +	HIV -		
	N (%)	n (%)	n (%)	OR (95% CI)	p-value
Multiple sex partners in the same week					0.02
Yes	205 (17.7)	12 (5.9)	193 (94.1)	2.30 (1.14-4.66)	
No	950 (82.3)	25 (2.6)	925 (97.4)	1 [Reference]	
Have been deployed in the past 2 years					0.55
Yes	511 (44.2)	15 (2.9)	496 (97.0)	0.82 (0.42-1.59)	
No	646 (55.8)	23 (3.6)	623 (96.4)	1 [Reference]	
Ever been tested for HIV					0.02
Yes at a military facility only	709 (61.3)	20 (2.8)	689 (97.2)	0.82 (0.36- 1.90)	
Yes at an outside facility	71 (6.1)	7 (9.9)	64 (90.1)	3.12 (1.09-8.92)	
Yes both	141 (12.2)	3 (2.1)	138 (97.9)	0.62 (0.16-2.38)	
No	236 (20.4)	8 (3.4)	226 (96.6)	1 [Reference]	
Number of times tested for HIV since joining the military					0.64
0-1	408 (35.3)	15 (3.7)	393 (96.3)	1.75 (0.67-4.57)	
2-3	428 (37.0)	16 (3.7)	412 (96.3)	1.78 (0.69-4.61)	
4+	281 (24.3)	6 (2.1)	275 (97.9)	1 [Reference]	
Unkwown	40 (3.5)	1 (2.5)	39 (97.5)	1.18 (0.14-10.02)	
Alcohol use					0.21
None	663 (57.3)	17 (2.6)	646 (97.3)	1 [Reference]	
Low use	317 (27.4)	15 (4.7)	302 (95.3)	1.89 (0.93-3.83)	
Harmful and Hazardous use	177 (15.3)	6 (3.4)	171 (96.6)	1.33 (0.52-3.43)	
Number of sexual partners over lifetime					0.60
1	190 (16.4)	6 (3.2)	184 (96.8)	1 [Reference]	
2	158 (13.7)	4 (2.5)	154 (97.5)	0.80 (0.22-2.87)	
3+	320 (27.7)	8 (2.5)	312 (97.5)	0.79 (0.27-2.30)	
Unknown	489 (42.3)	20 (4.1)	469 (95.9)	1.31 (0.52-3.31)	
Partner types in the last year					0.74
Regular or Casual only	799 (69.1)	24 (3.0)	775 (97.0)	0.59 (0.13-2.58)	
Regular and Casual	317 (27.4)	11 (3.5)	306 (96.5)	0.68 (0.15-3.20)	
None	40 (3.5)	2 (5.0)	30 (95.0)	1 [Reference]	
Ever traded sex for goods or money					0.44
Yes	110 (9.5)	4 (3.6)	106 (96.4)	1.46 (0.56-3.83)	
No	1047 (90.5)	33 (3.2)	1014 (96.8)	1 [Reference]	
Unintended sex as result of alcohol drinking					<0.01
Yes	58 (5.0)	6 (10.3)	52 (89.7)	3.85 (1.54-9.61)	
No	1099 (95.0)	32 (2.9)	1067 (97.1)	1 [Reference]	
Condom use at last sex*					0.04
Consistent use with any partners	268 (23.6)	16 (6.0)	252 (94.0)	2.47 (1.24-4.92)	
Inconsistent CU, CU only with regular partner	43 (3.8)	2 (4.7)	41 (95.3)	1.90 (0.43-8.46)	
Inconsistent CU, CU only with casual partner	94 (8.3)	1 (1.1)	93 (98.9)	0.42 (0.06-3.17)	
No CU with any partners	719 (63.4)	18 (2.5)	701 (97.5)	1 [Reference]	

[§]excluding those who did not have sex in the last 6 months (n=23) or missing responses (n=10). CU: condom use; Adjusted for all variables in the model

Table 2.4. Adjusted odds of being HIV positive among study participants, Sierra Leone, 2013

	AOR (95% CI)	p-value
Gender		0.04
Female	2.72 (1.07-6.90)	
Male	1 [Reference]	
Marital Status		0.08
Married or Living with a partner	1 [Reference]	
Single	0.16 (0.02-1.27)	
Widowed/Divorced/Separated	2.18 (0.68-7.04)	
Ever been tested for HIV		0.03
No	1.27 (0.51-3.16)	
Yes at an outside facility	3.91 (1.50-10.18)	
Yes at both types of facilities	0.71 (0.20-2.46)	
Yes at a military facility only	1 [Reference]	
Multiple sex partners in the same week		0.03
Yes	2.37 (1.11-5.06)	
No	1 [Reference]	
Unintended sex as result of alcohol drinking		0.03
Yes	3.03 (1.13-8.15)	
No	1 [Reference]	
Condom Use[§]		0.02
CU with any partners	2.82 (1.38-5.76)	
CU only with regular partner	1.80 (0.39-8.31)	
CU only with casual partner	0.46 (0.06-3.50)	
No CU with any partners	1 [Reference]	

[§]excluding those who did not have sex in the last 6 months (n=23) or missing responses (n=10). CU: condom use; AOR adjusted for all variables in the model

Table 2.5. Adjusted odds of being positive for syphilis among study participants, Sierra Leone, 2013

	AOR (95% CI)
Age (years)[δ]	1.04 (1.01-1.07)
HIV status [δ]	
Positive	3.35 (1.36-8.28)
Negative	1 [Reference]
Site Region [δ]	
Rural regions	6.14 (3.20-11.77)
Western Region	1 [Reference]

[δ]p-value <0.001; AOR adjusted for all variables in the model

CHAPTER 3.

Alcohol-Related Disinhibitory Behaviors and Correlates of HIV Transmission Risk among Men in Sierra Leone

ABSTRACT

Background: The risk for HIV transmission can further be increased by behaviors such as alcohol use leading to disinhibitory acts. We investigated the prevalence of alcohol-related disinhibitory sexual behaviors and their correlated HIV risk determinants among male soldiers in Sierra Leone.

Methods: Analyses were restricted to men randomly selected among Sierra Leone military members living in the Eastern region of the country. Computer-assisted personal interview collected demographics and sexual history. HIV status was also assessed using rapid tests. Simple descriptive, factor analysis, and logistic regression methods were used to describe relationship to alcohol-related sexual disinhibition (ARSD).

Results: Our study sample was comprised of 235 men who were on average 39 years old, ranging from 22-59 years. The HIV prevalence was 4.7%, and 29% had a high school or beyond education level. Most were married (76.6%), and 12.3% were living with their partner but not married. Ten percent of participants reported unintended sex or unprotected sex due to alcohol consumption in the past 3 months, and 11% reported symptoms indicative of a sexually transmitted infection (STI) in the past year. ARSD was significantly positively associated with cohabitating with a sexual partner, paying for sex, not having been previously tested for HIV, and STI symptoms ($p<0.05$).

Conclusion: Our findings highlight the need for multi-faceted alcohol use reduction program integrated into HIV prevention programs that focus on event-level high-risk sexual behaviors.

INTRODUCTION

Since the human immunodeficiency virus (HIV) was first identified in the 1980's, more than 39 million people have died after contracting the virus, and the number of people living with HIV has reached more than 30 million [1–3]. HIV has persisted as a major public health issue over the last three decades. In 2013, more than 1.5 million were newly infected with HIV in sub-Saharan Africa [2]. In Sierra Leone, over 57000 individuals were living with HIV in 2013, and 3000 have died from conditions related to acquired immunodeficiency syndrome (AIDS) [4]. Sierra Leone has a yearly HIV incidence of 100 cases per 100 000 individuals [4]. Among adult males, the highest proportion of new cases is among those aged 25-34 years old [4]. Lastly, Sierra Leone's HIV epidemic is mostly transmitted horizontally through heterosexual contact and vertically from mother to child [5].

Behaviors increasing the risk for sexually transmitted infections (STIs) have been well studied. These can include injection and illicit drug use, early onset of sexual intercourse, elevated number of sexual partners, and multiple and concurrent sexual partnership [6, 7]. More precisely, substance misuse including alcohol use has been studied as a risk factor for HIV transmission both quantitatively and qualitatively for the past decade [8, 9]. This includes a high frequency of alcohol use and heavy drinking have been shown to be strongly associated with STI acquisition [10]. These positive associations were more pronounced among populations with very high HIV prevalence (e.g. located in Southern Africa) but were also observed in lower prevalence setting such as the United States [9, 11]. Moreover, studies among wine farming communities in

South Africa have demonstrated that the high prevalence of heavy drinking and frequent alcohol consumption increased the risk for HIV and STIs [12]. Other studies found frequent heavy alcohol consumption correlated with a decrease in risk perception resulting in behaviors such as sex with recently met casual partners, lack of condom use, and seeking services of sex workers [13, 14].

It has been established that alcohol use in social settings can trigger behavioral disinhibition such as thrill seeking, and impulsivity [15]. The range of disinhibitory sexual behaviors due to alcohol use is varied. The event-related alcohol use can in turn increase the occurrence of unprotected sex, unplanned sex, non-monogamous sexual partnerships, and engaging in transactional sex [9, 16–18]. Therefore, investigating alcohol-related sexual behaviors in order to further understand determinants of HIV transmission among at-risk groups is essential.

Although there is substantial information examining alcohol use in sub-Saharan African population in the context of possibility for HIV transmission have been focused in the Southern and Eastern parts of Africa. There is little research on the topic from populations in the Western region of Africa such as Sierra Leone. Countries in this region have lower HIV prevalence than those located in Southern Africa where the dynamics may be different. This analysis will improve the understanding of the circumstances of HIV transmission in this Sierra Leonean population. The purpose of this paper is to describe alcohol-related disinhibitory sexual behaviors in Sierra Leonean military men, and evaluate correlates of these behaviors.

STUDY POPULATION AND METHODS

Study design and population

Study participants were recruited as part of a cross-sectional study in 2013 examining risk-behaviors associated with HIV among Sierra Leone military members. Potential participants were randomly selected using a proportional stratified scheme from military bases. The detailed methodological approach of the study has been previously described [19]. In sum, data were originally collected over a period of 6 weeks, at 13 different sites across the country. Participants were individually interviewed using a computer-assisted structured questionnaire. The analysis was restricted to male participants recruited in the Eastern region of Sierra Leone, which covered 3 study sites.

Questionnaire

Participants provided socio-demographic characteristics such as age (22-34 years old, 35-44 years old, and 45 years old and older), educational attainment dichotomized at the high-school level, and relationship status (not in a relationship, living with a partner, or married). Sex was defined to participants as vaginal and anal sex and excluded oral sex. Participants self-reported past HIV testing experience, number of sexual partners over the past 12 months categorized as 1 or 2 and 3 or more, history of concurrent sexual partnerships (if they had ever had multiple sexual partners within the same week), use of commercial sex defined as providing money in exchange for sex, and history of an active STI in the past year by self-reporting urethral discharge or genital ulcers [20]. After completing the interview, study participants also received HIV testing using a serial rapid

testing algorithm. HIV tests results were anonymously linked to the questionnaires using study generated identifiers.

Statistical analyses

The study originally collected 1176 surveys. The sample analyzed was restricted to male participants located in the Eastern region of Sierra Leone (n=245) with a completed questionnaire. Those missing information for the specified variables were excluded (n=10). The final sample analyzed was therefore comprised of 235 participants. The outcome of interest was history of alcohol-related sexual disinhibition (ARSD) over the past 3 months [21, 22]. ARSD was defined as unplanned sex and/or unprotected sex as a result of alcohol drinking in the last 3 months. Descriptive measures such as frequencies and means were obtained for the variables of interest. Chi-square tests were used to evaluate differences to the distribution of categorical variables with respect to the outcome of interest. Univariate logistic regression with the primary outcome was performed, odds ratios (OR) and Wald test p-values were presented. Multivariate logistic regression included the combination of variables identified through exploratory factor analysis using the variables independently associated with the outcome at p<0.1. Factors with eigenvalues greater then 1.0 were subsequently analyzed. The new variable combinations were divided into high risk, or low risk categories based on the univariate results. High-risk combinations included the intersection of the original categories with increased univariate odds of the outcome. Conversely, low risk combinations included the intersection of the original categories with decreased univariate odds of the outcome. Analyses were performed using SAS version 9.3 (SAS Institute Inc., Cary, North

Carolina). A p-value<0.05 was considered statistically significant and was not adjusted for multiple comparisons.

Informed written consent was obtained from all those who volunteered to participate. This research has been conducted in compliance with all applicable federal and local regulations governing the protection of human subjects in research. The study was approved by the appropriate institutional ethics review boards (Naval Health Research Center, Sierra Leone Ethics and Scientific Review Committee, and San Diego State University Human Research Protection Program).

RESULTS

All demographic characteristics of the study population are presented on Table 3.1. The mean age was 38.9 years and ranged from 22-59 years. In addition, 31.1% were aged 22 to 34 years old, 46.8% 35-44 years old, and the rest (22.6%) were above 45 years old. Most (71.1%) had less than a high school education, and were married (76.6%). The prevalence of HIV among study subjects was 4.7%.

Sample characteristics relating to alcohol use, sexual behaviors, and STIs are also presented on Table 3.1. The outcome of interest, alcohol-related sexual disinhibition in the past 3 months was reported in 10.2% of the study population. The majority (77.1%) had 1 or 2 sexual partners in the past year, and 22.1% reported 3 or more sexual partners. Among study subjects, 15.7% had multiple concurrent sexual partners, within the same

week. Approximately 67.7% had taken an HIV test prior to this study, and 10.6% reported symptoms indicative of an STI in the last 12 months. Paying for sex was prevalent among 8.5% of men.

The proportion of ARSD was different by age group, as shown in Figure 3.1 (χ^2 p=0.04). Among those reporting ARSD, the majority (68.0%) were 35-44 years old. Forty-four percent (44.1%) of participants who did not experience ARSD in the past 3 months were 35-44 years old.

Univariate logistic regression correlates of ARSD are presented on Table 3.2. Those aged 45 and above were 89% (95% CI: 23-99%) less likely to have experienced ARSD compared to those aged 35-44 years old (p=0.09). Compared to married men, those living with their non-married partners were 6.3 times more likely to report ARSD (95% CI: 2.4-16.8). Those not in a current relationship were not more likely than married men to report the behaviors of interest (OR=1.8, 95% CI: 0.5-6.9). Men with 3 or more sexual partners in the last year were 2.3 times more likely (95% CI: 0.9-5.7) to report ARSD compared to those with 1-2 partners, although this association was marginally significant (p=0.06). Use of sex workers, history of HIV testing, and self-reported STIs in the past year are all significantly correlated with ARSD. More specifically, men who had engaged with sex workers were 6.3 times more likely (95% CI: 2.2-17.8) to also exhibit ARSD compared to men who had never paid for sex. The odds of an STI in the past year were 4.4 times higher among those with ARSD (95% CI: 1.6-12.0) in comparison to men

who did not have any ARSD. Education, HIV status, and multiple sexual partnerships were not independently associated with ARSD.

Factor analysis showed that the variables independently associated with ARSD could be combined into 2 components (Table 3.3). The first factor loaded most on using a sex worker, number of sexual partners, thus representing sexual partnerships. Participants who had used a sex worker and/or had 3 or more sexual partners in the last year (26.0%) were classified as high-risk sexual partnerships, Table 3.4. Low risk sexual partnerships concerned those who did not use a sex worker and had 1 or 2 sexual partners in the last year (74.0%). The second component loaded heavily on demographic characteristics (age group and marital status). Participants who were 35-44 years old and/or living with their partners were classified as having high-risk demographics (60.8%). Conversely, those not in the 35-44 age group and married or not in a relationship were classified as having low risk demographics (39.2%).

In the multivariate model, sexual partnerships and STI history were significantly positively associated with ARSD (p<0.01), see Table 3.4. HIV testing history was marginally associated with ARSD (p=0.05), after adjusting for the other behaviors and demographics. We found those with high risk sexual partnerships (3 or more sexual partners in the past year, and/or use of sex workers) were 3.3 times more likely (95% CI: 1.3-8.2) to experience ARSD compared to those with low risk sexual partnerships (1-2 partners in the last year, and no use of sex workers services), after adjusting for demographic characteristics, STI symptoms, and HIV testing history. After adjustment,

men with STI symptoms in the past year were 3.5 times more likely (95% CI: 1.2-10.5) to report ARSD compared those with low risk drinking and no STI history.

DISCUSSION

Our study found alcohol-related sexual disinhibition (unintended sex and unprotected sex due to alcohol use) in 1 in 10 study subjects. This behavior was significantly positively associated with previous of STI, not getting tested for HIV, paying for sex workers, and having more than 3 sexual partners in the last year, even after adjustment. Our findings confirm the existence of high-risk behaviors for HIV acquisition that relate to alcohol consumption in this Sierra Leonean population. This study also implies that prevention of HIV transmission risk in this military population located in the Eastern region should also cover alcohol-related behaviors.

Overall, our findings are consistent with those shown in other sub-Saharan African population, where ARSD is correlated with increased number of sexual partnerships, and other STIs such as Chlamydia [9, 12]. In this study, we found no significant association between HIV status and unplanned, unprotected sex. However the direction of the relationship found in this study follows other reports of direct association with HIV status [23]. The true association of HIV with ARSD in our study may have been confounded by the limited information due to the small temporality of the outcome of interest (3 months). In addition, others have also found no association with prevalent

HIV status and situational alcohol use [9]. The 3-months time period for recall of ARSD could also alter the strength of this association.

Furthermore, this study did not include information of the time since HIV diagnosis. Individuals who already knew their status may already have changed their behaviors, which had put them at risk for the virus [24]. As previously stated, the behaviors in the ARSD outcome only concerned a 3 months time recall. Therefore, the prevalence of this alcohol-related outcome might be underestimated because of the time frame. Among our study population, more than a third had never taken an HIV test prior to this study, and the prevalence of HIV among this group was 3.9% compared to 5.0% among those who had been previously tested (data not shown). Moreover our study population showed much higher HIV testing rates than the general male population aged 20-59 years old of Eastern Sierra Leone (8%) [25]. This observation further reinforces the evidence of behavior change following diagnosis and counseling.

Among study subjects, those most likely to have experienced ARSD belonged to the 35-44 years age group. The average age of our study population was higher than in other studies, as the research on alcohol-related risky sexual behaviors has been primarily focused on young adults. Impulsivity and thrill seeking behaviors among young adults were considered to be a main driver of alcohol use [15]. Others have shown that alcohol-related behavior can be situational and event dependent [15, 26]. Additional cultural factors specific to Sierra Leone and its military could elucidate the determinants of high-risk sexual behaviors among the 35-44 years age group.

Our study demonstrated patterns of correlations consistent with the established literature. For instance, being married was also positively correlated with knowledge of HIV status among respondents of a South African household survey [27]. Moreover, we also found that acquiring an STI was also associated with alcohol misuse and seeking services sex workers, similar to results of previous studies among male populations [28]. Despite the possibility of confounding, our multivariate associations with ARSD were maintained. Additional research in alcohol use and HIV transmission risk in this population is needed. The singularities of consumption of alcohol in Sierra Leone could warrant further investigations on alcohol misuse. For example, people most commonly consume non-traditional alcohol, outside of beer, wine, and liquor, which is much different from less poverty-stressed environments [29]. We could hypothesize that different measures would be needed to better assess alcohol misuse in this population.

Further event and situation level association research into drug use and ARSD is needed to further explain the relationships found. Other features of behavioral disinhibition that could be studied in future research may be use of illicit drugs, or tobacco smoking in order to understand stand how they related to increased HIV transmission risk in this population [28, 30]. Finally, unstudied psychological traits may also add to the understanding of these alcohol-related sexual behaviors [31].

Strength and limitations

While rigorous methods were employed, our findings may nonetheless be limited by a few facts. For example, the sample size may have limited the strength and statistical

significance of the associations studied. Nonetheless, randomized selection of study participants served to limit selection bias. As the population prevalence of alcohol-related disinhibitory sexual behaviors is unknown, it is not possible to compare our overall study results to previous research in the same context. This study can help formulate larger scale investigations of ARSD in this understudied population. In addition, issues with recall of behaviors over a 12-month duration or over an entire lifetime may have led to an underestimation of these risky behaviors. Since our analyses were still able to show high magnitude correlations and detect meaningful patterns of high-risk behaviors, limiting this bias could lead to stronger results. Moreover, self-reported STI symptoms can also be underestimating true STI history because of several reasons that include socially desirable biases in reporting genital problems, and asymptomatic participants that were still actively infected with an STI [32]. Although our findings relied on self-reports, computer assisted interviews have been shown to promote increasing accuracy of self-reported sexual behaviors [33].

In summary, our study showed that alcohol-related disinhibitory behaviors able to increase the risk of HIV transmission are also correlated with other high risk behaviors such as use of sex workers, acquiring STIs, and ignorance of one's own HIV status among our study population. To our knowledge, this is the first study to examine correlates of a combination of disinhibitory behaviors, namely unplanned sex and unprotected sex due to alcohol consumption in this lower HIV prevalence context.

CONCLUSION

In conclusion, this study demonstrated that HIV transmission risk behaviors mediated by alcohol use leading to unintended and unprotected sex were also associated with other high-risk behaviors such as larger sexual networks encompassing transactional sex, and acquisition of other STIs. Our findings highlight the need for alcohol use reduction program integrated into HIV prevention programs in this population.

ACKNOWLEDGEMENTS

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Table 3.1. Demographic and behavioral characteristics among male soldiers living in Eastern Sierra Leone

	Total	
	N	%
Age group (years)		
22-34	73	31.1%
35-44	109	46.4%
45+	53	22.6%
Mean (SD)	38.9 (7.4)	
Median (Range)	39 (22-59)	
Education		
Less than high school	167	71.1%
High school and beyond	68	28.9%
Marital Status		
Living with partner	29	12.3%
Married	180	76.6%
Not in a relationship	26	11.1%
HIV status		
Positive	11	4.7%
Negative	224	95.3%
Alcohol-related sexual dishinbition, past 3 months		
Yes	24	10.2%
No	211	89.8%
Number of sexual partners, past year		
1-2	183	77.9%
3 or more	52	22.1%
Sex with sex worker		
Yes	20	8.5%
No	215	91.5%
History of concurrent sexual partnerships		
Yes	37	15.7%
No	198	84.3%
Had been previously tested for HIV		
Yes	159	67.7%
No	76	32.3%
Genital ulcers or abnormal discharge, past year		
Yes	25	10.6%
No	210	89.4%

Figure 3.1. Age group distribution by ARSD among male soldiers living in Eastern Sierra Leone

ARSD: alcohol-related sexual disinhibition; y.o.: years old.

Table 3.2. Univariate odds of alcohol-related sexual disinhibition among male soldiers living in Eastern Sierra Leone

	OR (95% CI)	p-value
Age group (years)		0.09
22-34	0.62 (0.24-1.58)	
35-44	1 [reference]	
45+	0.11 (0.01-0.87)	
Education		0.36
Less than high school	1 [reference]	
High school and beyond	0.62 (0.22-1.72)	
Marital status		<0.01
Living with partner	6.30 (2.36-16.80)	
Married	1 [reference]	
Not in a relationship	1.83 (0.48-6.96)	
HIV status		0.38
Positive	2.04 (0.41-10.05)	
Negative	1 [reference]	
Number of sexual partners in the last year		0.06
1-2	1 [reference]	
3 or more	2.34 (0.96-5.72)	
Sex with sex worker		<0.01
Yes	6.27 (2.21-17.82)	
No	1 [reference]	
Had previously been tested for HIV		0.02
Yes	1 [reference]	
No	2.78 (1.18-6.53)	
Genital ulcers or abnormal discharge, past year		<0.01
Yes	4.41 (1.62-12.05)	
No	1 [reference]	
History of concurrent sexual partnership		0.47
Yes	1.47 (0.51-4.23)	
No	1 [reference]	

OR: odds ratio

Table 3.3. Factor analysis results of characteristics univariately associated with alcohol-related sexual disinhibition among male soldiers living in Eastern Sierra Leone

Characteristic	Factor #1	Factor #2
Age group	0.17	0.69
Marital status	0.31	0.53
HIV testing history	0.30	-0.58
Number of sexual partners	-0.68	-0.02
Sex with sex worker	0.67	-0.17
STI history	0.54	-0.03
Variance explained	1.43	1.12
Proportion of variance (%)	23.8%	18.7%

STI: Sexually transmitted infection

Table 3.4. Adjusted odds of alcohol-related sexual disinhibition among male soldiers living in Eastern Sierra Leone

	n (%)	AOR (95% CI)	p-value
Combined demographic characteristics			0.08
High risk	143 (60.85%)	2.57 (0.88-7.51)	
Low risk	92 (39.15%)	1 [reference]	
Combined sexual partnerships			0.02
High risk	61 (25.96%)	3.28 (1.32-8.18)	
Low risk	174 (74.04%)	1 [reference]	
STI symptoms			0.01
Yes	25 (10.6%)	3.51 (1.17-10.50)	
No	210 (89.4%)	1 [reference]	
HIV testing history			0.05
Yes	159 (67.7%)	1 [reference]	
No	76 (32.3%)	2.48 (1.01-6.13)	

AOR: adjusted odds ratio. Odds ratios are adjusted for all other combined variables in the model

CHAPTER 4.

The Influence of Female Genital Mutilation on Sexual Behaviors: a Study of Perceptions

in Sierra Leone

ABSTRACT

Female genital mutilation/cutting (FGM/C) is deeply rooted in cultural and traditional beliefs of most ethnic groups represented in Sierra Leone. This practice may affect sexual behaviors linked to the sexual transmission of infections such as HIV. Specific behaviors include sexual partner selection, condom use, and protection from transmission of sexually transmitted infections (STIs). This study investigated the participants attitudes sexual behaviors possibly associated with FGM/C among 1033 randomly selected Sierra Leone military members. Data were collected on attitudes, demographic characteristics, HIV transmission knowledge, and HIV status. Approximately 12% of male and 14 % of female subjects agreed that FGM/C was protective against STIs, 15% (men) and 13% (women) agreed that FGM/C influenced sexual partner selection, and 8% (men) and 6% (women) agreed that FGM/C was the reason for the lack of condom use. Among males, the belief that FGM/C status influenced sexual partner selection was positively correlated with lower education and poor HIV transmission knowledge ($p < 0.05$). Among females, the notion conferring to FGM/C protection from STIs was positively associated with HIV status and high self-perceived HIV risk ($p < 0.05$). This study found that beliefs on the impact FGM/C on sexual behaviors were present and limited to individual characteristics. Sexual health education clarifying that FGM is not protective against HIV may be beneficial in eradicating these myths.

INTRODUCTION

Female genital mutilation/cutting (FGM/C) is a customary practice referring to the non-therapeutic surgical modification of the external genitalia. The four types of FGM/C classified by the World Health Organization (WHO) include Type I which is described as any variation of a clitoridectomy; Type II: excision of the clitoris with partial or total excision of the labia minora, Type III: excision of part or all of the external genitalia and stitching/narrowing of the vaginal opening; and Type IV: all others manipulations to the female genitalia not included in the previous 3 categories [1,2]. Type I and II are most frequently practiced in Sierra Leone [2,3].

Among countries located in the West African region, Sierra Leone has the second highest prevalence of FGM/C among women aged 15-49, estimated between 90-94%, only surpassed by Guinea (96%) [3-5]. A slightly lower prevalence of FGM/C (81%) has also been reported among a limited sample of women attending antenatal clinics in urban areas located in the northern, eastern, and western regions of Sierra Leone [2]. In Sierra Leone, ethnic and religious traditions perform the practice during coming of age rituals. It is customarily referred to as Bondo or Bondo Society [6,7]. The Bondo Society involves women congregations who also underwent FGM/C and rituals are unique among each ethnic group [2]. Illiteracy and lack of education likely contribute to the perpetuation of the practice [7,8]

The use of unsanitary equipment during FGM/C and vaginal trauma can result in many infections [1]. Vaginal cutting is associated with genital pain, bleeding and sores;

and FGM/C sequaele has been shown to be correlated with a number of severe maternal and fetal health outcomes such as obstructed labor, fetal distress, perineal tear, and post-partum hemorrhage [9,10]. To date, the causal connection between FGM/C and HIV has not been scientifically demonstrated [11]. However, there is strong consensus among the medical community that vaginal scarring practices can increase the efficiency of STI transmission including HIV [12,13].

In the past three decades, increasing advocacy and interventions, implemented with varying degrees of success, sensitized the population about women's rights and the adverse effects of the practice. These campaigns have encouraged behavioral change, while considering alternative trades for excision practitioners, and supporting the local traditional leaders in ending the practice [14,15]. The impact of FGM/C on sexual behaviors is starting to emerge in the scientific literature. However, most studies have been limited to the overall perception of women in the FGM/C practicing community and did not examine the association of FGM/C on subsequent sexual behaviors. Some reported the practice affected sex appeal to men and increased the sexual pleasure of men, while other cited the impact on marriageability and sexual sensations [16,17]. In most African communities, women who underwent FGM/C are perceived as not promiscuous and more trustworthy to their partners[8]. Other surveys have also evidenced beliefs of Bondo affecting social acceptance, marriageability, and hygiene [5].

The role of FGM/C in continued heterosexual transmission of HIV is of interest to further prevent the spread of the disease. Reports of attitudes towards FGM/C are lacking

in Sierra Leone, especially on how they affect sexual practices. The purpose of this study was to investigate the influence of the practice on the lack of condom use and other high-risk sexual behaviors linked to HIV transmission in this context.

METHODS

Study description and population

This cross-sectional study was performed in 2013 across 13 military sites distributed throughout the four regions of the territory (Western, Eastern, Southern, and Northern). Military men and women over the age of 18 were eligible to be included in the study. All potential participants were briefed regarding the purpose of the study. Consenting subjects responded to a standardized computerized personal interview performed by a trained study interviewer and were also tested for HIV. Volunteers were randomly selected using a proportional strategy based on military rank distribution (n=1193). Women participants were oversampled to achieve an adequate analytical sample size as they overall represent less than 3% of the target population. HIV testing was performed in series according to the national guidelines using Alere Determine HIV-1/2 (Alere Medical Co., Ltd., Chiba-ken, Japan), and Uni-Gold Recombigen HIV (Trinity Biotech, Bray, Co Wicklow, Ireland).

Study questionnaire

Study variables included demographic characteristics (age, gender, marital status, religion, education, military rank) and sexual history (age at sexual debut, frequency of

condom use during vaginal or anal sex grouped as: always/almost always, sometimes, never). HIV risk perception was the self-reported the chances that they themselves may become infected with HIV. This was categorized into 3 groups: low risk (not at all likely, somewhat likely), high risk (highly likely, already HIV positive), and unknown (don't know/not sure). Information on HIV transmission knowledge corresponded to five standard questions extracted from the United Nations General Assembly Special Session (UNGASS) on HIV/AIDS core indicators [17]. A categorized score was created using the number of questions answered correctly (low: 0 to 3, intermediate: 4, and high: 5). HIV testing results were anonymously linked to each questionnaire. Using a Likert-type scale to assess attitudes towards FGM/C, participants were asked scale whether they agree, or disagree to three statements encompassing the topics of STI protection, partner selection, and condom use, respectively: undergoing Bondo protects women from diseases that are sexually transmitted; a man should only seek sexual partners that have undergone Bondo; and a man does not need to use a condom when having sex with a woman if she is circumcised.

Statistical analysis

Subjects with missing questionnaires (n=17) and missing responses for the key study variables (n=143) were excluded from the analysis. The sample size analyzed was 1033, including 920 men and 113 women. For the purpose of the analysis, agree and partially agree response categories to FGM/C attitudes were combined. Descriptive measures including frequencies, percentages, means, and standard deviations were obtained for study variables in sex-specific analyses. Chi-square statistic was used to

assess sex differences in other demographic characteristics. The outcome of agreeing to the each attitude statement was analyzed using univariate logistic regression to identify associated factors. No adjustment was made for multiple comparisons.

Ethical considerations

All participants enrolled in the study provided informed consent. This research has been conducted in compliance with all applicable federal and local regulations governing the protection of human subjects in research and was approved by the appropriate institutional ethics review boards (Naval Health Research Center, Sierra Leone Ethics and Scientific Review Committee, San Diego State University Human Research Protection Program).

RESULTS

All demographic characteristics significantly differed by gender ($\chi 2$ p<0.001). The mean age was 39.2 years and 33.5 years among men and women, respectively (Table 4.1). Thirty percent (30.1%) of women (vs. 12.1% of men) were born in the Western region. Only 14.3% of male participants and 5.3% of women had no formal schooling. Forty-one percent of men (41.0%) completed senior secondary school equivalent to high school, and 58.4% of women did so . A larger proportion of women reported being of Christian faith compared to men (65.5% vs. 41.7%). More men than women were married or living with a partner (89.6% vs. 56.6%).

Among men, 11.5% believed FGM/C protected women from STIs, 14.6% thought FGM/C status lead their partner selection, and 7.7% accepted the idea that FGM/C lead to lack of condom use (Table 4.2). Similarly among women, 14.2% believed FGM/C protected women from STIs, 13.3% thought FGM/C status lead their partner selection, and 6.2% accepted the idea that FGM/C lead to lack of condom use. Among men, 15% agreed to one attitude only, 7% to two and 2% to three (Figure 4.1); while 24% of women agreed to one attitude, 3.5% to two, and less than 1% had positive responses to all three opinions.

Among men, age did not significantly affect attitudes about FGM/C and partner selection, and protection from STIs, see Table 4.3. However, older men were more likely to agree that condom use is not indispensable with a circumcised woman. Education affected the belief that FGM/C was protective against STIs (Figure 4.2). Men with no formal education and who completed junior secondary school (equivalent to middle school) were 2.3 times and 2.1 times more likely (respectively) to agree that FGM/C protected women from STIs compared to those completing senior secondary school (equivalent to high school), 95% CI 1.2-4.3 and 1.2-3.6, respectively. Men who responded that HIV could not be transmitted through scarring rituals were 2.2 times more likely to agree that FGM/C protects women from STIs compared to men responding that HIV could be transmitted through scarring rituals (95% CI: 1.0-4.7). Religion, marital status, age of sexual debut, frequency of condom use, HIV transmission knowledge, HIV status, and HIV risk perception were not factors influencing this particular attitude about STI protection. Regarding the influence of FGM/C on the choice of sexual partners, only

education and HIV transmission knowledge were factors affecting this attitude (Figure 4.3). Notably, those with no formal schooling and those achieving primary school were both 2.1 times more likely to agree to the influence of circumcision status on partner selection compared to men whom completed senior secondary school (95% CI: 1.2-3.6 and 1.3-3.4). Beliefs about condom use with a circumcised women were affected by age at sexual debut, HIV transmission knowledge and perceived HIV risk but not by birth region, education, religion, marital status, frequency of condom use, and HIV status among men (Figure 4.4). Men older at sexual debut were less likely to agree that a man does not need to use a condom when having sex with a woman if she is circumcised. In contrast to men 15 and younger at sexual debut, those 16-19 and 20-25 years old were 63% and 59% less likely to agree (p=0.02).

Factors affecting the attitudes towards FGM/C among women are presented in Table 4.4. HIV status and self-perceived risk of being HIV positive were significantly associated with the belief of protection from STIs. Women HIV positive were 5.2 times more likely to agree that FGM/C protects women from STIs (95% CI: 1.1-26.2) in contrast to those HIV negative. Moreover, women who perceived their HIV risk as high or unknown were 4.6 and 6.5 times more likely to agree to that statement compared to women perceiving their risk as low (95%CI: 1.1-19.2; 1.7-24.8, respectively). None of the behaviors studied were significantly associated with attitudes on the choice of the sexual partners based on circumcision status among women. Concerning the lack of condom use based on a women circumcision status, women's viewpoints were influenced by their marital status, their frequency of condom use, HIV transmission knowledge, and

perceived HIV risk. Their birth region, education level, HIV status, and age at sexual debut were not associated with this belief. Only women married or living with a partner were significantly more likely to agree that a condom is not needed with a circumcised women compared to currently single women (OR: 12.3, p=0.01). Women using condoms always or almost always with their partners were also more likely to have this attitude compared to those who rarely/never used condoms in the last 6 months (OR: 9.7, p=0.06). Women with lowest HIV transmission knowledge scores were 17.1 times more likely to agree to this opinion compared to those with perfect knowledge (95% CI: 2.0-143.8). Finally, women unaware of their own risks to HIV acquisition were 8.30 times more likely to be in agreement that FGM/C is the reason for the lack of condom use compared to those that perceived their risk as high (95% CI: 1.2-93.7).

DISCUSSION

The present study found minor levels of agreement to attitudes suggesting the influence of FGM/C on sexual behaviors that included partner selection, perceived lack of sexual promiscuity, and condom use. These affected only 1 in 4 women and 1 in 6 men interviewed. Common traits associated with attitudes in women were marital status, knowledge of HIV transmission, self-perceived risk of acquiring HIV. In men, this study found that education, age at sexual debut, UNGASS score and knowledge of how HIV can be transmitted, and also self-perceived HIV risk were primarily associated with their viewpoint towards FGM/C.

Gender and attitudes towards FGM/C

While other studies of attitudes towards FGM/C showed that men and women can have different opinions concerning FGM/C [19,20], this study revealed that the proportion of agreement to each attitude was not different by gender. Most reports have been focused on women's opinions of FGM/C [7,16,21] and the absence of differences in opinions across gender lines observed could originate from cultural differences. For instance, previous studies of attitudes were mostly performed among persons of Sudanese and Somali heritage where the reasons for circumcision may differ from those existing in the Sierra Leone culture. In this study, men were less likely to agree to just one belief compared to women. This could also indicate that the impact of FGM/C on sexual behaviors may be more widespread among the men studied compared to the women as other researchers have previously noted [19,20].

Sexual health and desirability

Overall notions related to STI transmission such as HIV risk perception, HIV status, HIV knowledge, and frequency of condom use were factors influencing attitudes towards FGM/C and sexual health in female participants. Among men, education, age, age at sexual debut, in addition to HIV risk perception, HIV transmission knowledge were associated indicators. Prior research had shown that many FGM/C practicing communities believed the practice was beneficial to deter sexual promiscuity, and also to ensure virginity until marriage [22]. However, qualitative research through systematic surveys evidenced that age at marriage and sexual debut was not dependent on FGM/C status in the communities studied [23]. The belief that condoms are dispensable because

of the circumcision status of the female sexual partner seems to be rooted in the hygienic

rationale of the practice [9]. However past studies from populations in Tanzania, Kenya,

and Guinea Bissau have not shown definitive evidence linking an increase of STIs with

FGM/C [24–26]. This lack of validation could be explained mostly as a result of the

different ways that FGM/C is practiced in different communities. The general belief is

that FGM/C means disease free, however this cultural notion continues to bare no

empirical evidence. Education, and community lead cultural awareness programs could

mitigate these myths toward FGM/C to reveal the realities of the practice and its effect on

sexual health.

        While all demographic characteristics were different by sex, older age was not a

factor influencing the choice of sexual partners in either gender group. This finding in our

study population is in disaccord with previous reports from Egypt, where the prevalence

of female circumcision is also high. In this Egyptian cohort, older men were more likely

to feel FGM/C did influence which women were chosen as sexual partners compared to

younger adult men [17]. Another qualitative research study among rural Sudanese

populations showed the impact of FGM/C on body esthetics and sexual desirability [27].

Unfortunately, precise comparisons with our current study are limited by qualitative

methodology employed. Our study findings are in accord, however, with another study

analyzing the role of genital mutilation on sexual behavior adult women from Mali. This

study found that FGM/C status did not influence specific sexual behaviors such as age at

sexual debut or number of sexual partners [28].

Limitations

Despite of the rigorous scientific approach, the present study had several

limitations. Specific information about ethnic identity could not be captured as it is still a

sensitive topic among the military as a result of the civil war. Ethnicity has been shown to

influence the practice of female circumcision in Sierra Leone [7]. In our study, we used

birth region as a surrogate for ethnicity information, but it was not found to influence

opinions. The existence of FGM/C among female participants would have helped explain

the relationships found. However, self-reported FGM/C status of women was not

captured because of reticence from our data collection staff that was predominantly male.

In addition, the proportion of women interviewed was small compared to men. Women

were purposefully oversampled in this study and represented 40% of all available female

military members. Gender-specific analyses still provided great insight on factors

associated with attitudes toward FGM/C. The limited availability of women to be

included in this study possibly hid some key factors influencing these attitudes and also

resulted in the lack in numerical precision of certain estimates. Additionally, the

proportion of participants believing in the role of FGM/C on sexual behaviors was lower

than unexpected, especially in an environment were FGM/C is the norm. Further research

on the association of FGM/C with sexual behaviors studied is needed in order to explain

these observed rates.

To summarize, this analysis showed that a sizeable sample of the study population

believed in the influence of FGM/C on partner selection, STI protection, and condom use.

Community programs regarding alternatives to culture-specific social identity that can

bypass FGM/C are greatly needed for this population with emphasis on discussing and educating not only women but also men [29].

CONCLUSION

In conclusion, this is the first study to contextualize the impact of female circumcision on sexual behavior and adds to the understanding of social and behavioral dynamics in Sierra Leone regarding FGM/C. Education campaigns demystifying the beliefs that FGM/C grants protection from STIs would be primordial in this context.

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Chapter 4, in full, is currently being prepared for submission for publication of the material. Djibo, Djeneba Audrey; Sahr, Foday; Jain, Sonia; Araneta, Maria Rosario G.; Brodine, Stephanie K.; McCutchan, J. Allen; Shaffer, Richard A. The influence of female genital mutilation on sexual behaviors: a study of perceptions in Sierra Leone. The dissertation author was the primary author of this material.

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Table 4.1. Demographic characteristics among male and female study participants, Sierra Leone 2013

	Men (N=920)		Women (N=113)	
	N	%	N	%
Age (years)[§]				
Mean (SD)	39.2 (7.7)		33.5 (7.7)	
Birth region[§]				
Western	111	12.1%	34	30.1%
Southern	169	18.4%	14	12.4%
Eastern	232	25.2%	24	21.2%
Northern	408	44.3%	41	36.3%
Education level[§]				
None	132	14.3%	6	5.3%
Primary	177	19.2%	15	13.3%
Junior Secondary School	234	25.4%	26	23.0%
Senior Secondary School	330	35.9%	53	46.9%
Vocational/College/University	47	5.1%	13	11.5%
Religious affiliation[§]				
Muslim	536	58.3%	39	34.5%
Christian	384	41.7%	74	65.5%
Marital status[§]				
Single	58	6.3%	36	31.9%
Married or Living with a partner	824	89.6%	64	56.6%
Widowed/Divorced/Separated	38	4.1%	13	11.5%

[§]χ^2 p-value <0.001 between male and female subjects

Table 4.2. Comparisons of opinions between male and female study participants towards FGM's influence on sexual behaviors, Sierra Leone – 2013

Statement	Men (N=920)				Women (N=113)				p-value
	Agree		Disagree		Agree		Disagree		
	N	%	N	%	N	%	N	%	
Undergoing Bondo protects women from diseases that are sexually transmitted	106	11.5%	814	88.5%	16	14.2%	97	85.8%	0.41
A man should only seek sexual partners that have undergone Bondo	134	14.6%	786	85.4%	15	13.3%	98	86.7%	0.71
A man does not need to use a condom when having sex with a woman if she is circumcised	71	7.7%	849	92.3%	7	6.2%	106	93.8%	0.56

χ^2 p-value comparing men and women study participants; Bondo is the local term for female genital mutilation

Figure 4.1. Proportion of participants who agree to 1, 2, or 3 statements regarding female genital mutilation's influence on sexual behaviors among male and female study participants, Sierra Leone, 2013

The statements on female genital mutilation were "undergoing Bondo protects women from diseases that are sexually transmitted", "a man should only seek sexual partners that have undergone Bondo", and "a man does not need to use a condom when having sex with a woman if she is circumcised". Bondo is the local term referring to female genital mutilation

Table 4.3. Association of demographic, knowledge and behavioral factors with opinions regarding female genital mutilation's influence on sexual behaviors among male study participants, Sierra Leone – 2013

	Undergoing Bondo protects women from diseases that are sexually transmitted			A man should only seek sexual partners that have undergone Bondo			A man does not need to use a condom when having sex with a woman if she is circumcised		
	Agree (N=106)	Disagree (N=814)	p-value	Agree (N=134)	Disagree (N=786)	p-value	Agree (N=71)	Disagree (N=849)	p-value
	N %	N %		N %	N %		N %	N %	
Age (yrs)									
Mean (SD)	39.1 (7.1)	39.2 (7.7)	NS	40.0 (7.5)	39.1 (7.7)	NS	41.0 (7.7)	39.1 (7.6)	0.04
Birth region			NS			NS			NS
Eastern	24 22.6%	208 25.6%		30 22.4%	202 25.7%		11 15.5%	221 26.0%	
Western	10 9.4%	101 12.4%		10 7.5%	101 12.8%		7 9.9%	104 12.2%	
Southern	18 17.0%	151 18.6%		28 20.9%	141 17.9%		17 23.9%	152 17.9%	
Northern	54 50.9%	354 43.5%		66 49.3%	342 43.5%		36 50.7%	372 43.8%	
Education level			0.04			0.005			NS
None	21 19.8%	111 13.6%		27 20.1%	105 13.4%		13 18.3%	119 14.0%	
Primary	22 20.8%	155 19.0%		36 26.9%	141 17.9%		19 26.8%	158 18.6%	
Junior secondary school	34 32.1%	200 24.6%		33 24.6%	201 25.6%		18 25.4%	216 25.4%	
Senior secondary school	25 23.6%	305 37.5%		36 26.9%	294 37.4%		20 28.2%	310 36.5%	
Vocational/college/university	4 3.8%	43 5.3%		2 1.5%	45 5.7%		1 1.4%	46 5.4%	
Religious affiliation			NS			NS			NS
Muslim	68 64.2%	468 57.5%		86 64.2%	450 57.3%		43 60.6%	493 58.1%	
Christian	38 35.8%	346 42.5%		48 35.8%	336 42.7%		28 39.4%	356 41.9%	
Marital status			0.08			NS			NS
Single	2 1.9%	56 6.9%		6 4.5%	52 6.6%		2 2.8%	56 6.6%	
Married or living with a partner	102 96.2%	722 88.7%		123 91.8%	701 89.2%		66 93.0%	758 89.3%	
Widowed/divorced/separated	2 1.9%	36 4.4%		5 3.7%	33 4.2%		3 4.2%	35 4.1%	
Age at first sex (yrs)			NS			NS			0.02
<= 15	18 17.0%	81 10.0%		18 13.4%	81 10.3%		14 19.7%	85 10.0%	
16-19	36 34.0%	292 35.9%		55 41.0%	273 34.7%		19 26.8%	309 36.4%	
20-25	40 37.7%	328 40.3%		43 32.1%	325 41.3%		23 32.4%	345 40.6%	
26-38	3 2.8%	41 5.0%		6 4.5%	38 4.8%		6 8.5%	38 4.5%	
Unknown	9 8.5%	72 8.8%		12 9.0%	69 8.8%		9 12.7%	72 8.5%	

*Wald χ^2 value; NS: not significant; Bondo is the local term referring to female genital mutilation

Table 4.3. Association of demographic, knowledge and behavioral factors with opinions regarding female genital mutilation's influence on sexual behaviors among male study participants, Sierra Leone – 2013, continued

	Undergoing Bondo protects women from diseases that are sexually transmitted						A man should only seek sexual partners that have undergone Bondo						A man does not need to use a condom when having sex with a woman if she is circumcised					
	Agree (N=106)		Disagree (N=814)		p-value		Agree (N=134)		Disagree (N=786)		p-value		Agree (N=71)		Disagree (N=849)		p-value	
	N	%	N	%			N	%	N	%			N	%	N	%		
Condom use frequency					NS						NS						NS	
Always or almost always	21	19.8%	158	19.4%			34	25.4%	145	18.4%			15	21.1%	164	19.3%		
Sometimes	16	15.1%	167	20.5%			22	16.4%	161	20.5%			9	12.7%	174	20.5%		
Rarely or never	69	65.1%	489	60.1%			78	58.2%	480	61.1%			47	66.2%	511	60.2%		
HIV status					NS						NS						NS	
Positive	4	3.8%	24	2.9%			3	2.2%	25	3.2%			1	1.4%	27	3.2%		
Negative	102	96.2%	790	97.1%			131	97.8%	761	96.8%			70	98.6%	822	96.8%		
HIV transmission knowledge					NS						0.006						<0.001	
Low: 0-3 answers correct	15	14.2%	94	11.5%			23	17.2%	86	10.9%			19	26.8%	90	10.6%		
Intermediate: 4 answers correct	34	32.1%	212	26.0%			45	33.6%	201	25.6%			26	36.6%	220	25.9%		
High: 5 answers correct	57	53.8%	508	62.4%			66	49.3%	499	63.5%			26	36.6%	539	63.5%		
Self-perceived HIV risk					NS						NS						0.01	
Low-risk	50	47.2%	394	48.4%			61	45.5%	383	48.7%			31	43.7%	413	48.6%		
High risk	18	17.0%	189	23.2%			28	20.9%	179	22.8%			9	12.7%	198	23.3%		
Unknown risk	38	35.8%	230	28.3%			45	33.6%	223	28.4%			31	43.7%	237	27.9%		
HIV can be transmitted by tattooing or ritual scarring					0.07						NS						NS	
Yes	94	88.7%	735	90.3%			121	90.3%	708	90.1%			62	87.3%	767	90.3%		
No	9	8.5%	32	3.9%			5	3.7%	36	4.6%			5	7.0%	36	4.2%		
Don't know	3	2.8%	45	5.5%			8	6.0%	40	5.1%			4	5.6%	44	5.2%		

*Wald χ^2 value; NS: not significant; Bondo is the local term referring to female genital mutilation

Figure 4.2. Odds ratios of demographic and knowledge factors associated with male study participants' opinions that undergoing Bondo protects women from diseases that are sexually transmitted, Sierra Leone 2013
Odds ratio reference categories: education- senior secondary school, marital status- married or living with partner, HIV transmitted by tattooing/ritual scarring – yes; Bondo is the local term referring to female genital mutilation.

Figure 4.3. Odds ratios of demographic and knowledge factors associated with male study participants' opinions that a man should only seek sexual partners that have undergone Bondo

Odds ratio reference categories: education level- senior secondary school, HIV transmission knowledge – high – 5 answers correct; Bondo is the local term referring to female genital mutilation

Figure 4.4. Odds ratios of demographic and knowledge factors associated with male study participants' opinions that a man does not need to use a condom when having sex with a woman if she is circumcised
Odds ratio reference categories: Age at first sex-≤15, HIV transmission knowledge – high, self-perceived HIV risk- low risk

Table 4.4. Association of demographic, knowledge and behavioral factors with opinions regarding female genital mutilation's influence on sexual behaviors among female study participants, Sierra Leone - 2013

	Undergoing Bondo protects women from diseases that are sexually transmitted					A man should only seek sexual partners that have undergone Bondo					A man does not need to use a condom when having sex with a woman if she is circumcised				
	Agree (N=16)		Disagree (N=97)		p-value	Agree (N=15)		Disagree (N=98)		p-value	Agree (N=7)		Disagree (N=106)		p-value
	N	%	N	%		N	%	N	%		N	%	N	%	
Age (yrs)															
Mean (SD)	33.5 (7.8)		33.5 (7.7)		NS	35.0 (8.3)		33.2 (7.6)		NS	30.1 (6.7)		33.7 (7.7)		NS
Birth region					NS					NS					NS
Eastern	4	25.0%	20	20.6%		1	6.7%	23	23.5%		2	28.6%	22	20.8%	
Western	1	6.3%	33	34.0%		5	33.3%	29	29.6%		1	14.3%	33	31.1%	
Southern	2	12.5%	12	12.4%		2	13.3%	12	12.2%		0	0.0%	14	13.2%	
Northern	9	56.3%	32	33.0%		7	46.7%	34	34.7%		4	57.1%	37	34.9%	
Education level					NS					NS					NS
None	1	6.3%	5	5.2%		0	0.0%	6	6.1%		0	0.0%	6	5.7%	
Primary	4	25.0%	11	11.3%		1	6.7%	14	14.3%		0	0.0%	15	14.2%	
Junior secondary school	4	25.0%	22	22.7%		4	26.7%	22	22.4%		3	42.9%	23	21.7%	
Senior secondary school	6	37.5%	47	48.5%		10	66.7%	43	43.9%		3	42.9%	50	47.2%	
Vocational/college/university	1	6.3%	12	12.4%		0	0.0%	13	13.3%		1	14.3%	12	11.3%	
Religious affiliation					NS					NS					NS
Muslim	5	31.3%	34	35.1%		5	33.3%	34	34.7%		3	42.9%	36	34.0%	
Christian	11	68.8%	63	64.9%		10	66.7%	64	65.3%		4	57.1%	70	66.0%	
Marital status					NS					NS					0.01
Single	5	31.3%	31	32.0%		7	46.7%	29	29.6%		6	85.7%	30	28.3%	
Married or living with a partner	9	56.3%	55	56.7%		6	40.0%	58	59.2%		1	14.3%	63	59.4%	
Widowed/divorced/separated	2	12.5%	11	11.3%		2	13.3%	11	11.2%		0	0.0%	13	12.3%	
Age at first sex (yrs)					NS					NS					NS
<= 15	3	18.8%	7	7.2%		1	6.7%	9	9.2%		1	14.3%	9	8.5%	
16-19	10	62.5%	55	56.7%		11	73.3%	54	55.1%		2	28.6%	63	59.4%	
20-25	2	12.5%	30	30.9%		3	20.0%	29	29.6%		3	42.9%	29	27.4%	
26-38	0	0.0%	2	2.1%		0	0.0%	2	2.0%		1	14.3%	1	0.9%	
Unknown	1	6.3%	3	3.1%		0	0.0%	4	4.1%		0	0.0%	4	3.8%	

*Wald χ2 p-value; NS: not significant, Bondo is the local term referring to female genital mutilation

Table 4.4. Association of demographic, knowledge and behavioral factors with opinions regarding female genital mutilation's influence on sexual behaviors among female study participants. Sierra Leone – 2013, continued

	Undergoing Bondo protects women from diseases that are sexually transmitted					A man should only seek sexual partners that have undergone Bondo					A man does not need to use a condom when having sex with a woman if she is circumcised				
	Agree (N=16)		Disagree (N=97)		p-value	Agree (N=15)		Disagree (N=98)		p-value	Agree (N=7)		Disagree (N=106)		p-value
	N	%	N	%		N	%	N	%		N	%	N	%	
Condom use frequency					NS					NS					0.06
Always or almost always	2	12.5%	13	13.4%		0	0.0%	15	15.3%		3	42.9%	12	11.3%	
Sometimes	3	18.8%	15	15.5%		1	6.7%	17	17.3%		2	28.6%	16	15.1%	
Rarely or Never	11	68.8%	69	71.1%		14	93.3%	66	67.3%		2	28.6%	78	73.6%	
HIV status					0.04					NS					NS
Positive	3	18.8%	4	4.1%		2	13.3%	5	5.1%		0	0.0%	7	6.6%	
Negative	13	81.3%	93	95.9%		13	86.7%	93	94.9%		7	100.0%	99	93.4%	
HIV transmission knowledge					NS					NS					0.03
Low: 0-3 answers correct	1	6.3%	4	4.1%		1	6.7%	4	4.1%		2	28.6%	3	2.8%	
Intermediate: 4 answers correct	1	6.3%	27	27.8%		1	6.7%	27	27.6%		2	28.6%	26	24.5%	
High: 5 answers correct	14	87.5%	66	68.0%		13	86.7%	67	68.4%		3	42.9%	77	72.6%	
Self-perceived HIV risk					0.02					NS					0.01
Low-risk	4	25.0%	63	64.9%		10	66.7%	57	58.2%		2	28.6%	65	61.3%	
High risk	5	31.3%	17	17.5%		1	6.7%	21	21.4%		0	0.0%	22	20.8%	
Unknown risk	7	43.8%	17	17.5%		4	26.7%	20	20.4%		5	71.4%	19	17.9%	
HIV can be transmitted by tattooing or ritual scarring					NS					NS					0.04
Yes	13	81.3%	92	94.8%		14	93.3%	91	92.9%		5	71.4%	100	94.3%	
No	2	12.5%	3	3.1%		1	6.7%	4	4.1%		2	28.6%	3	2.8%	
Don't know	1	6.3%	2	2.1%		0	0.0%	3	3.1%		0	0.0%	3	2.8%	

*Wald $\chi2$ p-value; NS: not significant, Bondo is the local term referring to female genital mutilation

CHAPTER 5.

Discussion and Conclusions

OVERVIEW

The goals of this dissertation project were to examine the prevalence and correlates of sexually transmissible infections and to identify gender norms surrounding female genital mutilation among soldiers in the Sierra Leone military. More specifically, we evaluated the associated risk factors with the prevalence of HIV and syphilis, and high-risk sexual behaviors surrounding alcohol use. Opinions about partner selection, STI protection, and condom use based on female genital mutilation status were also investigated, as they pertained to higher risk sexual behaviors.

The important findings presented highlighted the need for increased research efforts on the combination of local cultural and behavioral factors influencing the transmission of the infectious diseases studied. The results of this dissertation encourage comprehensive community participative programs covering education, prevention, and behavioral modification. A better understanding of the poor health outcomes stemming from the practice of FGM/C should continue to be discussed among men and women belonging to this community. Moreover, increasing comprehensive health services, with reduced stigma, and alcohol use education would greatly benefit early diagnosis and decrease the opportunities for transmission.

SUMMARY OF FINDINGS

Prevalence of HIV and syphilis and associated risk factors

The prevalence of syphilis among study participants was 7.3% (95% CI: 5.9-8.8%). Older age, being HIV positive, and residing in the rural part of the country increased the odds of being positive for syphilis. The overall prevalence of HIV among the study participants was 3.3% (95% CI: 2.3-4.3%). Positively associated risks for HIV included having multiple concurrent partnerships, being female, having HIV tests outside of military health facilities, unplanned sex after drinking alcohol, and using condoms. Properties intrinsic to the military environment such as common cohort effects, i.e. military rank, and deployment within the national territory did not affect HIV status.

This research investigation found that HIV-positive participants did not have lower frequency of condom use with their partners compared to those who were HIV-negative. This observation was not influenced by known confounders including age, relationship status, or types of sexual partner. Additionally, we reported that those who obtained HIV testing only at clinics outside of military health facilities were more likely to be HIV-positive than those who had been tested at military facilities. This study finding may be indicative of further issues with health services or stigma that were not studied in depth. For instance, some participants cited the unavailability of test kits and mistrust of counselors as deterrents from using military HIV testing services.

Alcohol-related sexual disinhibition among men and associated determinants

Unplanned or unprotected sex due to alcohol demonstrates the relationship between HIV transmission risk and alcohol-triggered sexual disinhibition. Our study demonstrated that many other high-risk behaviors were associated with this event-level behavior. For instance, 10.2% reported alcohol-related sexual disinhibition (ARSD) in the past 3 months. ARSD was positively associated with being 35-44 years old, living in concubinage, having 3 or more sexual partners in the past year, paying for sex, not getting testing for HIV, and acquiring an STI. After adjustment, unplanned sex and unprotected sex after alcohol consumption were also associated with high-risk sexual partnerships, lack of HIV testing, and STI history. Having more than 3 sexual partners in the last year and paying for sex were considered high-risk sexual partnerships.

This study evidenced the existence of high-risk behaviors linked to HIV transmission in a population where the HIV prevalence is approximately 5%. These behaviors are directly connected to the occurrence of alcohol consumption in this population.

Attitudes towards sexual behaviors influenced by female genital mutilation

Regarding the practice of female genital mutilation, we found important levels of agreement to the attitudes studied. Our findings evidenced the influence of FGM/C on partner selection, STI protection, and condom use. Overall, a quarter of the women believed that FGM/C influenced these behaviors, and one in six men did so as well. Among women, attitudes were influenced by marital status, poor knowledge of HIV transmission, and low self-perceived risk of acquiring HIV. In men, this study found that

lower education, lower age at sexual debut, poor overall knowledge of how HIV can be

transmitted, and also low self-perceived HIV risk were associated with their beliefs on

FGM/C.

RESEARCH CONTRIBUTIONS AND IMPLICATIONS

The scientific literature on communicable diseases determinants and beliefs

associated with female genital mutilation in Sierra Leone is severely limited, in

comparison to other countries of the West African region, e.g. Ghana or Côte d'Ivoire,

where health infrastructures tend to be more organized and are better equipped to supply

necessary human resources to sustain the demand for services. After decades of civil war

that ravaged most of Sierra Leone's infrastructures including structured healthcare

coverage and sanitation, most of the scientific literature has been focused on the trauma

of war and the reinsertion of former child soldiers. More recently, the Ebola virus

outbreak in the region has renewed the interest about the state of the health and sanitation

infrastructures in the country [1]. The subject of this dissertation is under-investigated in

this population. With this body of research based on a military population, we were able

to bring to light several issues that are unique in the Sierra Leone context. For instance,

the need to eliminate persistent barriers to HIV testing was predominant especially when

it was also shown that testing infrastructures are already easily accessible because of

aggressive outreach from the military HIV/AIDS prevention program.

Additionally, high-risk behaviors linked to alcohol use accentuated the necessity for comprehensive combined HIV and alcohol education topics to be included in all prevention programing. For instance, interventions among men presenting with STI symptoms to health clinics could address behavioral change education to reduce unprotected or unplanned sex after a drinking event [2]. Examining the impact of alcohol use together with HIV transmission risk would contribute to reduce the incidence of STIs including HIV in our population of interest. In order to eliminate the potential for horizontal transmission of HIV, comprehensive interventions are indeed necessary.

Moreover on the subject of gender norms and women's sexual health, this dissertation provided the first outlook of the effects of FGM on sexual behaviors, in a society were more than 90% of women have underwent the procedure. Indeed, little is known on this aspect of the topic. This work emphasized the impact of FGM on sexual health and the need to provide culture-specific education to trigger behavioral change.

The implications of the results of this research project include the need for routine HIV and STI testing among those affiliated with the Sierra Leone military similarly to other military populations [3]. Our findings also showed the impact of counseling and behavior change among those already diagnosed with HIV. For example, we observed more frequent and consistent condom use with any partners among HIV-positive study subjects. Evidenced-based prevention methods such as barrier prevention and education should continue to be emphasized within this population. Although those already HIV-positive had the opportunity for the correct behavior change education, other sexually

transmitted diseases such as syphilis are also highly prevalent. This finding stresses the importance of sexual health education and STD prevention in this population.

STRENGTHS AND LIMITATIONS

This research study had several strengths. First, the study population was a heterogeneous mix and a wide range of behaviors and beliefs were represented. The systematic random sampling methodology greatly helped achieve this ideal study population. The assessment of the presence of sexually transmitted infection in blood was done with state–of-the-art rapid testing tools. In addition, there was a very low non-response rate to the random selection, further emphasizing that a minimal amount of bias was introduced in the study population. The use of computer assisted personal interviews may have helped reduce bias in recalling sensitive sexual behaviors and increase data quality using automated audits for inconsistent responses [4]. Finally, the larger sample sizes of the study population analyzed allowed to maximize the meaningfulness of the observations.

Despite sound methodological approaches and robust analyses, this research study has a few limitations. The cross sectional design limited the temporal assessment of behavioral risk. We only investigated prevalent HIV-positive cases. Adding diagnosis dimensionality to behaviors with respect to the event of HIV diagnoses would help separate continued high-risk behaviors. Also the study population may be in better health than the general population, as soldiers must pass physical medical examinations that

include sexually transmitted infections screenings prior to being eligible to enlist into the armed forces. Moreover, new soldiers are only allowed to enlist if they are HIV negative. This policy has only been enforced in recent years, further obscuring the effect of temporality among this cohort of soldiers.

Women participation was also a limitation. There were less than 20% of women in our study population, a limitation of the military environment. This limited the amount of women-specific conclusions possible from our observations. Furthermore, self-reported behaviors and STIs possibly led to reporting and recall bias. Underreporting of possibly stigmatized behaviors, such as heavy drinking, paying for sex, lack of condom use with casual partners because of guilt may contribute to the underestimation of these important high-risk behaviors [5, 6]. It would also be true among those that have received education on HIV prevention and factor in the reliability of our results. Nonetheless, missing responses to the questionnaire were scarce and overall non-participation less than 5%.

Attitudes on the relationship of FGM/C to sexual behaviors have never been studied in this manner. Although our study questionnaire was piloted, further qualitative research to measure the repeatability of the attitudes from the same source population. However, we do not believe the validity of the answers to FGM/C attitudes were hampered by socially desirability bias in this situation, because there are no laws in Sierra Leone banning the practice contrary to other West African countries such as Burkina Faso, Mauritania, Senegal, Guinea, and Cote d'Ivoire [7]. Other systematic surveys in

the general population of Sierra Leone had an extremely high response rate (greater than 99%) on attitudes regarding continuing the practice on daughters [8]. Furthermore, specific information about ethnic identity among our study participants could not be captured, as it is still a sensitive topic among the military as a result of the civil war. Ethnicity has been shown to influence the practice of female genital mutilation in Sierra Leone [9]. Information on the actual prevalence of FGM/C among female study participant might be a missing factor characterizing the relationships found. Bondo practices although well known by both gender are still taboo to be discussed, as they describe membership into a secret society. Our predominantly male data collection staff was extremely reticent to inquire about the FGM/C status of women in the study. The analysis of the determinants of beliefs toward FGM/C would have been better explained knowing the status of the women in the study and of the sexual partners of male participants.

FUTURE DIRECTIONS

Based on the results of this observational cross-sectional study, there are still several research questions to be answered in order to fully understand the effect of high-risk behaviors and characteristics influencing HIV and syphilis transmission in this population. Future investigations should first focus on determining the exact incidence of these sexually transmissible diseases (HIV and syphilis) in the same source population. It would be important to define the exact causal behavioral determinants of these infections in order to halt the existing pathways of transmission. This population sees a high burden of HIV, syphilis, as well tuberculosis in addition to other infections difficult to prevent as

malaria, Lassa fever, and more recently Ebola hemorrhagic fever [1, 10]. An individual can be repeatedly re-infected with syphilis even after successful treatment and cure. Investigating the repeated transmission of active syphilis would greatly impact the understanding of key risk factors, and case clusters in high-risk behaviors [11]. It would permit the creation of tailored evidence-based interventions needed to control the transmission of these diseases, and successfully eliminate the incidence of new cases in this population.

Study subjects recruited from the rural Eastern region had the highest HIV prevalence and would benefit from a targeted study that would provide information on specific risk factors to soldiers living in that region. We have already established that men in this region did exhibit alcohol-related sexual disinhibitory behaviors that are correlated with other determinants of HIV transmission risk. Our study also found that participants living in the Eastern region were more likely to have never been tested for HIV compared to those living in Western region, 32% vs. 18%, respectively. Moreover, 19% of participants in the Northern region and 12% from the Southern region had never taken an HIV test prior to this study. Additionally, unstudied factors favoring sexual transmission of HIV specific to these localities may also account for this increase. Soldiers with steady incomes can be attractive for sexual partnerships in places with limited employment opportunities. Furthermore, the Eastern region of the country has a common border with the Northern Liberia and Southeastern Guinea where the regional HIV prevalence are higher, especially among adult women [12, 13].

Understanding possible physical, behavioral, or mental barriers to HIV testing in military facilities would be important in reducing the reticence in the knowledge of HIV status. This information could be use to implement community interventions aimed to increased the uptake using the health services freely available for all soldiers and their dependents. Furthermore, accurate measures of condom use affiliated with alcohol use would help better our understanding of the combination of HIV transmission risk due to alcohol in our at-large population. Other impulsive behaviors due to alcohol that would further suggest psychosocial determinants would be intimate partner violence (IPV) or gender-based violence (GBV) [14]. Studying the perpetration of GBV together with situational alcohol drinking could lead to all-round prevention to eliminate the violence.

Finally, further research on opinions regarding FGM/C and risk behaviors associated with HIV transmission is greatly needed. This is the first epidemiological analysis investigating the association with FGM/C.

CONCLUSIONS

In conclusion, this research project outlined the need for continued research into the risk factors for HIV, syphilis; and for discussed beliefs surrounding sexual behaviors associated with practice of female genital mutilation. It revealed that the respective prevalence of HIV and syphilis among members of the Sierra Leone military remained elevated. Outreach efforts should encourage behavior changes aimed at reducing high-risk behaviors such as reduction in numbers of contemporaneous sexual partners and

moderation in alcohol use. Discussing the impact of female genital mutilation on sexual behavior would add to the understanding of social and behavioral dynamics in Sierra Leone regarding FGM/C. It also adds another dimension to the topics the sexual health and violence against women. Education campaigns demystifying the beliefs that FGM/C grants protection from STIs would be primordial in this context. Understanding sexual behaviors associated with the practice may be an important step in providing comprehensive HIV prevention services in this community.

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APPENDIX.

Study Questionnaire

(Survey Face page for interviewer)

RSLAF HIV Seroprevalence and Behavioral Risk Survey

Subject ID _____

FP1. Base Location

1.	1 BN HQ	8.	12 BN HQ
2.	2 BN HQ	9.	14 BN HQ
3.	4 BN HQ/ 4 BDE HQ	10.	AFTC
4.	5 BN HQ	11.	JMU HQ
5.	5 BDE HQ	12.	JLU
6.	9 BN HQ	13.	M/WING HQ
7.	11 BN HQ		

FP2.What is the participant's gender?
q(1) Male
q(2) Female

Module Section 1. Demographic Information

Thank you for participating in the survey. Please remember that your answers to this survey are completely confidential, your name will not be attached to any of your answers, so please answer as honestly as possible.

I would like to begin the interview by asking some questions about you.

101. What is your age? Please estimate your best answer

|__|__| years old
q(99) REFUSED

102. In what district were you born?

q(1) Bo
q(2) Bombali
q(3) Bonthe
q(4) Kailahun
q(5) Kambia
q(6) Kenema
q(7) Koinadugu
q(8) Kono
q(9) Moyamba
q(10) Port Loko
q(11) Pujehun
q(12) Tonkolili
q(13) Western Area Urban
q(14) Western Area Rural
q(99) REFUSED

103. What is the highest education level that you have completed?

q(1) Did not attend school
q(2) Attended some primary school but not completed
q(3) Primary
q(4) JSS
q(5) SSS
q(6) Vocational
q(7) College/University
q(99) REFUSED

104. What is your religious affiliation?

    q(1) Muslim
    q(2) Christian
    q(3) No religious affiliation
    q(4) Other (non-Christian) → Please specify:_____
    q(99) REFUSED

105. What is your current marital status?

    q(1) Single, never married and not living with a partner [→ SKIP TO Q107]
    q(2) Single, living with a partner
    q(3) Married to one partner
    q(4) Polygamous marriage
    q(5) Widowed
    q(6) Divorced/Separated
    q(99) REFUSED

106a. [Male]: All together, how many sexual partners do you live with now?
      [INTERVIEWER: ENTER "999" FOR REFUSED]

    |__|__| partners
    q(999) REFUSED

106b [Female]: Including yourself, how many wives or live-in partners does your husband or partner have?
     [INTERVIEWER: ENTER "999" FOR REFUSED]

    |__|__| partners
    q(999) REFUSED

These next questions are about your military background.

107. What military unit are you in?

    Please indicate the number corresponding to the unit you belong to:|_____|
    q(1) Joint Medical Unit
    q(2) Juba Barracks
    q(3) Murray Town Barracks
    q(4) 3rd Brigade Freetown Garrison
    q(5) 11th Battalion Kambia
    q(6) Marine Time Wing
    q(7) 15th Battalion Lungi
    q(8) Armed Forces Training Center (Benguema)
    q(9) 5th Battalion Wilberforce
    q(10) 7th Battalion Goderich

q(11) Armed Forces Educational Center (AFEC)
q(12) Army Engineers Wellington
q(13) Ministry of Defence
q(14) Cockeril Station – Joint Forces Command
q(15) Joint Communication Unit
q(16) Peace Mission Training Center
q(17) Joint Logistics Unit
q(18) Military Police
q(19) 4th Brigade Makeni
q(20) 4th Battalion Makeni
q(21) 9th Battalion Kono
q(22) 12th Battalion Kabala
q(23) 5th Brigade Gondama Bo
q(24) 1st Battalion Daru
q(25) 2nd Battalion Kenema
q(26) 14th Battalion Pujehun
q(99) REFUSED

108. What is your current rank in the military?
    q(1) Private
    q(2) Junior NCO
    q(3) Warrant Officer/Senior NCO
    q(4) Junior Officer
    q(5) Senior Officer
    q(99) REFUSED

109. How many years have you been in the military?
    [INTERVIEWER: ENTER "999" FOR REFUSED]

    |__|__| years
    q(999) REFUSED

110. Have you been deployed or sent to training to any of the following local locations for 6 months or more in the past 2 years? Check ☑ all that apply. CHOOSE ALL THAT APPLY

    q(98) I have not been on a local deployment in the past 2 years [→ SKIP TO Q113]
    q(1) Freetown
    q(2) Kambia
    q(3) Pujehun
    q(4) Bo
    q(5) Makeni
    q(6) Other → Please specify:_____
    q(99) REFUSED

111. During your most recent local deployment that lasted 6 months or more, how many total sexual partners did you have? Please estimate your best answer
"Sexual partners" include anyone you have had vaginal or anal sex with. It does not include oral

4

sex.

[INTERVIEWER: ENTER "999" FOR REFUSED. IF NO SEXUAL PARTNERS, WRITE 0]

|__|__|__| partners [→IF "0" SKIP TO Q113]
q(999) REFUSED

112. What type of sexual partners did you have during your most recent local deployment?
Check ☑ all that apply.
"Regular partners" include your spouse and boyfriend/girlfriend and any person with whom you
have a committed or permanent relationship even if they do not stay with you.
"Casual partners" includes any person with whom you have sex only once or periodically, but do
not have a committed relationship. This does not include your spouse, boyfriend/girlfriend, or
regular partners
q(1) Regular Partner(s)
q(2) Casual Partner(s)
q(3) Commercial sex worker(s)
q(99) REFUSED

113. Have you been deployed to any of the following foreign locations in the past 2 years?
Check ☑ all that apply.

q(98) I have not been on a foreign deployment in the past 2 years [→SKIP TO Q201]
q(1) Sudan
q(2) Lebanon
q(3) East Timor
q(4) Other → Please specify:_____
q(99) REFUSED

114. During your most recent foreign deployment, how many total sexual partners did you have?
Please estimate your best answer
[INTERVIEWER: ENTER "999" FOR REFUSED. IF NO SEXUAL PARTNERS, WRITE 0.]

|__|__|__| partners [→ IF "0" SKIP TO Q201]
q(999) REFUSED

115. What type of sexual partners did you have during your most recent foreign deployment?
Check ☑ all that apply.
"Regular partners" include your spouse and boyfriend/girlfriend and any person with whom you
have a committed or permanent relationship even if they do not stay with you.
"Casual partners" includes any person with whom you have sex only once or periodically, but do
not have a committed relationship. This does not include your spouse, boyfriend/girlfriend,
or regular partners. .

q(1) Regular Partner(s)
q(2) Casual Partner(s)

q(3) Commercial sex worker(s)
q(99) REFUSED

Module Section 2. Sexual History

The next questions ask about HIV and sexual partners. Please try to answer as honestly as possible. Remember, your answers will remain strictly confidential and will not have any effect on your military service or benefits. No personal information will be released that can be traced back to you.

201. Have you ever had sex? By sex, we mean vaginal or anal sex between 2 willing individuals. This does not include oral sex.
    q(1) Yes
    q(2) No
    q(99) REFUSED

202. Approximately how many sexual partners have you had in your <u>lifetime</u>, including any current partners? Please estimate your best answer
[INTERVIEWER: ENTER "999" FOR REFUSED. ENTER "777" FOR DON'T KNOW]

    |__|__|__| partners

    q(777) Don't know
    q(999) REFUSED

[→IF 201=No and 202 is 0 then SKIP TO Section 3]

203. Approximately how old were you the first time you had sex? By sex, we mean vaginal or anal sex between 2 willing individuals. This does not include oral sex. Please estimate your best answer
    [INTERVIEWER: ENTER "999" FOR REFUSED. ENTER "777" FOR DON'T KNOW]

    |__|__| years old

    q(777) Don't know
    q(999) REFUSED

204. "Regular partners" include your spouse and boyfriend/girlfriend and any person with whom you have a committed or permanent relationship even if they do not stay with you. . In the past <u>12 months</u>, how many <u>regular partners</u> did you have sex with?
[INTERVIEWER: ENTER "0" if haven't had sex with any regular partners in the last 12 months. ENTER "999" FOR REFUSED. ENTER "777" FOR DON'T KNOW]
    |__|__|__| regular partners

    q(777) Don't know
    q(999) REFUSED

205. ""Casual partners" includes any person with whom you have sex only once or periodically but do not have a committed relationship. This <u>does not</u> include your spouse, boyfriend/girlfriend, or regular partners. In the past <u>12 months</u>, how many <u>casual partners</u>

did you have sex with?
[INTERVIEWER: If haven't had sex with any casual partners in the last 12 months, write 0. IF
    REFUSED ENTER "999" IF DON'T KNOW ENTER "777"]

|__|__|__| casual partners

q(777) Don't know
q(999) REFUSED

206. Have you ever had sex with more than one partner in the same week? By sex, we mean
vaginal or anal sex between 2 willing individuals. This does not include oral sex.
    q(1) Yes
    q(2) No
    q(99) REFUSED

207. Have you ever received or provided money, shelter, food, drugs, favors, or gifts in exchange
    for sex? Check ☑ all that apply.
    q(1) Yes, I've paid a commercial sex worker
    q(2) Yes, I've received or provided money, shelter, food, drugs, favors, or gifts in
    exchange for sex
    q(3) No, I've never received or provided money, shelter, food, drugs, favors, or gifts in
    exchange for sex
    q(99) REFUSED

We now would like to collect some more information about any sexual partners you had
during the last 6 months.

Answer the following questions about the last time you had sex with your regular partner.
"Regular partners" include your spouse and boyfriend/girlfriend, and any person with
whom you have a committed or permanent relationship even if they do not stay with you.

208. Was a condom used the last time you had sex with this regular partner?
        q(1) Yes
        q(2) No
        q(98) I did not have sex with a regular partner in the past 6 months (→ SKIP TO Q214)
        q(99) REFUSED

209. How often was a condom used with this regular partner in the last 6 months? Would you
say:
        q(1) Always:100% of the time
        q(2) Almost always: 76-99% of the time
        q(3) Sometimes:26-75% of the time
        q(4) Rarely/Never: 0-25% of the time
        q(99) REFUSED

210. Was this regular partner's status HIV positive, HIV negative, or unknown?
        q(1) HIV positive

q(2) HIV negative
q(77) Don't know
q(99) REFUSED

211. Did you know your own HIV status the last time you had sex with your regular partner?
    q(1) Yes
    q(2) No
    q(99) REFUSED

212. What is the gender of this regular partner?
    q(1) Male
    q(2) Female
    q(88) Prefer not to answer
    q(99) REFUSED

213. What type of sex did you have?
    q(1) Vaginal
    q(2) Anal
    q(3) Both vaginal and anal
    q(88) Prefer not to answer
    q(99) REFUSED

These last questions were about regular partners you had in the last 6 months. We will now ask you the same questions, but about casual partners you had in the last 6 months

Answer the following questions about the last time you had sex with your casual partner. "Casual partners" includes any person with whom you have sex with only once or periodically with but do not have a committed relationship. This does not include your spouse, boyfriend/girlfriend, or regular partners.

214. Was a condom used the last time you had sex with this casual partner?
    q(1) Yes
    q(2) No
    q(98) I did not have a casual partner in the past 6 months (→ SKIP TO Q221)
    q(99) REFUSED

215. How often was a condom used with this casual partner in the last 6 months? Would you say:
    q(1) Always:100% of the time
    q(2) Almost always:76-99% of the time
    q(3) Sometimes:26-75% of the time
    q(4) Rarely/Never:0-25% of the time
    q(99) REFUSED

216. The last time you had sex with this casual partner, were you drinking alcohol within 2 hours before having sex?
    q(1) Yes
    q(2) No

q(99) REFUSED

217. Was this casual partner's status HIV positive, HIV negative, or unknown?
q(1) HIV positive
q(2) HIV negative
q(77) Don't know
q(99) REFUSED

218. Did you know your own HIV status the <u>last time you had sex</u> with your casual partner?
  q(1) Yes
  q(2) No

  q(99) REFUSED

219. What is the gender of this casual partner?
  q(1) Male
  q(2) Female
  q(88) Prefer not to answer
  q(99) REFUSED

220. What type of sex did you have?
  q(1) Vaginal
  q(2) Anal
  q(3) Both vaginal and anal
  q(88) Prefer not to answer
  q(99) REFUSED

221. (FOR MEN ONLY). Sometimes men experience discharge from their penis, sore or ulcer near their penis, or burning upon urination. During the last 12 months have you experienced any of these symptoms?
  q(1) Yes
  q(2) No
  q(77) Don't know
  q(99) REFUSED

Module Section 3. Condom Use and Accessibility

301. In the last <u>3 months</u>, how often did you use a condom when you had sex? Would you say:
    q(1) Always :100% of the time
    q(2) Almost always:76-99% of the time
    q(3) Sometimes: 26-75% of the time
    q(4) Rarely/Never: 0-25% of the time
    q(98) I did not have sex during the last 3 months
    q(99) REFUSED

302. Where could you obtain **free condoms**, if you wanted one, within your military? Check ☑ all that apply.
    q(98) Free condoms are not available at my barracks, unit, or base
    q(1) Mess/Barracks
    q(2) Toilet/Bathroom
    q(3) MI Room, Military medical facility, clinic, or hospital
    q(4) Peer educator/ counselor
    q(5) Other. Please specify _____
    q(77) Don't know
    q(99) REFUSED

303. How easy or difficult is it for you to get the **free condoms**? Would you say it is:
    q(1) Very easy
    q(2) Easy
    q(3) Difficult
    q(4) Very difficult
    q(99) REFUSED

304. Do you generally use the **free** condoms provided by your military?
    q(97) Free condoms are not available at my barracks, unit, or base [→SKIP TO Q306]
    q(1) Yes [→SKIP TO Q306]
    q(2) No
    q(99) REFUSED

305. What are the reasons you do not generally use the free condoms provided by your military?
Please answer "Yes" or "No" for each of the possible reasons listed.

1. I don't like the lubricant	q(1) Yes	q(2) No	q(99) REFUSED
2. I don't like the texture	q(1) Yes	q(2) No	q(99) REFUSED
3. I don't like the smell	q(1) Yes	q(2) No	q(99) REFUSED
4. I don't trust them	q(1) Yes	q(2) No	q(99) REFUSED
5. They don't have the right brand	q(1) Yes	q(2) No	q(99) REFUSED
6. It is embarrassing to take the free condoms from the available sources (e.g. clinics, condom dispensers, etc.)	q(1) Yes	q(2) No	q(99) REFUSED
7. Location of free condoms is not convenient	q(1) Yes	q(2) No	q(99) REFUSED
8. Insufficient quantity of free condoms	q(1) Yes	q(2) No	q(99) REFUSED
9. The hours of availability aren't convenient	q(1) Yes	q(2) No	q(99) REFUSED
10. Other reason Please specify:_____	q(1) Yes	q(2) No	q(99) REFUSED

Please answer each of the following questions by indicating if you agree with the statement, if you disagree with the statement, or if you don't know.

306. Condoms can be used more than once.
    q(1) Agree
    q(2) Disagree
    q(77) Don't Know
    q(99) REFUSED

307. A woman would lose respect for a man if he suggested that they use a condom.
    q(1) Agree
    q(2) Disagree
    q(77) Don't Know
    q(99) REFUSED

308. A man would lose respect for a woman if she asked him to use a condom.
    q(1) Agree
    q(2) Disagree
    q(77) Don't Know
    q(99) REFUSED

309. It is all right for a married woman to ask her husband to use a condom.
    q(1) Agree
    q(2) Disagree
    q(77) Don't Know
    q(99) REFUSED

310. It is all right for a married man to use a condom with his wife.
      q(1) Agree
      q(2) Disagree
      q(77) Don't Know
      q(99) REFUSED

311. I would use condoms more often if I had them when I needed one.
      q(1) Agree
      q(2) Disagree
      q(77) Don't Know
      q(99) REFUSED

312. It is the man's responsibility to have condoms when needed.
      q(1) Agree
      q(2) Disagree
      q(77) Don't Know
      q(99) REFUSED

313. Youth should be given education about condoms.
      q(1) Agree
      q(2) Disagree
      q(77) Don't Know
      q(99) REFUSED

Module Section 4. Utilization and Access to HIV Testing

401. Have you ever taken an HIV test? Check ☑ all that apply. CHOOSE ALL THAT APPLY
    q(1) Yes, at a military facility
    q(2) Yes, outside of a military facility
    q(3) No [→SKIP TO Q407]
    q(99) REFUSED

402. If you have previously taken an HIV test, what was your HIV status when you last tested?
    q(1) HIV-positive
    q(2) HIV-negative [→SKIP TO Q404]
    q(98) I did not receive the results[→SKIP TO Q404]
    q(88) Prefer not to answer[→SKIP TO Q404]
    q(99) REFUSED

403. If you are HIV positive, are you currently on anti-retroviral treatment?
    q(1) Yes
    q(2) No
    q(99) REFUSED

404. How long ago was your last HIV test? Please estimate your best answer

    |__|__|__| months ago

    q(777) Don't know
    q(999) REFUSED

405. How many times have you ever been tested for HIV since joining the military?
    [INTERVIEWER: ENTER "999" FOR REFUSED.ENTER "777" FOR DON'T KNOW]

    |__|__| times
    q(77) Don't know
    q(99) REFUSED

406. If HIV testing and counseling services are available on your base, have you been tested for HIV there?
    q(1) Yes
    q(2) No
    q(98)No services available on base
    q(99) REFUSED

407. If you were to take an HIV test, who would you tell your results to?
    Check ☑ all that apply.
    q(98) I would not want anyone to know my test results
    q(1) Spouse(s)
    q(2) Sexual partner(s) (other than spouse)
    q(3) Other family members
    q(4) Colleagues/friends

q(5) Commander
q(6) Other→ Please specify:_____
q(99) REFUSED

408. If you have HIV testing and counseling services on your base, do you use them?
q(1) Yes [→SKIP TO Q501]
q(2) No
q(98)Not applicable, no services available on my base [→SKIP TO Q501]
q(99) REFUSED

409. Why don't you use the HIV testing and counseling services on your base? Please answer
"Yes" or "No" for each of the possible reasons listed

1. I don't have transportation	q(1) Yes	q(2) No	q(99) REFUSED
2. Services are too far away	q(1) Yes	q(2) No	q(99) REFUSED
3. I don't have time	q(1) Yes	q(2) No	q(99) REFUSED
4. Not open during my free time/infrequent hours	q(1) Yes	q(2) No	q(99) REFUSED
5. I don't know where to find services	q(1) Yes	q(2) No	q(99) REFUSED
6. Only available to certain ranks or personnel	q(1) Yes	q(2) No	q(99) REFUSED
7. No test kits available when I go	q(1) Yes	q(2) No	q(99) REFUSED
8. I don't feel comfortable/trust the counselors there	q(1) Yes	q(2) No	q(99) REFUSED
9. I don't want to know my status	q(1) Yes	q(2) No	q(99) REFUSED
10. Other reason	q(1) Yes	q(2) No	q(99) REFUSED
Please specify:_____			

Module Section 5. Circumcision

501. [MEN ONLY]Are you circumcised?
    q(1) Yes
    q(2) No [SKIP TO 504]
    q(77) Don't know
    q(99) REFUSED

502. [MEN ONLY]If you are circumcised, who performed the circumcision?
    q(1) Medical provider
    q(2) Traditional circumciser
    q(3) Other → Please specify:_____
    q(77) Don't know
    q(99) REFUSED

503. [MEN ONLY]At approximately what age were you circumcised?

    |___|___| years old;
    q(77) Don't know
    q(99) REFUSED

504. [MEN ONLY]. After seeing the drawing, please indicate the amount of foreskin that most closely resembles your penis?
    q(1) Drawing #1
    q(2) Drawing #2
    q(3) Drawing #3
    q(4) Drawing #4
    q(99) REFUSED

Others have made the following comments regarding *Bondo* (female genital circumcision). Indicate if you agree or disagree with the following statements.

505. Undergoing *Bondo* protects women from diseases that are sexually transmitted.
    q(1) Agree
    q(2) Partially agree
    q(3) Disagree
    q(99) REFUSED

506. A man should only seek sexual partners that have undergone *Bondo*.
    q(1) Agree
    q(2) Partially agree
    q(3) Disagree
    q(99) REFUSED

507. A man does not need to use a condom when having sex with a woman if she is circumcised.
    q(1) Agree
    q(2) Partially agree
    q(3) Disagree
    q(99) REFUSED

Module Section 6. Gender-Based Violence

Other people have made the following comments listed below. Please indicate if you agree or disagree with these statements.

601. It is alright for a man to use physical force to get a woman to have sex when she does not want to.
    q(1) Agree
    q(2) Disagree
    q(77) Don't know/unsure
    q(99) REFUSED

602. It is alright for a man to threaten or coerce a woman to have sex when she does not want to.
    q(1) Agree
    q(2) Disagree
    q(77) Don't know/unsure
    q(99) REFUSED

603. When a woman is forced to have sex against her will, it is usually because of things she said or did.
    q(1) Agree
    q(2) Disagree
    q(77) Don't know/unsure
    q(99) REFUSED

604. A woman should not withhold sex from a man she knows when he desires it.
    q(1) Agree
    q(2) Disagree
    q(77) Don't know/unsure
    q(99) REFUSED

605. Have you had sex when you didn't want to because you were verbally threatened, physically forced, or were afraid to refuse?
    q(1) Yes
    q(2) No [→ SKIP TO Q607]
    q(88) Prefer not to answer
    q(99) REFUSED

606. Have you ever been verbally threatened or physically forced to have sex, by a military member?
    q(1) Yes
    q(2) No
    q(77) Don't know
    q(88) Prefer not to answer
    q(99) REFUSED

607. If you have ever felt obligated to have sex with a military superior, why? Check ☑ all that apply.

    q(98) I have not felt obligated to have sex with any of my military superiors

    q(1) I wanted a promotion or other favor (such as avoiding deployment or a better assignment)

    q(2) Verbally threatened/physically forced

    q(3) Other → Please specify:_____

    q(88) Prefer not to answer

    q(99) REFUSED

Module Section 7. Alcohol Use
The following are questions about alcohol consumption. Drinks containing alcohol include dilution, rubber, beer, wine, a shot of liquor or a mixed drink with liquor in it.

701. In the last 3 months, did drinking alcohol prevent you from using condoms or using condoms correctly?
    q(0) Yes
    q(1) No
    q(97) I do not use condoms
    q(98) I did not have sex and/or I did not drink alcohol in the last 3 months
    q(99) REFUSED

702. In the last 3 months, did you ever have sex when you did not intend to, as a result of drinking alcohol?
    q(0) Yes
    q(1) No
    q(98) I did not have sex and/or I did not drink alcohol in the last 3 months
    q(99) REFUSED

703. How often during the last 12 months did you have any drink containing any amount of alcohol? Would you say:
    q(0) Never [→SKIP TO 711]
    q(1) Monthly or less
    q(2) 2-4 times a month
    q(3) 2-3 times a week
    q(4) 4 -6 times a week
    q(5) Everyday
    q(99) REFUSED

704. Thinking about the last 12 months, how many drinks containing alcohol do you have on a regular day? Would you say:
    q(0) 0
    q(1) 1 or 2
    q(2) 3 or 4
    q(3) 5 or 6
    q(4) 7 to 9
    q(5) 10 or more
    q(99) REFUSED

705. Thinking about the last 12 months, how often do you have 6 or more drinks containing alcohol on one occasion? Would you say:
    q(0) Never
    q(1) Less than monthly
    q(2) Monthly
    q(3) Weekly
    q(4) Daily or almost daily
    q(99) REFUSED

[Skip to Q709 if Q704=0 and Q705=0]

706. How often during the last <u>12 months</u> have you found that you were not able to stop drinking once you had started? Would you say:
    q(0) Never
    q(1) Less than monthly
    q(2) Monthly
    q(3) Weekly
    q(4) Daily or almost daily
    q(99) REFUSED

707. How often during the last <u>12 months</u> have you failed to do what was normally expected of you because of drinking? Would you say:
    q(0) Never
    q(1) Less than monthly
    q(2) Monthly
    q(3) Weekly
    q(4) Daily or almost daily
    q(99) REFUSED

708. How often during the last <u>12 months</u> have you needed a first drink in the morning to get yourself going after a heavy drinking session? Would you say:
    q(0) Never
    q(1) Less than monthly
    q(2) Monthly
    q(3) Weekly
    q(4) Daily or almost daily
    q(99) REFUSED

709. How often during the last <u>12 months</u> have you had a feeling of guilt or remorse after drinking?
    q(0) Never
    q(1) Less than monthly
    q(2) Monthly
    q(3) Weekly
    q(4) Daily or almost daily
    q(99) REFUSED

710. How often during the last <u>12 months</u> have you been unable to remember what happened the night before because of your drinking?
    q(0) Never
    q(1) Less than monthly
    q(2) Monthly
    q(3) Weekly
    q(4) Daily or almost daily
    q(99) REFUSED

711. Have you or someone else been injured because of your drinking?
     q(0) No
     q(1) Yes, but not in the last year
     q(2) Yes, in the last year
     q(99) REFUSED

712. Has a relative, friend, doctor or other health care worker been concerned about your drinking or suggested you cut down?
     q(0) No
     q(1) Yes, but not in the last year
     q(2) Yes, in the last year
     q(99) REFUSED

Module Section 8. HIV Knowledge

801. Can the risk of HIV transmission be reduced by having sex with only one faithful, uninfected partner?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

802. Can a person get HIV from mosquito bites?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

803. Can the risk of HIV transmission be reduced by using condoms?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

804. Can a person get HIV by sharing food with someone who is infected?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

805. Can a healthy-looking person have HIV?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

806. I would be willing to share my quarters with someone from my platoon who is infected with HIV
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

807. Can people get HIV because of witchcraft or other supernatural means?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

808. Can the virus that causes HIV be transmitted from a mother to a child during pregnancy?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

809. Can the virus that causes HIV be transmitted from a mother to a child during delivery?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

810. Can the virus that causes HIV be transmitted from a mother to a child through breastfeeding?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

811. Can you get HIV through traditional means, for example tattooing or ritual scarring?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

812. Do you think HIV/AIDS can be cured?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

813. Have you heard about antiretroviral drugs or ARVs that people infected with HIV can get from a doctor or a nurse to help them live longer?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

814. In your view, do you think there is anything a person can do to avoid getting HIV?
    q(1) Yes
    q(2) No
    q(77) Don't Know
    q(99) REFUSED

815. What are the chances that you may become infected with HIV? Would you say:
    q(98) Already HIV positive
    q(1) Not at all likely
    q(2) Somewhat likely
    q(3) Highly likely
    q(77) Don't know/Not sure
    q(99) REFUSED

Module Section 9. Drug Use

The next questions ask about your use of diamba (Cannabis). Please answer as honestly as possible. Remember, your answers will remain strictly confidential and will not have any effect on your military service or benefits. No personal information will be released that can be traced back to you

901. Have you ever used diamba? This includes smoking, drinking and eating. [Remember that your answers will remain strictly confidential and will not have any effect on your military service.]

    q(1) Yes
    q(2) No [→SKIP TO Q1001]
    q(99) REFUSED

902. In the past 12 months, how often have you used diamba? This includes smoking, drinking and eating.

    q(1) Never
    q(2) Once
    q(3) 2-4 times
    q(4) 2-3 times a week
    q(5) 4 or more times per week
    q(6) Everyday
    q(99) REFUSED

903. In the past 12 months do you think diamba use prevented you from using a condom properly?

    q(1) Yes
    q(2) No
    q(97) I do not use condoms
    q(98) Did not have sex in the past 12 months
    q(99) REFUSED

Module Section 10. Tuberculosis

1001. In the last 3 months have you experienced the following? Check ☑ all that apply.
    q(1) Lost your appetite
    q(2) Lost 5kg of weight or more involuntarily
    q(3) Had a cough
    q(4) Experienced night sweats
    q(98) None of the above
    q(99) REFUSED

1002. Have you ever been in contact with someone who you thought had Tuberculosis (dry cough)?
    q(1) Yes
    q(2) No
    q(99) REFUSED

1003. Do you currently smoke cigarettes?
    q(1) Yes [→SKIP TO Q1005]
    q(2) No
    q(99) REFUSED

1004. Did you smoke cigarettes regularly in the past and have now quit?
    q(1) Yes
    q(2) No
    q(99) REFUSED

1005. How many cigarettes do/did you usually smoke per day?

    |__|__|__| cigarettes
    q(99) REFUSED

1006. Have you ever been tested for Tuberculosis (dry cough)?
    q(1) Yes
    q(2) No
    q(99) REFUSED

1007. Have you ever been treated for Tuberculosis (dry cough)?
    q(1) Yes
    q(2) No [-> SKIP TO END]
    q(99) REFUSED

1008. If you have ever been treated for Tuberculosis (dry cough), how long did you take the medicine for?

    |__|__|__| months
    q(99) REFUSED