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Point-of-care testing for HIV and sexually transmitted infections reveals risky behavior among men at gambling centers in Uganda"

Agnes N Kiragga [1], John M Bwanika[1,2], Joshua Kyenkya[1], Grace Banturaki[1], Joanita Kigozi[3], Davis Musinguzi[2], Florence Namimbi[3], Geetanjali Chander[4], Steven J Reynolds[4,5] and Yukari C Manabe[4]

Abstract

In sub-Saharan Africa (SSA), men are generally difficult to engage in healthcare programs. However, sports gambling centers in SSA can be used as avenues for male engagement in health programs. We offered point-of-care HIV and syphilis testing for men located at five gambling centers in Uganda and assessed HIV risky sexual behavior. Among 507 men, 0.8% were HIV-positive and 3.8% had syphilis. Risky sexual behavior included condomless sex with partner(s) of unknown HIV status (64.9%), having multiple sexual partners (47.8%), engaging in transactional sex (15.5%), and using illicit drugs (9.3%). The majority at 64.5% were nonalcohol consumers, 22.9% were moderate users, and 12.6% had hazardous consumption patterns. In 12 months of follow-up, the incidence rate of syphilis was 0.95 (95% CI: 0.82-1.06) among 178 men. Thus, men in SSA have a high prevalence of syphilis and risky sexual behavior which should be more effectively addressed to reduce the risk of HIV acquisition.

Keywords

Syphilis (treponema pallidum), Africa, high-risk behavior, men, HIV (human immunodeficiency virus)

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Introduction

Globally, there were 36.9 million people living with HIV in 2017,[1] with Eastern and Southern African regions bearing the largest burden (19.6 million).[1] Even though the documented burden of HIV remains greater among women than men in Africa, more AIDS-related deaths have been observed among men than women[2]; in sub-Saharan Africa (SSA), men are also less likely to present to care.[3–5] Data from five African countries reported that nearly one-third of men had never tested for HIV[6]—a "blind spot" highlighted by UNAIDS.[7] Furthermore, the Uganda Demographic and Health Survey (UDHS 2016) revealed that 55% of women compared to only 47% of men aged 15–49 years had tested for HIV in the 12 months preceding the survey; while the recent Uganda Population–based Impact HIV assessment (UPHIA) survey showed that the prevalence of HIV among adults (aged 15–64 years) in Uganda was 6.2%–7.6% among women and 4.7% among men.[8] However, the proportion of men engaging in high-risk sexual behavior was high.[9] There is growing interest in finding and engaging African men in HIV programs, and several strategies have been implemented to increase uptake of HIV testing and male engagement in sexual and reproductive health, including testing at religious venues,[10] recreational sports teams,[11] on-site "moon-light" testing services,[12] and various self-testing strategies—either door-to-door or during voluntary medical male circumcision (VMMC) activities[13]—with variable

[1] Research Department, Infectious Diseases Institute, College of Health Sciences, Makerere University, Kampala, Uganda
[2] The Medical Concierge Group, Kampala, Uganda
[3] Outreach Department, College of Health Sciences, Infectious Diseases Institute, Makerere University, Kampala, Uganda
[4] Division of Infectious Diseases, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD, USA
[5] Division of Intramural Research, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, MD, USA

Corresponding author:
Agnes N Kiragga, Infectious Diseases Institute, College of Health Sciences, Makerere University, PO Box 22418, Kampala 22418 Uganda.
Email: akiragga@idi.co.ug

success. There is urgent need to expand HIV testing and Sexually Transmitted Infection (STI) screening services in male-dominated spaces, to increase uptake of these services among this important population.

Sub-Saharan Africa continues to bear the greatest burden of syphilis compared to other regions,[14] with higher prevalence recorded among young people.[15,16] In Africa, gender differences in prevalence of syphilis continue to exist with slightly higher reported prevalence among women than men.[17] According to the most recent UPHIA released in 2017, the national prevalence of syphilis among men and women aged 15–64 years was 2.0% and 2.2%, respectively.[18] In high-income countries, syphilis increases the risk of HIV, particularly among high-risk populations.[19] Similarly, genital herpes is a recurrent lifelong infection caused by herpes simplex virus (HSV) and is one of most prevalent STIs in SSA,[20] particularly in high-risk populations. Understanding the burden of such STIs (syphilis and genital herpes) among young men remains critical for development of strategies for risk reduction and reduced transmission.

Furthermore, other factors related to risky behavior, such as heavy alcohol consumption among men in countries like Uganda with high capita alcohol consumption among men, are critical.[21,22] A study conducted among outpatients who undertook provider-initiated HIV testing and counseling revealed that 14% of men engaged in hazardous alcohol consumption.[22] In fishing communities in Uganda, 53.5% of residents reported fisherfolk consumed alcohol,[23] and 69.8% of fishermen engaged in problematic consumption of alcohol.[24] Understanding the burden of HIV and syphilis among men, who do not interface with the public health programs, is key to generating accurate estimations of STIs in men in order to develop interventions to reduce incidence.

In Uganda and other SSA countries, sports gambling centers have burgeoning appeal to men and are often co-located with bars and commercial sex workers. Previous studies in resource-rich settings have been undertaken among gambling populations and reported several risk factors for HIV acquisition correlated with gambling.[25–27] We hypothesized that young Ugandan men in urban gambling centers may be at increased risk of HIV and STI acquisition due to the presence of neighboring services including commercial sex trade and alcohol sale. We, therefore, aimed to pilot point-of-care testing for HIV and syphilis for men at gambling centers and to characterize known HIV risk behaviors occurring in this population.

Methodology

Study setting and procedures

The study was conducted at five purposively selected sports gambling centers in two urban and peri-urban large cities: Kampala in Central Uganda and Mbale in Eastern Uganda. Prior to study initiation, the research team investigators received permission to conduct the study from the owners of the centers—Kampala City Council Authorities (KCCA)—as well as gambling center managers. Persons aged 18 years and above, whose last HIV test was more than 3 months prior or never had a test and were willing to consent to the study procedures, were eligible for participation. The research team worked with representatives from gambling houses to increase awareness of the testing service and to encourage them to distribute flyers to each client who visited the gambling center.

Following obtaining informed consent for study participation, research staff administered the study questionnaire and obtained a venous blood sample. HIV testing was performed using the national HIV sequential testing algorithm which includes use of Determine™ HIV-1/2 (Alere Medical Company Limited, Chiba, Japan) STAT-PAK™ (Chembio Diagnostic Systems, Medford, NY, USA), and Uni-Gold™ HIV (Trinity Biotech Plc, IDA Business Park, Bray, Co. Wicklow, Ireland) as the tiebreaker.[28] Syphilis testing was performed using the treponemal antibody SD BIOLINE Syphilis 3.0 (SD Standard Diagnostics, INC. 65, Borahagal-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea). All tests were performed on-site and results returned to the patients on-site within 30 min. All participants who tested positive on the treponemal test were asked about previous treatment for syphilis. Remaining sera was stored at -80°C. A random sample of 80 frozen samples was tested for herpes simplex virus-2 (HSV-2) to examine the prevalence of this STI. Samples for HSV-2 testing were selected using probability proportionate to size to ensure that men from all representative age groups (based on observed age groups (years 18–24, 25–35, 36–49, and 50+) and sites were included. HSV-2 tests were performed using the Kalon™ HSV-2 gG2 enzyme-linked immunosorbent assay (Kalon Biological Ltd, Aldershot, UK).

Risky behaviors

Using a structured questionnaire, we collected data on various risky sexual behaviors defined as sexual activities or practices that increase the risk of acquiring STIs and HIV, including non-condom use with sexual partner of unknown status, having multiple (>1) sexual partners, being non-circumcised, engaging in transactional sex, high alcohol intake, and illicit drug use which were defined as drugs that are illegal to make, sell, or use.[29]. In our study, marijuana was the most commonly used illicit drug. The time frame for assessing all risky behaviors was 12 months prior to the study. The Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) tool was used to identify patients with hazardous alcohol use.[30] Participants were asked three questions about their alcohol consumption and items were categorized to identify no (score 0), moderate/mild

(scores 1–3), and hazardous/heavy (4+) consumption. The AUDIT-C tool has been validated in sub-Saharan African settings and performed well.[31]

Mobile health platform

Following study initiation, all participants with a functional mobile telephone were enrolled on a mobile health-messaging platform. Short messaging services (SMS) and/or voice calls were sent from a telehealth center to remind men to link to care services and to return for repeat HIV and STI testing. Using an open-source SMS engine called "RapidPro SMS platform," all study participants immediately received an SMS upon joining the health platform while at the gambling center. The RapidPro SMS was customized and managed by The Medical Concierge Group (TMCG), a digital health company currently supporting several HIV and public health projects in Uganda and Kenya.[32] In addition to the SMS and voice calls, all enrolled subjects had access to a 24 h call center to communicate with in-house counselors and medical doctors in case they had any questions relating to HIV and STI testing and linkage to care. Research participation travel reimbursement was paid through electronic money transfers (mobile money) to mobile phones assigned to different existing telecom service providers within 7 days of their sign up.

Data collection and statistical analysis

Data were collected by trained study research assistants using a structured questionnaire designed and implemented using the REDCap software. Android tablets were used to gather and upload data daily onto the server at the Infectious Diseases Institute (IDI). All tablets were only accessible to research staff who had individualized passwords for security and confidentiality. We used descriptive statistics for demographic, clinical, and socioeconomic characteristics of study participants. Chi square and Fishers' exact were employed to test for differences between categorical variables, while Student's t-tests, analysis of variance (ANOVA), and Mann–Whitney tests were used to test for differences between continuous normally and non-normally distributed variables.

Risky sexual behavior variables were assessed as count variables, as has previously been done by others studies in order to enable us to compare our findings.[33,34] To examine the factors associated with risky sexual behavior, Poisson regression models controlling for other variables such as age and marital status were used. A key assumption of the Poisson regression is that the mean and variance for the distribution of the count variables have to be equal (equi-dispersion), and this was observed in our data.[35] We used a log link function with maximum likelihood estimation for the analysis of the Poisson regression. Factors with <0.2 in the univariable models were included in the multivariable model, together with clinically and demographically known confounders such alcohol consumption. Robust standard errors were used to account for inter-site correlation. Approximately 12 months after, the study team reached out to all study participants to converge at each of the gambling centers for repeat HIV and STI testing. All analyses were performed using STATA version 14, Texas, United States.

Ethical approval

The study obtained approval from the Joint Clinical Research Center (JCRC) institutional review and ethics committee and the Uganda National Council for Science and Technology (HS70ES). All study participants provided written informed consent for participation.

Results

A total of 527 men were screened and 20 were excluded because they had recently been tested for HIV and syphilis in the previous 3 months (n = 18), were <18 years (n = 1), and unwilling to be followed up after testing (n = 1). Between 75 and 137 men were enrolled at each of the 5 centers, each with one 8 hour testing day (Table 1). Median age was 28 years (interquartile range (IQR):24–34), the majority 49.6% (251/507) were married or living with their partners, and 49.8% (255/507) had completed secondary level education, while 90.5% (459/507) were employed with an average monthly income of $121. A total of 146/501 (29.1%) of the men were not circumcised. We found that 64.5% had an AUDIT-C score of zero and 22.8% were moderate consumers, while 12.6% engaged in hazardous alcohol consumption (Table 1).

Prevalence of HIV, syphilis, and HSV-2

A total of 91.5% (463/507) of the men had previously been tested for HIV. We observed very low HIV prevalence: only four men tested HIV-positive (prevalence of 0.8%). Nineteen (19) men had syphilis treponemal antibodies present corresponding to a prevalence of 3.8%. The men who tested syphilis treponemal antibody positive were slightly older than the negative ones and none had previously been treated for syphilis—32 years (interquartile range (IQR): 28, 35) versus 28 (IQR: 24, 34), p = 0.001. Among the randomly selected 80 samples for HSV-2 testing (10 among men who reported no risky behavior, 47 with one risky behavior, and 23 who engaged in two or more risk behaviors), 37.5% (30/80) were positive, while one participant had indeterminate results. All men who were identified as HIV-positive and those diagnosed with syphilis, identified at enrollment, were referred to the nearest health center supported by the IDI for ART initiation and active syphilis confirmation and treatment. Of the 22 cases (4 HIV and 19 syphilis), all HIV cases (4/4)

Table 1. Demographic and behavioral characteristics of men involved in point-of-care testing for HIV and other sexually transmitted infections at gambling centers in Uganda.

Characteristic	Study population *N* = 507
Age in years median (IQR)	28 (24, 34)
Education	
None	20 (3.9)
Primary	147 (28.7)
Secondary	255 (49.8)
Tertiary	30 (5.9)
University	60 (11.7)
Marital status	
Single	207 (41.2)
Married/cohabiting	251 (49.6)
Separated/divorced/widower	48 (9.5)
Employment status	
Employed	459 (90.5)
Full-time student	26 (5.1)
Unemployed	22 (4.3)
Average monthly income	$121
Ever tested for HIV	463 (91.5)
Alcohol consumption	
None	327 (64.5)
Moderate	116 (22.9)
Hazardous	64 (12.6)
Non-circumcised	146 (29.1)
Never heard about PrEP	364 (73.8)
Willing to take PrEP	333 (67.3)

IQR: interquartile range; N: number; PrEP: pre-exposure prophylaxis; WHO: world health organization; AUDIT-C: alcohol use disorders identification test-consumption.

and 94.7% of syphilis cases (18/19) were linked to care through the reminder call via the mobile technology services provided by the telehealth platform.

HIV risky behaviors

HIV risky behaviors were observed among the men, and these included the following: engaging in condomless sex 325/501 (64.9%), having multiple sexual partners 231/483 (47.8%), engaging in commercial sex 78/504 (15.5%), and consuming illicit drugs 47/504 (9.3%). In our cohort, only 69 (13.6%) of the men did not engage in any risky behavior, while 241 (47.5%) and 197 (38.9%) engaged in one and two or more HIV risky behaviors, respectively **(**Table 2**)**. In general, lower proportions of men engaging in two or more risk behaviors had attained high (tertiary or university level education) compared to the other two groups, $p = 0.015$. A greater proportion (94.4%) of men who engaged in two or more risky behaviors were employed, than those who engaged in one (89.6%) or none (82.6%), $p = 0.039$. We observed a dose–response relationship between alcohol consumption and engagement in HIV risky behavior. Among the men who did not engage in any HIV risky behavior, only 4.2% engaged in hazardous alcohol consumption, compared to 9.4% and 16.4% among men engaging in two or more risky behaviors, $p = 0.011$ **(**Table 2**)**.

Among the men who engaged in more than one risky behavior, the types of behaviors included having multiple sexual partners (26.7%), engaging in condomless sex with partner of unknown HIV status (24.4%), being uncircumcised (20.2%), engaging in transactional sex (16.3%), and engaging in illicit drug use (12.4%). In the entire cohort, the average number of sexual partners was 2.4 in the last 12 months. After excluding men with one sexual partner ($n = 252$), the mean number of sexual partners in the last 12 months was 3.7. Among the men who had multiple sexual partners, 56.7% (131/231) engaged in condomless sex with a partner of unknown HIV status. The majority of men who tested syphilis positive 9/19 (47.4%) were engaged in two or more risky sexual behaviors, while none of the men who engaged in risky behavior were HSV positive.

Factors associated with HIV risky sexual behaviors

In a multivariable Poisson regression model **(**Table 3**)**, we observed that age was associated with engagement in risky behavior. For every 5 year increase in age, the number of risky behaviors reduced by 0.04, corresponding to a risk ratio of 0.96 (95% CI: 0.93–0.99), $p = 0.014$.

Alcohol consumption was significantly associated with engaging in risky sexual behavior. The number of risky behaviors increased by an average of 0.15 among moderate drinkers and 0.21 among the hazardous alcohol consumers compared to nondrinkers—controlling for the other variables in the model **(**Table 3**)**. The model also showed that being a student was associated with lower engagement in risky behavior than men who were employed.

Participant follow-up data

All study participants were contacted over the phone and informed about the 1 year follow-up visit and repeat HIV and syphilis testing. Only 178/507 (35.1%) returned to the gaming centers for follow-up and repeat testing despite contacting 329/507 (78.3%). The median time to repeat follow-up visit was 14.2 months (IQR: 12.2–17.6). There were no differences in demographic characteristics and prevalence of risky behavior between men who returned for follow-up and those who did not. During follow-up, we observed no incident HIV cases; however, 1.1% (2/178) of men acquired syphilis. A total of 209.78 person years of follow-up were observed with an incidence rate of syphilis of 0.95 (95% CI: 0.82–1.06) per 100 person years of

Table 2. Demographic characteristics stratified by HIV risk behavior among men involved in point-of-care testing for HIV and other sexually transmitted infections at gambling centers in Uganda.

	HIV risky behavior N = 507			
Characteristic	None N = 69 (13.6%)	1 N = 241 (47.5%)	2+ N = 197 (38.9%)	p-value
Age in years median (IQR)	28 (24, 33)	28 (25, 35)	28 (25, 34)	0.835
Education[a]				
None	5 (7.2)	7 (2.9)	8 (4.2)	**0.015**
Primary	14 (20.3)	57 (23.9)	72 (36.7)	
Secondary	36 (52.2)	124 (52.1)	91 (46.4)	
Tertiary	2 (2.9)	18 (7.6)	10 (5.1)	
University	12 (17.4)	32 (13.5)	15 (7.6)	
Marital status				
Single	39 (56.5)	92 (38.4)	76 (38.6)	0.073
Married/cohabiting	26 (37.7)	122 (50.8)	103 (52.3)	
Separated/divorced/widower	4 (5.8)	26 (10.8)	18 (9.1)	
Employment status				
Employed	57 (82.6)	216 (89.6)	186 (94.4)	**0.039**
Full-time student	7 (10.1)	15 (6.2)	4 (2.0)	
Unemployed	5 (7.3)	10 (4.2)	7 (3.6)	
Average monthly income	US$132	US$125	US$110	0.323
Ever tested for HIV	65 (94.2)	220 (91.3)	178 (90.8)	0.721
HIV prevalence	0 (0.0)	3 (1.2)	1 (0.5)	0.795
Syphilis prevalence	3 (4.3)	7 (2.9)	9 (4.6)	0.651
HSV-2 prevalence	3 (30.0)	19 (40.4)	8 (34.8)	0.570
Alcohol consumption				
None	35 (74.5)	134 (70.2)	158 (58.7)	**0.025**
Moderate	10 (21.3)	39 (20.4)	67 (24.9)	
Hazardous	2 (4.2)	18 (9.4)	44 (16.4)	
Non-circumcised	0 (0.0)	22 (11.7)	124 (46.4)	**<0.001**
Never heard about PrEP	31 (67.4)	140 (75.7)	193 (73.4)	0.494
Willing to take PrEP	27 (60.0)	115 (61.5)	191 (72.6)	**0.011**

IQR: interquartile range; N: number; PrEP: pre-exposure prophylaxis; WHO: world health organization; AUDIT-C: alcohol use disorders identification test-consumption; HSV-2 testing was performed among 80 men; 10 among men who reported no risky behavior, 47 with one risky behavior, and 23 who engaged in two or more risk behaviors. *p*-values in bold were statistically significant with values $p < 0.05$.
[a]Education missing for three study participants.

follow-up. During the follow-up visit, participants were asked about their perceived risk of acquiring HIV, and 95% (19/20) who did not engage in any risk behavior thought they were unlikely to acquire HIV. However, 25.2% (34/135) of men engaging in 1–2 risk behaviors thought they were likely to acquire HIV, while 12/20 (60%) among those engaging in 3+ risky behaviors thought they were unlikely to acquire HIV despite their risky behavior, $p = 0.031$.

Discussion

Poor male engagement in sexual and reproductive care remains a key barrier to HIV treatment and prevention. Our study is the first to report HIV and STI prevalence among men at sports gambling centers in an African population. We found a low prevalence of HIV, but a higher than expected prevalence of syphilis. Additionally, we found that nearly half of the men were engaging in one risky behavior, while close to 40% engaged in two or more risk behaviors and 47.8% of the enrolled men had multiple sexual partners.

HIV prevalence (<1%) was low compared to the 6% population prevalence reported in the most recent UPHIA survey among men of similar age-group (14–49 years)[18] and reported HIV prevalence for the Central region (8.0%) of Uganda which includes Kampala, where the bulk of our testing occurred. We observed high prevalence of syphilis treponemal antibody (3.8%, with none of the men having previously been treated) compared to the national estimate of 2.0% among men 15–64 years, and 1.6% among men in urban areas.[18] Syphilis was also more prevalent among the older men. In comparison with data from pregnant women, the prevalence of syphilis in our cohort was higher.[20,36] A recent systematic review showed a pooled prevalence of syphilis among pregnant women in SSA of 2.9% (95% CI:

Table 3. Multivariable poisson regression model showing factors associated with HIV risky sexual behavior among men involved in point-of-care testing for HIV and other sexually transmitted infections at gambling centers in Uganda.

Variable	Multivariable poisson regression model		*p* value
Variable	β	Exp (β) (95% CI)	p Value
Age per 5 year increase	−0.04	0.96 (0.93–0.99)	**0.014**
Education			
None		Ref	
Primary	0.23	1.26 (0.88–1.80)	0.204
Secondary	0.07	1.07 (0.77–1.47)	0.679
Tertiary	0.06	1.05 (0.77–1.45)	0.726
University	−0.08	0.92 (0.70–1.22)	0.570
Marital status			
Single		Ref	
Married/cohabiting	0.06	1.08 (0.94–1.24)	0.276
Separated/divorced/widower	0.08	1.07 (0.76–1.50)	0.702
Employment status			
Employed		Ref	
Full-time student	−0.26	**0.77 (0.65–0.91)**	**0.002**
Unemployed	−0.18	0.83 (0.61–1.15)	0.271
Alcohol consumption			
None		Ref	
Moderate	0.15	**1.16 (1.04–1.29)**	**0.007**
Hazardous	0.21	**1.23 (1.06–1.52)**	**0.040**

CI: confidence interval. *p*-values in bold were statistically significant with $p < 0.05$.

2.4%–3.4%),[20] with higher estimates among women from Eastern and Southern Africa (3.2%, 95% CI: 2.3%–4.2% and 3.6%, 95% CI: 2.0%–5.1%, respectively).[20] Although not significant (most likely due to the small numbers of positives), syphilis prevalence was 8 times higher among the HIV-positive men, suggesting that, as with populations of men in the United States who have sex with men (MSM), syphilis may antedate HIV and increase the risk for HIV acquisition.[19]

Our results provide preliminary data that highlight the need for increased screening and longer follow-up among men diagnosed with syphilis, to ascertain and prevent early HIV acquisition. In our cohort, we observed two incident syphilis infections among 178 previously negative men, corresponding to a high incidence rate of 0.95 per 100 persons in a population that is not defined as "high risk." It has been shown that VMMC reduces the risk of syphilis and, in this population where a third of the men were uncircumcised, there is need for more activities to ensure that sexually active men are circumcised perhaps in similar venues.[37] The prevalence of HSV-2 was similarly high at 37.5% and comparable with other study populations in Uganda, which reported estimates between 30 and 67%.[20,38–40]

We observed a high prevalence of hazardous alcohol consumption (12.6%) which mirrored general population national estimates [21] and previous studies in Uganda.[22,23] In general, we observed a dose response of alcohol consumption and HIV risk behaviors such as poor condom use, multiple sexual partners, engagement in commercial sex, and non-illicit and illicit drug use. The observed prevalence of risky behaviors positions the young African men at high risk for HIV acquisition and is cause for alarm. The proportion of men with multiple sexual partners was higher than that reported in the most recent Uganda Demographic and Health Survey of 2016, with 31.1% compared to 29.1%.[9] In our study, the mean number of sexual partners in the last 12 months among all men who reported multiple sexual partners in the 12 months preceding the study was 3.7, indicating risky behavior which was correlated with hazardous alcohol consumption, as shown by other studies carried out in other key populations in Uganda.[24]

Studies in South Africa have demonstrated similarly high risk among the young men and support the urgent need for interventions to target behavioral change to reduce risk of acquiring HIV.[41] In Southwestern Uganda, researchers from Rakai Health Sciences Program reported high mobility among young men coupled with indulgence in several HIV risk behaviors including hazardous alcohol use, multiple sexual partners, and inconsistent condom use.[42] These findings emphasize the need for designing HIV behavioral interventions that target men who may benefit from HIV prevention services, given their high STI burden, high-risk profile, and low HIV prevalence. Behavioral community interventions that target men, such as the "Stylish Man"

campaign by the Rakai Health Sciences Program in Uganda, are timely and promote safe sexual behaviors.[43] Furthermore, the digital health-based interventions which leverage growing smartphone adoption in SSA could be used to promote HIV prevention behaviors.[44]

Our study has several limitations, including not knowing the total number of men at risk who attend betting and gaming centers. We observed very low prevalence of HIV and this could be attributed to self-selection for HIV testing among recent testers and those who were sure of their previous HIV status. This could have introduced a sampling bias and yielded HIV estimates that are much lower than expected in Kampala district and the Central region. Third, a small proportion of the participants returned for repeat testing and this could have hindered our ability to fully estimate HIV incidence in this population. The prevalence of syphilis observed from our study might be overestimated because of failure to use a nontreponemal test, which differentiates previous from current infection. Even though we asked all study participants whether they had ever received past treatment or management of genital ulcer diseases (GUDs) with intramuscular *benzathine penicillin G* (BPG), our results could be subject to recall bias.

Prior to any follow-up activity at the gaming centers, all participants were contacted using telephone calls and notified of the upcoming HIV/STI services. The majority (>85%) of the men who did not show up for repeat testing were contactable but gave several reasons for failure to participate in repeat tests, which included the following: being at work, having been travelling, had not engaged in any risky sexual behavior, and others. Notably, we did not find demographic differences between the men who returned in person and those who did not. Last, our study was not a case–control study, which made it difficult to compare data and draw concrete conclusions. Finally, we may have introduced sampling bias since over 90% of the men who consented to testing had previously tested negative for HIV. This, in turn, could have affected the estimation of HSV and syphilis in this population.

Conclusion

Risky sexual behaviors were prevalent in the men surveyed in the selected gambling venues. The higher than expected prevalence of syphilis, a known risk factor for subsequent HIV acquisition, combined with the low prevalence of HIV, highlights the importance of prevention efforts in this population. Men who engage in risk factors for HIV acquisition should be targeted for behavioral prevention and intervention programs, such as pre-exposure prophylaxis (PrEP) and HIV self-testing.

Declaration of Conflicting Interests

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ORCID iD

Agnes N Kiragga https://orcid.org/0000-0002-0969-0699

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