Original Research Article

HIV knowledge, risk perception and avoidant behaviour change among Sierra Leonean refugees in Guinea

Running title
HIV risk avoidance among African refugees

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Authors' contributions
AW and NH analysed the data and drafted the paper. SK and YS contributed to conception and design, acquisition of data, and reviewing the paper. AvR conceived the study, contributing to design and reviewing. MB designed the study, contributing to acquisition, interpretation of data, and critically reviewed the paper. All authors approved the version to be published.

Abstract

A common assumption underpinning health communications design in humanitarian settings is that increasing knowledge and risk perception will lead to appropriate behaviour change. This study compares associations of HIV knowledge and perceived risk with reported HIV avoidant behaviour changes and sexual health choices from a community survey of 698 sexually experienced male and female Sierra Leonean refugees in Guinea. HIV knowledge was not significantly associated with reported HIV-avoidant changes (OR 1.25; adjusted for gender; 95%CI 0.76-2.04), while perceived HIV risk was negatively associated (OR 0.38, adjusted for age at sexual debut; 95%CI 0.22-0.66). Trying to conceive was the main reason reported for not using condoms or other contraception (28%; 138/498), followed by current pregnancy/lactation (19%; 93/498). Results suggest contextual factors (e.g. desire for children) can be as important as knowledge and risk-perception, and HIV prevention initiatives in stable and chronic humanitarian settings should account for these.

Key words

HIV, risk perception, behaviour change, chronic emergencies, refugees

Introduction

Encouraging HIV avoidant behaviour change is complicated in chronic humanitarian settings by behavioural, environmental, and temporal factors (e.g. changes in socioeconomic factors, chronicity of disease and displacement).[1, 2] While behaviour change models suggest that increased awareness and risk perception precede behaviour change, HIV transmission knowledge and risk perception are not necessarily associated with safer sexual practices.[3, 4] Debate remains whether cognitive approaches (e.g. knowledge-change, increasing perceived risk) or structural approaches that alter the socioeconomic environment to reduce risk (e.g. stigma reduction, improving livelihoods) drive behaviour-change more effectively.[2, 5] While health promotion research suggests the latter, many sexual and reproductive health programmes in humanitarian settings continue to emphasise the former.[6, 7]

In sub-Saharan Africa, burdened by both conflict and HIV, diverse factors including HIV prevalence, interaction with host communities, availability of prevention and

treatment services, sexual practices, violence, and social power dynamics (e.g. gender and age inequities) can affect HIV incidence among refugees [8-13] and influence the effectiveness of HIV prevention messages. Authors showed in a previous paper that exposure to peer education was associated with increases in HIV knowledge, risk perception and avoidant behaviour change.[7] However, published research detailing associations of HIV risk perception and avoidant behaviour changes among refugees in chronic-emergency settings has been limited, focusing on Uganda, Tanzania, and Kenya.[14-16]

The primary objective of this study was to determine whether increased HIV knowledge or HIV risk perception was associated with greater frequency of reported HIV-avoidant sexual health choices (e.g. current condom usage, STI treatment seeking) in this Sierra Leonean study population. The secondary objective was to examine whether HIV risk perception was associated with other sexual health variables (i.e. STI knowledge and symptoms, family planning knowledge and attitudes) as a causal diagram (Figure 1) indicated these might influence both HIV risk perception and avoidant behaviour change. Implications for HIV prevention in similar chronic-emergency settings are discussed.

Methods

Study setting

Approximately 3.1 million refugees, and 69% of the world's 35.3 million people living with HIV, are in sub-Saharan Africa.[12, 17] From 1989-2002, violent conflict in Sierra Leone displaced approximately half a million people into the Forest Region of neighbouring Guinea.[8, 18, 19] By 1999, the Guinean Forest Region's Kissidougou and Guéckédou districts hosted a total of 329,479 refugees, overburdening Guinean health services.[20] Refugees used government health services, with fees paid by the United Nations High Commissioner for Refugees (UNHCR). Many refugees expressed dissatisfaction with Guinean services, as for example, contraceptives only became available in health centres from 1992.[18, 20] In 1995, a group of refugee midwives established the *Reproductive Health Group* (RHG) as a non-governmental organisation to improve reproductive health services in Kissidougou and Guéckédou districts.[20, 21]

The RHG '*Reproductive health for refugees by refugees*' programme was implemented among refugees in Guinea's forest region during the Sierra Leone civil conflict of 1991-2002.[22, 23] The programme emphasised reproductive health (RH), with components intended to address drivers of HIV transmission, including empowering refugee women and young people, increasing health service and contraceptive access (including condoms), and reducing stigma (e.g. particularly around adolescent sexual health). HIV-related initiatives included: (a) seconding and supporting refugee nurses and midwives to work in Guinean health facilities; (b) providing in-service training for all health staff in sexually transmitted infection (STI) management; and (c) training and supporting refugee women as peer facilitators to provide community health education, free condoms and spermicides, and referral to RHG-supported facilities.[7]

Study design and data collection

This paper uses quantitative data from a 1999 cross-sectional, questionnaire-based interview survey of sexual health among refugees in camps supported by RHG for at least four years. Study design and data collection details are described in Howard et al.[21] Briefly, the target population was reproductive age (15-49 years) female and male refugees from an estimated population of 250,000 in 48 camps across Guinea's Forest Region.

A required sample size of at least 876 individuals was calculated using Epi-Info™6 to allow a confidence level of 95%, a power of 80%, an equal number of male and female study subjects, and a design effect for clustered data of 2. The EPI cluster sampling method was used to identify household clusters with a probability proportional to camp size based on UNHCR population figures. Twenty subjects (i.e. 10 men and 10 women) were randomly selected from each of 45 clusters. All resident household members of reproductive age were eligible for interview, with temporarily absent household members visited twice more.

Participation was voluntary, with travel costs reimbursed. The questionnaire was validated for African settings and piloted locally. Refugee interviewers were trained, supervised, and of the same gender as participants. The Ministry of Public Health in

Guinea and London School of Hygiene & Tropical Medicine (LSHTM) in the United Kingdom granted ethics approval (No. 4/221).

Data analysis

A causal diagram was developed to clarify potential causal associations between RHG programme exposure, HIV knowledge and risk perception and HIV-avoidant behaviour change outcomes and guide analysis of the associations between exposures and outcomes of interest.

Data were double-entered in Epi-Info™6, and analysed in Stata®11.0, to determine associations between HIV knowledge or risk perception and sexual health outcomes, using chi-square tests and logistic regression odds ratios (ORs). Associations were considered significant at the $p \leq 0.05$ level. Potential confounders, determined by literature review and outcomes of accompanying papers, were retained in multivariate logistic regression models if ORs changed over 10%, after accounting for clustering using robust standard errors.[21]

Exposure and outcome variables were coded as binary to increase cell sizes after determining this did not change results. HIV knowledge was categorised as *lower* versus *higher,* with the former combining those providing less than four correct answers to eight HIV knowledge questions and the latter combining those providing four or more correct answers. HIV-related risk perception was categorised as *no-risk* versus *HIV-risk*, with the latter combining those identifying themselves as having low, high, or undefined risk of HIV infection. HIV avoidance was categorised as *HIV-avoidant* if participants reported changing their sexual behaviour in one or more ways to avoid HIV transmission versus *unchanged* if they did not. Reported changes were abstinence, monogamy, having fewer concurrent or sequential partners, and using condoms always or with casual partners. FP use was defined as reported use of one or more modern contraceptives, including condoms, pills, injections, intrauterine devices (IUDs), or spermicides.

Potential confounders were gender, age, education, age at sexual debut, and marriage. Gender compares *women* to *men.* Age compares *mature* (25-49 years) to *youth* (15-24 years). Education compares *formally educated* (ever attended any

school) to *not formally educated* (no formal school attendance). Age at sexual debut, defined as first penetrative sexual intercourse, compares *young* (14 years or less) to *older* (15 years or older). Marriage compares *ever* to *never married*.

Results

Demographics

The final analytical sample included 698 sexually experienced participants who had heard of HIV, of the original 868 Sierra Leonean participants interviewed. Table 1 provides demographic information disaggregated by perceived HIV risk and gender. Additional demographic analysis is published elsewhere.[7, 21, 24]

HIV knowledge, risk perception, and avoidance

Figure 1 provides a causal diagram of credible associations between exposures and outcomes of interest, including potential confounders. This analysis focuses on the associations between HIV knowledge, risk perception and avoidant behaviour change as indicated by **bold** arrows.

Table 2 provides associations of HIV knowledge and reported HIV avoidant behaviour changes. Higher HIV knowledge was not significantly associated with either risk perception (OR 0.99; 95%CI 0.65-1.52) or HIV avoidant behaviour change (OR 1.25; adjusted for gender; 95%CI 0.76-2.04). The only significant knowledge-related association was that participants with higher HIV knowledge had 41% lower odds of reporting monogamy as an HIV-avoidant choice than did lower-knowledge participants (OR 0.59, adjusted for gender; 95%CI 0.36-0.96).

Table 3 provides associations of perceived HIV risk and reported HIV avoidant behaviour changes. Perceived risk was significantly negatively associated with avoidant behaviour change, with 62% lower odds of any HIV avoidant change (63% versus 81%; OR 0.38, adjusted for age at sexual debut; 95%CI 0.22-0.66). This included 48% lower odds of current condom usage (OR 0.52; 95%CI 0.35-0.77), 66% lower odds of always using condoms (OR 0.34, adjusted for ever having married; 95%CI 0.16-0.76), twice the odds of reporting fewer sexual partners (OR 2.08; 95%CI 1.26-3.43), and 53% lower odds of abstinence (OR 0.47, adjusted for age at sexual debut; 95%CI 0.24-0.94). Perceived risk was additionally associated

with 54% lower odds of having sought advice from health professionals when experiencing a genital discharge or ulcer (39% versus 66%; OR 0.46; 95%CI 0.21-1.00), though significance was borderline.

HIV risk perception and sexual health

Table 4 provides associations of perceived HIV risk and general sexual health knowledge and attitude variables. Table 4a shows that HIV risk perception was not associated with STI knowledge or recognition of STI symptoms, except for 49% lower odds of recognising that women cannot prevent STIs by washing after sexual intercourse (OR 0.51; 95%CI 0.35-0.72). HIV risk perception was significantly associated with recent experience of STI symptoms, with those reporting HIV risk having 61% greater odds of reported genital discharge in the past twelve months (OR 1.61; 95%CI 1.14-2.26).

Table 4b shows associations between perceived HIV risk and family planning knowledge and attitudes. Perceived HIV risk was associated with 60% greater odds of approving couples usage of family planning (OR 1.60; 95%CI 1.02-2.50), 45% lower odds of partner disapproval of family planning (OR 0.55; 95%CI 0.35-0.84), and 79% and 60% greater odds respectively of stating that girls and boys should be taught about family planning before age fifteen (OR 1.79, 95%CI 1.30-2.47 for girls; OR 1.60, 95%CI 1.04-2.48 for boys). Among the 498 (71%) participants not using condoms or other methods of contraception, the main reasons given were currently attempting to conceive (28%; 138/498), followed by current pregnancy/lactation (25%; 124/498) and infrequent sex (11%; 54/498).

Discussion

HIV knowledge and risk perception

The lack of associations between HIV knowledge and avoidant behaviour change supports research indicating HIV awareness and transmission knowledge are relatively poor determinants of HIV prevention choices.[6, 22] Knowledge is a potential first step in behaviour change but appears insufficient alone in changing behaviour or predicting change.[5, 25] While it could be argued that sexual health knowledge was relatively high in this population prior to RHG's intervention, making additional knowledge increases less relevant, HIV prevention efforts focused on 'awareness

raising' appear a relatively ineffective use of the generally limited resources available in chronic-emergency settings. This may also be true for 'non-emergency' African populations, including the Guinean host population, as indicated by multi-country surveys conducted in 1992 and 2006.[25]

The significant negative associations between HIV risk perception and avoidant behaviour change could demonstrate accurate personal risk assessments by study participants, given their current sexual behaviour (e.g. those able to avoid risk felt relatively safe, while those who took risks understood the potential hazard). Irrespective of perceptive accuracy, however, such risk perception would not necessarily translate into changed behaviour. Behaviour-change theories used in HIV research, such as the Health Belief Model (HBM), suggest that perceived risk precedes behaviour change.[26-28] While study findings do not contradict the HBM model, as those reporting HIV risk might later change their behaviour and then feel less risk, findings do indicate that the relationship between HIV risk perception and avoidant behaviour change is neither linear nor straightforward. Thus, increased risk perception also appears insufficient alone in changing behaviour or predicting change. The significant positive association between HIV risk perception and reporting fewer sexual partners is encouraging, however, as having fewer partners can significantly reduce HIV risk.[29, 30]

Behaviour change approaches that increase personal risk perception may have limited effectiveness in settings where self-efficacy and personal autonomy - the self-belief and ability to change one's own circumstances – are not assured. The AIDS Risk Reduction Model relates risk perception to personal sexual behaviour.[31] In this study population, women were more likely to perceive themselves at risk of HIV but less likely to report behaviour changes to avoid HIV.[7] Gender dynamics are likely to influence self-efficacy. Reasons could be similar to those found in a Ugandan study, in which women's perceptions appeared determined more by sexual partners' behaviour than their own.[32] Additionally, Tsasis and Nirupama suggest that risk behaviour is more a social than individual issue due to the close relationship between culture and risk perception.[4] Therefore community-based approaches might be more effective in these types of settings.[33]

As Rimal and colleagues noted, it is important to enhance self-efficacy when interventions aim to heighten perceived HIV risk to stimulate behaviour change.[34] Effective approaches trialled elsewhere include positive modelling (e.g. sports and other celebrities advocating condoms), environmental support (e.g. making free condoms available in discrete accessible locations rather than just through health workers), and increasing access to confidential HIV testing and antiretroviral drugs. Agha and colleagues found exposure to the normalising effects of branded condom advertising among Kenyans was associated with higher HIV risk perceptions, greater belief in self-efficacy and condom efficacy, and less embarrassment about buying condoms.[35]

The effects of knowledge and perceived risk on behaviour change may have been constrained by desire for children. The main reasons reported for non-use of condoms or other contraceptives in this population were fertility related, particularly wanting another child or having recently given birth.[21, 36] Research suggests desire to rebuild after many children died and food rations based on refugee household size may increase desire for more children in chronic emergencies.[37-40] Research in refugee settings is limited, but indicates that availability of male circumcision and prevention of mother-to-child transmission (PMTCT) services are feasible approaches for those desiring more children.[41, 42] Rutta and colleagues showed the feasibility of integrating PMTCT services into antenatal care for refugees in Tanzania.[42] An 'opt-out' HIV testing system, as trialed among pregnant Burmese refugees, shows promise for refugee PMTCT programmes where differing risk perceptions are an issue.[11] PMTCT was not available for this study population, but could benefit other refugee settings where non-use of condoms is predominantly fertility related.

Universal access to diagnosis and treatment, an option rarely available in refugee settings, could both reduce transmission and bypass many of the complicating factors highlighted in this study (e.g. gaps in risk perception, entrenched avoidant behavior). However, until universal access becomes financially viable in refugee settings, condoms remain key to preventing HIV transmission. Research indicates condom usage among refugees is often low and access remains a barrier for many.[16, 39, 43] Current condom usage in this refugee population was low (11%), but

similar to usage found in the host population by Mishra et al (e.g. 12.5%, or 5% of Guinean women and 20% of men, used a condom at last sex in 2005).[7, 25] . RHG facilitators distributed free condoms to refugees, but reported stock-outs approximately 30% of the time, indicating demand exceeded supply. A commercially-available condom three-pack, costing approximately 200 Francs Guinéens (approximately US$0.30 in 2013 constants), may not have been affordable for all refugees.[7] Howard and colleagues found reasons for non-usage of modern family planning in this population were mainly related to fertility (72%) or opposition (16%).[21] Cost was among the top five reasons for selecting a particular source of contraceptives (reported by 78%), indicating its importance to family planning decision-making in this population. [21] Thus, ensuring availability and affordability of condoms remains a logical contribution to future interventions.

HIV risk perception and sexual health

Positive associations between HIV risk perception and frequency of STI symptoms seem reasonable. For example, experiencing symptoms could encourage behaviour change or symptomatic patients may have been exposed to additional sexual health warnings while receiving treatment. The association between lack of HIV risk perception and more frequent STI advice seeking could indicate that health seeking behaviour for one infection reduces perceived risk from the other.

Significant positive associations between HIV risk perception and attitudes towards family planning methods, such as favouring early family planning education, may exist because peer educators provided both contraceptives and health information. Earlier research indicated refugees were more likely to get contraceptives from their RHG peer facilitators than from clinic workers.[21] Interestingly, participants who reported no HIV risk had significantly greater odds of approving couples using family planning and lower odds of having a partner who disapproved of family planning. Treating family planning discussion as a proxy for sexual health communication suggests that strengthening sexual health communication among couples could increase the frequency of positive behaviour change. While several behaviour-change models link positive attitude to behaviour change, this seems less likely in this setting where lack of usage appears primarily fertility related.

As both the '*Integrative Model of Behavioural Prediction*' and the '*Theory of Planned Behaviour*' include *intention* as a step between risk perception and behaviour change, it is perhaps worth noting that perceived HIV risk was associated with more frequent reported intention to use contraceptives in future while lack of perceived risk was associated with no intention to use contraceptives.[44]

Limitations

The greatest limitation was the lack of qualitative data, which authors were unable to collect due to evolving security constraints. Second, cross-sectional studies establish association but often not causality, making it difficult to interpret the direction of relationships between HIV knowledge, risk perception, and avoidance. Authors did not correlate HIV risk perception with actual risk. However, existing behaviour-change theories can provide a framework from which to draw hypotheses. Third, funding constraints prevented authors replicating the survey in the host population, which would have provided more clarity on the extent results were due to refugee status.[15] Fourth, as specialised facilities for those wanting children when one or both partners are HIV-infected are not currently viable in refugee settings, the pragmatic desire for children may have constrained results. Fifth, observer and reporting biases were minimised by means of surveyor training and questionnaire piloting. Chance was reduced using robust standard errors. There is a possibility of residual confounding due to insufficient data on variables that could influence risk perception and behaviour, such as socioeconomic status, gender-based violence, and preferred family size. Finally, results should be interpreted contextually as data were collected prior to the widespread availability of HIV testing or antiretroviral therapies.

Conclusions

This study provided insight into HIV knowledge, risk perception and avoidance within the context of a broader sexual health programme for refugees in a chronic-emergency setting in Guinea. Lack of associations between HIV knowledge and avoidant change suggests that programmes emphasising knowledge-change (e.g. 'awareness raising' campaigns) are unlikely to change behaviour beyond a minimal level, probably insufficient to reduce HIV transmission among refugees, and may thus be a poor use of limited resources. Similarly, communication strategies

emphasising risk perception may not be effective unless awareness and risk perception can be connected effectively with self-efficacy. HIV prevention and behaviour-change initiatives for refugees should consider the circumstances of low condom usage and adopt additional approaches to reducing HIV transmission (e.g. male circumcision, PMTCT) in populations such as this one in which non-use of condoms appears predominantly fertility related.

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Declaration of Conflicts of Interest

AvR and YS have worked as GIZ employees, while MB has worked as a GIZ consultant.

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Tables

Table 1 Demographic and behavioural characteristics, comparing perceived HIV risk and disaggregated by gender

Demographic variables	Men		Women	
	No perceived HIV risk	Perceived HIV risk	No perceived HIV risk	Perceived HIV risk
All participants	*n=179 (%)*	*n=159 (%)*	*n=158 (%)*	*n=202 (%)*
Age				
Youth (15-24)	44 (48)	48 (52)	56 (41)	81 (59)
Mature (25-49)	135 (55)	111 (45)	102 (46)	121 (54)
Camp arrival				
Early (before 1996)	96 (51)	93 (49)	91 (43)	120 (57)
Late (1996 or later)	83 (56)	66 (44)	67 (45)	82 (55)
Education				
Not-formally educated	64 (48)	69 (52)	113 (44)	142 (56)
Formally educated	115 (56)	90 (44)	45 (43)	60 (57)
Marital status				
Never married	50 (49)	53 (51)	20 (50)	20 (50)
Ever married	129 (55)	106 (45)	138 (43)	182 (57)
Religion				
Catholic	31 (46)	37 (54)	30 (48)	32 (52)
Protestant	70 (55)	58 (45)	64 (42)	90 (58)
Muslim	78 (55)	64 (45)	64 (44)	80 (56)
Age at sexual debut				
<15 years	14 (38)	23 (62)	20 (36)	35 (64)
15-20 years	138 (57)	105 (43)	132 (46)	157 (54)
>20 years /Unknown	27 (47)	31 (53)	6 (38)	10 (62)
All ever married	*n=129 (%)*	*n=106 (%)*	*n=138 (%)*	*n=182 (%)*
Marital status				
Widowed/Separated	14 (64)	8 (36)	21 (44)	27 (56)
Currently married	115 (54)	98 (46)	117 (43)	155 (57)

Residence of spouse				
Living separately	25 (71)	10 (29)	36 (41)	52 (59)
Living together in camp	104 (52)	96 (48)	102 (44)	130 (56)
Marriage age [1]				
<18 years	8 (53)	7 (47)	96 (42)	135 (58)
≥18 years	121 (55)	99 (45)	41 (47)	47 (53)

NB: [1]One participant who did not report marriage age was dropped.

Table 2 Reported HIV risk perception and avoidant behaviour changes among 698 sexually-experienced refugees, comparing those with higher HIV-related knowledge to those with lower or none, adjusted for known confounders

HIV-avoidant sexual health variables	Lower HIV knowledge	Higher HIV knowledge	OR[+] (95%CI)
All participants	*n=133 (%)*	*n=565 (%)*	
Perceive themselves at risk of HIV	69 (52)	292 (52)	0.99 (0.65-1.52)
Reported any HIV-avoidant behaviour changes [a]	93 (70)	408 (72)	1.25 (0.76-2.04)
Current condom user [a,b]	17 (13)	78 (14)	1.21 (0.60-2.45)
All reporting HIV-avoidant behaviour changes	*n=95 (%)*	*n=408 (%)*	
Staying faithful to one partner [a] *	68 (71)	266 (64)	0.59 (0.36-0.96)
Having fewer sexual partners than previously	6 (6)	53 (13)	2.18 (0.75-6.33)
Using condoms with casual partners [a,b]	5 (5)	36 (9)	1.81 (0.69-4.73)
Abstaining [e]	8 (9)	33 (8)	1.18 (0.74-2.96)
Always using condoms [a]	8 (9)	25 (6)	0.82 (0.34-2.01)
Started making these changes more than 12 months ago	69 (73)	313 (76)	1.06 (0.63-1.77)
All reporting recent genital discharge/ulcer [1]	*n=39 (%)*	*n=173 (%)*	
Stopped sex while symptomatic [a,e]	32 (82)	136 (78)	1.98 (0.55-5.18)
Sought health worker advice [a]	30 (77)	136 (78)	1.42 (0.60-6.50)
Told partner/s about symptoms [a]	27 (69)	124 (71)	1.34 (0.58-3.09)
Used condoms during sex while symptomatic	0 (0)	8 (5)	-

NB: *p-value ≤ 0.05; **p-value ≤ 0.001. [+]OR only calculated if cell n≥5 and investigated for confounding by gender, education, age, marriage, age at sexual debut. [1]Multiple answers possible. Adjusted for: [a]gender, [b]education, [c]age, [d]marriage, [e]age at sexual debut.

Table 3 HIV-avoidant behaviour changes among 698 sexually-experienced refugees, comparing those reporting some HIV risk to those reporting none, adjusted for known confounders

HIV-avoidant sexual health variables	No perceived HIV risk	Perceived HIV risk	OR[+] (95%CI)
All participants	*n=337 (%)*	*n=361 (%)*	
Reported any HIV-avoidant behaviour changes [e] **	274 (81)	227 (63)	0.38 (0.22-0.66)
Current condom user **	59 (18)	36 (10)	0.52 (0.35-0.77)
All reporting HIV-avoidant behaviour changes	*n=274 (%)*	*n=227 (%)*	
Staying faithful to one partner	179 (64)	155 (68)	1.17 (0.83-1.66)
Having fewer sexual partners than previously *	23 (8)	36 (16)	2.08 (1.26-3.43)
Using condoms with casual partners	24 (9)	17 (7)	0.85 (0.48-1.51)
Abstaining [e] *	28 (10)	13 (6)	0.47 (0.24-0.94)
Always using condoms [d] *	25 (9)	8 (3)	0.34 (0.16-0.76)
Started making these changes more than 12 months ago	221 (79)	161 (70)	0.62 (0.38-1.01)
All reporting recent genital discharge/ulcer [1]	*n= 83 (%)*	*n=129 (%)*	
Stopped sex while symptomatic	68 (82)	100 (77)	0.74 (0.32-1.66)
Told partner/s about symptoms	64 (77)	87 (67)	0.60 (0.33-1.09)
Sought advice from health workers *	71 (66)	95 (39)	0.46 (0.21-1.00)
Used condoms during sex while symptomatic	4 (4)	4 (3)	-

NB: *p-value ≤ 0.05; **p-value ≤ 0.001. [+]OR only calculated if cell n≥5 and investigated for confounding by gender, education, age, marriage, age at sexual debut. [1]Multiple answers possible. Adjusted for: [a]gender, [b]education, [c]age, [d]marriage, [e]age at sexual debut.

Table 4 Sexual health knowledge, attitudes and reported practices among 698 sexually-experienced refugees, comparing those reporting some HIV risk to those reporting none

4a) STI knowledge and symptoms	**No perceived HIV risk**	**Perceived HIV risk**	**OR[+] (95%CI)**
All participants	*n=335 (%)*	*n=361 (%)*	
Reported STI symptoms:			
Had genital discharge in the past 12 months *	75 (22)	114 (32)	1.61 (1.14-2.26)
Had genital ulcer in the past 12 months	32 (9)	53 (15)	1.64 (0.96-2.79)
All who've heard of STIs	*n=324 (%)*	*n=340 (%)*	
Correctly answered STI knowledge statements:			
People can protect themselves from STIs by staying with one faithful partner	308 (95)	317 (93)	0.72 (0.39-1.32)
People can protect themselves from STIs by using condoms during sexual intercourse	297 (92)	319 (94)	1.38 (0.73-2.63)
Women cannot protect themselves by squatting and washing after intercourse **	210 (65)	164 (48)	0.51 (0.35-0.72)
People cannot protect themselves from STIs by swallowing a tablet before intercourse	151 (47)	142 (42)	0.82 (0.58-1.16)
People cannot protect themselves from STIs by avoiding public toilets	144 (44)	133 (39)	0.80 (0.57-1.13)
Recognised STI symptoms[1]:			
penile discharge	260 (80)	253 (74)	0.72 (0.46-1.10)
vaginal discharge	204 (63)	237 (70)	1.35 (0.90-2.04)
male genital itching	59 (18)	56 (16)	0.86 (0.54-1.45)
female genital itching	142 (44)	136 (40)	0.85 (0.62-1.17)
4b) Family planning (FP) knowledge and attitudes			
Able to explain FP [b]	272 (81)	309 (86)	1.48 (0.93-2.37)
Current FP user	108 (32)	92 (25)	0.73 (0.49-1.07)
Identified the following FP methods[1:]			
Condoms	313 (93)	347 (96)	1.90 (0.99-3.65)
Pill	293 (87)	322 (89)	1.24 (0.76-2.01)
Injection *	239 (71)	286(79)	1.56 (1.05-2.33)
IUD [a]	142 (42)	150 (42)	0.87 (0.62-1.24)
Spermicide [a]	130 (39)	150 (42)	1.03 (0.69-1.53)
Preferred age to teach FP:			

Before age 15 for girls **	130 (39)	191 (53)	1.79 (1.30-2.47)
Before age 15 for boys *	46 (14)	73 (20)	1.60 (1.04-2.48)
Approve of couples using FP *	281 (83)	321 (89)	1.60 (1.02-2.50)
Disapproves of couples using FP	50 (15)	38 (10)	0.68 (0.41-1.11)
Don't know own attitude	6 (2)	2 (1)	-
All currently with partner	*n=232 (%)*	*n=253 (%)*	
Discussed FP with partner in last 12 months	143 (62)	150 (59)	0.91 (0.61-1.35)
Partner approves of couples using FP	149 (64)	167 (66)	1.08 (0.77-1.52)
Partner disapproves of couples using FP *	50 (22)	33 (13)	0.55 (0.35-0.84)
Don't know partner's attitude	33 (14)	55 (21)	1.60 (0.98-2.60)

NB: *p-value ≤ 0.05; **p-value ≤ 0.001. [+]OR only calculated if cell n≥5 and investigated for confounding by gender, education, age, marriage, age at sexual debut. [1]Multiple answers possible. Adjusted for: [a]gender, [b]education, [c]age, [d]marriage, [e]age at sexual debut.