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Community-level HIV stigma as a driver for HIV transmission risk behaviors and sexually transmitted diseases in Sierra Leone: a population-based study

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Abstract

Introduction—While HIV stigma has been identified as an important risk factor for HIV transmission risk behaviors, little is known about the contribution of community-level HIV stigma to HIV transmission risk behaviors and self-reported sexually transmitted diseases (STDs), or how gender may modify associations.

Methods—We pooled data from the 2008 and 2013 Sierra Leone DHS. For HIV stigma, we examined HIV stigmatizing attitudes and HIV disclosure concerns at both individual and community levels. Outcomes of HIV transmission risk behaviors were recent condom usage, consistent condom usage, and self-reported STDs. We assessed associations with multivariable logistic regressions. We also analyzed gender as an effect modifier of these associations.

Results—24,030 (69.5%) of 34,574 respondents who had heard of HIV were included in this analysis. Community-level HIV stigmatizing attitudes and disclosure concerns were associated with higher odds of self-reported STDs, respectively (AOR=2.07; 95%CI, 1.55–2.77; AOR=2.95; 95%CI, 1.51–5.58). Compared to men, community-level HIV stigmatizing attitudes among women were a stronger driver of self-reported STDs (interaction $p=0.07$). Gender modified the association between community-level HIV disclosure concerns and both recent and consistent condom usage (interaction $p=0.03$ and $p=0.002$, respectively). Community-level HIV disclosure concerns among women were observed to be a driver of risky sex and self-reported STDs.

Conclusions—This study shows that community-level HIV stigma may be a driver for risky sex and self-reported STDs, particularly among women. Our findings suggest that community-held

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stigmatizing beliefs and HIV disclosure concerns among women might be important targets for HIV stigma reduction interventions.

Keywords

Community-level HIV stigma; HIV transmission risk behaviors; sub-Saharan Africa; population-based; gender-specific effect modifications; Sierra Leone

Introduction

Thirty years into the HIV epidemic, people living with HIV/AIDS still face widespread HIV stigma and discrimination.¹⁻³ HIV stigma drives inequitable access to HIV care and sub-optimal outcomes in both HIV treatment and prevention.⁴⁻⁷ Although there has been considerable progress towards implementation of HIV stigma and discrimination interventions,⁸ over 50% of men and women report having discriminatory attitudes towards people living with HIV.⁹ Ending the HIV epidemic will require that governments prioritize identifying effective HIV stigma reduction strategies for their HIV national responses.

Conceptual framework

From a socio-behavioral perspective, HIV stigma has the potential to manifest with stigmatizing attitudes and/or disclosure concerns in the general population.¹⁰⁻¹² Gilmore and Somerville described stigmatizing attitudes as HIV risk perception differences of ‘them’ and ‘us’ based on a response to threats of values.¹³ These risk perceptions differences can shape how individuals form stigmatizing attitudes, and the sum of these individuals’ stigmatizing attitudes form the norms of the community.¹⁴ Steward and his colleagues adapted a model of hidden distress first described by Scambler to illustrate how discrimination and hostility against HIV-infected persons can lead to behavioral modifications such as serostatus disclosure concerns.^{15,16} Both individual- and community-level stigma can influence behavior modifications,¹⁷ and these stigmatizing attitudes and/or disclosure concerns may be adapted differently by populations based on gender or educational level.^{11,18,19}

There is a growing body of literature about the influence of normative beliefs on health behaviors and outcomes.²⁰⁻²² By condemning HIV-infected people, people who are uninfected or not aware of their HIV status are more likely to feel protected and less likely to engage in risk-reduction strategies.¹⁷ As a result, instrumental fears about casual transmission, negative attitudes toward people living with HIV, and anticipated stigma are associated, at the individual level, with HIV transmission risk behaviors and failure to link to HIV treatment.^{23-25,6,19,26} In addition, normative beliefs and anticipated stigma of HIV-infected women have been associated with worse HIV prevention and treatment outcomes,^{27,28} but little is known about gender-specific associations between HIV stigma in the general population and transmission risk behaviors.¹¹ Several studies have shown that normative beliefs in the community related to stigmatizing attitudes and disclosure concerns (community-level HIV stigma) can negatively impact individual behaviors.^{23,29-32} Less is known about the associations between HIV transmission risk behaviors and stigma when measured at the community level.^{11,33,34} This is an important gap in the literature because

HIV stigma is not simply a matter of individual belief, but norms within the community about HIV and about persons living with HIV can also affect HIV-related behaviors as well.

To address these gaps in the literature and to inform ongoing HIV prevention interventions in Sierra Leone, we pooled data from the 2008 and 2013 Sierra Leone Demographic and Health Surveys (DHS) to test hypotheses about individual- and community-level HIV stigma and their impact on HIV transmission risk behaviors and self-reported STDs. We hypothesized that individual-level HIV stigmatizing attitudes and disclosure concerns are associated with lower odds of condom usage and higher odds of self-reported STDs. Independent of individual-level HIV stigma, we hypothesized that community-level HIV stigmatizing attitudes and disclosure concerns are also associated with lower odds of condom usage and higher odds of self-reported STDs. Lastly, we hypothesized that gender modify these associations.

Methods

Data

This cross-sectional study used data collected by Statistics Sierra Leone in collaboration with the Ministry of Health and Sanitation for the 2008 and 2013 Sierra Leone DHS. Data were pooled to ensure sufficient statistical power for a community-level analysis. We assessed whether the association between stigma and HIV risk was modified by year of DHS and found no statistically significant interaction. Each DHS employed a stratified, two-stage cluster sampling approach to the country's population. All women age 15–49 who permanently lived in selected households or slept in the household on the night before the survey were eligible to be interviewed. In one-half of the study households, men age 15–59 who also had the same living situation as women were eligible to be interviewed. Overall, the response rate in 2008 was greater than 92% while the response rate in 2013 exceeded 96%.

Questions on self-reported HIV transmission risk behaviors (i.e., condom use at last sexual intercourse, consistent condom use) and self-reported STDs were administered only to study participants who were sexually active, and stigma questions were administered only to study participants who reported having heard of HIV. Therefore, only study participants who had ever heard of HIV and were sexually active were included in the analyses (and only responses from those study participants who had ever heard of HIV were used to construct aggregated stigma variables). In the DHS, the primary geographic unit of aggregation is the primary sampling unit (PSU), which represents a village or cluster of villages in rural areas and a ward or residential neighborhood in urban areas. Each PSU formed a clustered unit of analysis. Additional information about field staff training and data collection procedures is detailed in the 2008 and 2013 Sierra Leone DHS report.^{35,36}

Measures

The primary outcomes were as follows: recent condom use, defined as “having used a condom at last sexual intercourse”; consistent condom use, defined as “having used a condom at every sexual intercourse over last 12 months”; and self-reported history of

sexually transmitted disease (STD), defined as “having had any STD in the last 12 months.” Responses were scored as a binary variable (yes/no) and reported as separate outcomes.

Our primary explanatory variable measured HIV stigmatizing attitudes as a 3-item scale. The variable assessed social distance and was elicited by asking whether respondents “are not willing to care for a family member with the AIDS virus in the respondent’s home,” “would not buy fresh vegetables from shopkeeper who has the AIDS virus,” and/or “say that a teacher with the AIDS virus and is not sick should not be allowed to continue teaching.” All responses were scored as a binary variable (yes/no). The HIV stigmatizing attitudes scale was defined as the sum of affirmative responses, with a maximum score of three and minimum score of zero. This scale was reported at the individual-level. The estimated Cronbach’s alpha for the scale was 0.63, indicating an acceptable degree of internal consistency. Our secondary explanatory variable measured HIV disclosure concerns. The variable was 1-item and was elicited by asking respondents “if a member of your family got infected with the AIDS virus, would you want it to remain a secret or not?” Responses were scored on a binary (yes/no) scale, and affirmative responses described respondents who had HIV disclosure concerns.

Individual responses to the explanatory variables were aggregated by PSU to construct community-level explanatory variables for HIV stigmatizing attitudes and HIV disclosure concerns. Herein, we use the term “community-level” to refer to this level of analysis. Thus, the two community-level variables were measured by averaging the scores of all participants in each participant’s PSU (excluding the index participant), and the community-level variables represent the mean level of HIV stigmatizing attitudes, and the proportion of people with HIV disclosure concerns, among other people in the index participant’s village.

Statistical Analysis

We pooled data from the 2008 and 2013 Sierra Leone DHS. We then used last condom usage, consistent condom usage, and self-reported STDs as the dependent variables and HIV stigmatizing attitudes and disclosure concerns at the individual and community levels as predictor variables. Given that the attitudes and behaviors of individuals can collectively form the norms of a society, it was reasonable to expect a some correlation between individual- and community-level stigma. We used variance inflation factors (VIFs) to check for collinearity and the VIFs indicated that, even though there is some correlation between the stigma measures at the individual and community levels, there is no collinearity.

Using our conceptual model and relevant literature, we identified several potential confounders of the associations between stigma and outcomes of interest, including age, gender, marital status, residence, household headship, wealth index, and educational level.^{11,33,34,37,38} In multivariable logistic regression models, we adjusted these estimates for the potential confounders. We used the survey data provided by ICF Macro to account for survey weights, clustering and stratification so that our standard errors and findings were nationally representative.

Based on the conceptual framework and literature,^{11,33,34,38} we hypothesized that gender modify the effects of HIV stigmatizing attitudes and disclosure concerns at the individual

and community level on the outcomes. We included product terms between gender and the stigma variables to test for effect modification by gender. Additional analyses were done to test for effect modification by urban vs. rural residence. Analyses were conducted in STATA/IC 13.1 (StataCorp L.P., College Station, Texas).

Ethics Statement

The data collection procedures for the DHS were approved by the ICF Macro Institutional Review Board and the Sierra Leone Ministry of Health. All participants verbally consented to participate in the study.

Results

30,702 of 34,574 (89%) respondents had heard of HIV and 26,520 of 34,574 (77%) respondents were sexually active. In total, 24,030 (70%) of 34,574 respondents who had heard of HIV and were sexually active (Table 1) were included in this analysis. The median age was 30 years (IQR, 22–38), and most (71%) were married or had a partner. The majority (53%) had no education. The study participants lived in 348 villages (median number study participants per village, 70; IQR, 53–84).

Very few (6%) used a condom at last sexual intercourse, or reported consistent condom use (4%) (Table 2). About one-tenth (11%) self-reported an STD in the last twelve months. Two-thirds (66%) endorsed at least one item of the HIV stigmatizing attitudes scale, and about half (51%) had HIV disclosure concerns. The mean score on the HIV stigmatizing attitudes scale across all study participants was 1.23 (95% CI, 1.18–1.28). The mean score on the HIV stigmatizing attitudes scale across all villages was 1.28 (95% CI, 1.25–1.33), and the mean score on HIV disclosure concerns across all villages was 0.51 (95% CI, 0.49–0.53).

Associations of HIV stigmatizing attitudes and disclosure concerns with HIV transmission risk behaviors and self-reported STDs

In unadjusted analyses, HIV stigmatizing attitudes at the individual level were associated with lower odds of recent and consistent condom usage (Table 3). After multivariable adjustment, individual-level HIV stigmatizing attitudes remained significantly associated with lower odds of recent and consistent condom usage, respectively (adjusted odds ratio [AOR]=0.89; 95% CI, 0.82–0.96; and AOR=0.83; 95% CI, 0.76–0.92). Community-level HIV stigmatizing attitudes were significantly associated with higher odds of self-reported STDs (AOR=2.07; 95% CI, 1.55–2.77).

In unadjusted analyses, HIV disclosure concerns at the individual level were associated with recent condom usage, consistent condom usage and self-reported STDs. After adjustment for potential confounders and community level HIV disclosure concerns, none of the associations held for HIV disclosure concerns at the individual level, but community-level HIV disclosure concerns were significantly associated with higher odds of self-reported STDs (AOR=2.95; 95% CI, 1.51–5.58).

Effect modifications

We assessed for effect modification by gender. Most women (66%) and men (63%) endorsed at least one HIV stigmatizing attitude. About half of the women (52%) and men (52%) had HIV disclosure concerns. In general, both women and men had low rates of condom usage. Only 12% of men and 4% of women reported recent condom usage. Men (8%) reported consistent condom usage four times more than women (2%). Men and women reported a similar proportion of STDs (Table 2).

Gender modified the associations between HIV stigma and HIV transmission risk behaviors and self-reported STDs. Among men, individual-level HIV stigmatizing attitudes were significantly associated with lower odds of recent and consistent condom usage, respectively (AOR=0.86; 95% CI, 0.77–0.96; and AOR=0.81; 95% CI, 0.71–0.93). Community-level HIV stigmatizing attitudes were significantly associated with higher odds of self-reported STDs (AOR=1.60; 95% CI, 1.15–2.24). Individual-level HIV disclosure concerns were associated with lower odds of self-reported STDs (AOR=0.80; 95% CI, 0.63–1.02) while community-level HIV disclosure concerns were associated with higher odds of consistent condom usage (AOR=1.89, 95% CI, 0.77–4.65).

Among women, individual-level stigmatizing attitudes were significantly associated with lower odds of consistent condom usage (AOR=0.84; 95% CI, 0.72–0.98) while community-level stigmatizing attitudes were significantly associated with higher odds of self-reported STDs (AOR=2.33, 95% CI, 1.64–3.32). Individual-level HIV disclosure concerns were associated with lower odds of recent condom usage (AOR=0.76; 95% CI, 0.57–1.00) and consistent condom usage (AOR=0.72; 95% CI, 0.51–1.00) and were significantly associated with higher odds of self-reported STDs (AOR, 1.34; 95% CI, 1.13–1.58). Community-level HIV disclosure concerns were associated with lower odds of consistent condom usage (AOR= 0.38; 95% CI, 0.13–1.07) and were significantly associated with higher odds of self-reported STDs (AOR, 3.79; 95% CI 1.68–8.55).

Compared to men, community-level HIV stigmatizing attitudes among women were a stronger driver of self-reported STDs (interaction $p=0.07$). Individual-level HIV disclosure concerns among women were associated with higher odds of self-reported STDs while individual-level HIV disclosure concerns among men were associated with lower odds of self-reported STDs (interaction $p=0.001$). Gender modified the association between community-level HIV disclosure concerns and both recent and consistent condom usage (interaction $p=0.03$ and $p=0.002$, respectively). Community-level HIV disclosure concerns among women were observed to be a driver of risky sexual behaviors while community-level HIV disclosure concerns among men were observed to be a driver of safer sexual behaviors. Gender did not modify associations between individual-level HIV stigmatizing attitudes and HIV transmission risk behaviors or self-reported STDs (Table 4). In analyses testing for effect modification by urban vs. rural residence, we found that urban vs. rural residence did not modify the associations between individual- and community-level stigma and recent condom usage, consistent condom usage, and self-reported STDs.

Other associations with HIV transmission risk behaviors and self-reported STDs

In adjusted analyses, women had lower odds of recent and consistent condom usage compared to men while single marital status, higher educational level, and higher wealth status were associated with higher odds of recent and consistent condom usage. There was a dose-response relationship between education and condom usage (recent and consistent), with higher levels of condoms usage at higher educational levels. Age \geq 21 years, female gender, and having completed only primary or secondary education were associated with higher odds of self-reported STDs. Being married or partnered was associated with lower odds of self-reported STDs (Table 3).

Discussion

This study shows that HIV stigma may be a risk factor for HIV transmission risk behaviors at the individual and community levels. We found that individual-level HIV stigmatizing attitudes were associated with condom usage and that community-level HIV disclosure concerns and stigmatizing attitudes were associated with self-reported STDs. Causality can not be inferred in this cross-sectional study. If confirmed in longitudinal study, our findings would suggest that simply changing individual attitudes, without changing the underlying normative beliefs in the community, would be insufficient to prevent HIV transmission. These findings underscore the importance of including community-wide interventions that target HIV stigma, especially among women, in national HIV responses. Such community-wide interventions may also prevent transmission of other STDs in addition to HIV.

We found that gender was an effect modifier for the associations between HIV stigma and HIV transmission risk behaviors and self-reported STDs. HIV stigma among women was an important driver of risky sex and self-reported STDs, though HIV stigma among men had independent effects. Our findings suggest that men and women are both at risk of poor HIV transmission risk behaviors and outcomes when exposed to certain dimensions of HIV stigma. Women, however, were the primary driver of negative associations for individual- and community-level HIV disclosure concerns with consistent condom usage and self-reported STDs. HIV disclosure concerns among HIV-positive women are a well-known driver of poor HIV treatment and care outcomes and secondary transmission risk.^{27,39,40} Our study offers new evidence that disclosure concerns in the general population may drive HIV transmission risk behaviors and self-reported STDs. In particular, individual- and community-level disclosure concerns among women were associated with self-reported STDs, suggesting that disclosure concerns both at the individual- and community-level may be important targets for intervention. This is further supported by other studies that have shown that women who have HIV disclosure concerns have more inequitable sexual relationships.⁴¹ Other studies have, in turn, found that relationship power inequities are determinants of HIV transmission risk.^{42,43} In order to comprehensively address HIV disclosure concerns among women, future research is needed to understand the role of community norms in influencing relationship power inequities and risky sex.

In our study, the general population of Sierra Leone had high rates of HIV stigma and very low rates of condom usage. While these high rates of HIV stigma were comparable to other parts of sub-Saharan Africa,^{2,3} the low rates of condom usage were considerably lower than

rates reported elsewhere in sub-Saharan Africa.⁴⁴ The national HIV program in Sierra Leone may need to rethink its HIV prevention package to increase condom usage and reduce STDs, and our findings suggest that stigma reduction at the community level should be part of these efforts.

Similar to previous literature, we also found that women and young persons were more likely to report STDs, independent of HIV stigma.^{45,46} Furthermore, individuals with little formal education and the poorest wealth status were least likely to report recent condom usage as reported in previous studies.^{47,48} Young women in poverty, especially those with little or no formal education, represent high-risk groups that several biomedical HIV prevention trials in sub-Saharan Africa have failed to effectively reach with pre-exposure prophylaxis,^{49,50} so novel behavioral and biomedical interventions are needed to prevent HIV transmission in this group.

There are several important limitations to this work. The explanatory and outcome variables were self-reported measures, and they may have been under-reported. Second, in the 2008 DHS survey, there were additional measures of HIV stigma, particularly about prejudiced attitudes, that were not questions asked in the 2013 DHS survey. More detailed measures of anticipated stigma were not available, so this study was not representative of the entire conceptual landscape of HIV stigma, and it is likely that other measures of HIV stigma may also have had an impact on HIV transmission risk behaviors. Third, this was a cross-sectional study based on two cross-sectional samples obtained in 2008 and 2013. Hence, we cannot determine the direction of causality or rule out the unlikely possibility that a participant was surveyed twice. Interpretation of these findings was limited by potential unmeasured.

HIV stigma has remained a major barrier to HIV treatment and prevention efforts, in part due to challenges in unpacking the different domains of HIV stigma, and finding appropriate targets for HIV stigma reduction strategies. We provide new evidence that community-level HIV stigmatizing attitudes and disclosure concerns may be risk factors for risky sex and self-reported STDs, particularly among women. HIV stigma is widespread, not just in Sierra Leone, but around the world. Ending the HIV epidemic will require that national HIV responses implement effective, community-wide and gender-specific interventions addressing HIV stigma and HIV prevention behaviors.

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Table 1

Socio-demographic characteristics of respondents who had heard of HIV and were sexually active (n=24,030)

Characteristics	N (%) [*] or mean (95% CI)
Age (in years)	30.8 (30.6–31.0)
Gender	
Male	7,897 (33.1)
Female	16,133 (66.9)
Current marital status	
Never married	6,172 (24.8)
Married or partnered	16,742 (70.5)
Widowed, divorced, or separated	1,116 (4.7)
Highest educational level	
No education	12,421 (53.3)
Primary	3,005 (12.4)
Secondary	7,429 (29.4)
Higher	1,175 (4.9)
Interviewed household head	6,305 (26.1)
Wealth index [†]	
Poorest	4,022 (17.3)
Poorer	3,723 (17.2)
Middle	4,160 (18.4)
Richer	5,668 (20.2)
Richest	6,457 (26.8)

* N refers to the raw number of observations, while the % refers to the survey-weighted percentage (not the raw percentage)

[†]The household asset wealth index is calculated by applying principal components analysis to a set of household possessions and housing characteristics. The index is then defined as the first principal component extracted from the principal components analysis and used to categorize participants into quintiles of household asset wealth. Further details on the construction of the asset index can be found in Filmer D, Pritchett LH. *Demog* 2011;38:115–132.

Summary statistics of HIV stigmatizing attitudes, HIV disclosure concerns, and HIV transmission risk behaviors for men and women who had heard of HIV and were sexually active

Table 2

	Total (n=24,030) N (%) * or mean (95% CI)	Men (n=7,897) N (%) or mean (95% CI)	Women (n=16,133) (%) or mean (95% CI)
HIV stigmatizing attitudes			
Endorsed at least one stigmatizing attitude	15,607 (66.0)	4,971 (62.9)	10,636 (65.9)
Mean score of HIV stigmatizing attitudes scale [†]	1.23 (1.18–1.28)	1.05 (0.99–1.11)	1.32 (1.26–1.37)
Not willing to care for relative with HIV	5,089 (22.1)	1,082 (13.7)	4,007 (24.8)
Person with HIV not allowed to continue teaching	10,383 (44.3)	2,970 (37.6)	7,413 (45.9)
Would buy vegetables from vendor with HIV	13,442 (56.7)	4,201 (53.2)	9,241 (57.3)
HIV disclosure concerns			
Endorsed a desire to keep HIV-status of family a secret	12,512 (51.0)	4,137 (52.3)	8,375 (51.9)
HIV transmission risk behaviors			
Used a condom at last sexual intercourse	1,527 (6.4)	938 (11.9)	589 (3.7)
Used a condom at every sexual intercourse	972 (4.1)	626 (7.9)	346 (2.1)
Having had any STD	2,627 (10.9)	756 (9.6)	1,871 (11.6)

* N refers to the raw number of observations, while the % refers to the survey-weighted percentage (not the raw percentage)

[†]The HIV stigmatizing attitudes scale was generated by summing the total number of responses to three questions about persons with HIV, with responses indicating a negative view of persons with HIV coded to equal "1". The scale ranges from 0–3, with higher values indicating a greater degree of stigma.

Table 3

Unadjusted and adjusted associations between HIV stigma and recent condom usage, consistent condom usage, and self-reported STDs

	Recent condom usage		Consistent condom usage		Self-reported STDs	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Self-reported stigma/disclosure concerns						
Stigmatizing attitudes (individual) [†]	0.69 (0.64–0.75)***	0.88 (0.81–0.96)**	0.63 (0.56–0.70)***	0.83 (0.75–0.91)***	1.07 (0.99–1.14) [‡]	1.04 (0.98–1.12)
Stigmatizing attitudes (community)	--	1.01 (0.78–1.31)	--	0.95 (0.66–1.38)	--	2.07 (1.55–2.77)***
Disclosure concerns (individual)	1.28 (1.07–1.52)**	0.88 (0.73–1.04)	1.36 (1.11–1.68)**	0.89 (0.73–1.09)	1.13 (0.98–1.29) [‡]	1.13 (0.97–1.32)
Disclosure concerns (community)	--	0.91 (0.46–1.77)	--	1.00 (0.46–2.20)	--	2.95 (1.51–5.58)***
Age						
Age >22 yrs	Ref	Ref	Ref	Ref	Ref	Ref
Age 21 yrs	0.57 (0.49–0.68)***	1.05 (0.88–1.27)	0.59 (0.49–0.72)***	1.03 (0.84–1.26)	0.89 (0.80–1.00)**	1.23 (1.04–1.45)**
Gender						
Male	Ref	Ref	Ref	Ref	Ref	Ref
Female	0.29 (0.24–0.35)***	0.32 (0.26–0.39)***	0.26 (0.20–0.32)***	0.30 (0.23–0.38)***	1.21 (1.02–1.42)**	1.18 (0.99–1.41)*
Current marital status						
Never married	Ref	Ref	Ref	Ref	Ref	Ref
Married or partnered	0.23 (0.20–0.28)***	0.39 (0.31–0.48)***	0.23 (0.19–0.27)***	0.40 (0.31–0.50)***	0.72 (0.63–0.83)***	0.67 (0.55–0.81)***
Widowed, divorced, separated	0.45 (0.31–0.60)***	0.67 (0.47–0.96)**	0.47 (0.31–0.72)***	0.75 (0.48–1.18)	1.02 (0.83–1.25)	0.90 (0.70–1.16)
Region of country						
Eastern	Ref	Ref	Ref	Ref	Ref	Ref
Northern	1.03 (0.79–0.34)	1.10 (0.85–1.41)	0.94 (0.70–1.28)	1.00 (0.72–1.36)	0.97 (0.77–1.22)	0.90 (0.72–1.13)
Southern	1.49 (1.14–1.95)**	1.69 (1.30–2.46)***	1.11 (0.82–1.50)	1.20 (0.88–1.65)	0.69 (0.57–0.85)***	0.67 (0.55–0.83)***
Western	3.48 (2.76–4.38)***	1.83 (1.41–2.34)***	3.74 (2.77–5.02)***	1.87 (1.37–2.54)***	0.96 (0.76–1.21)	0.81 (0.60–1.10)
Location						
Urban	Ref	Ref	Ref	Ref	Ref	Ref
Rural	0.33 (0.27–0.40)***	0.93 (0.72–1.19)	0.29 (0.23–0.37)***	0.923 (0.70–1.23)	0.90 (0.75–1.08)	1.01 (1.08–1.49)

		Recent condom usage		Consistent condom usage		Self-reported STDs	
		Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Highest educational level							
No education	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Primary	1.76 (1.39–2.23)***	1.30 (1.01–1.68)**	1.79 (1.33–2.41)***	1.30 (0.93–1.80)	1.29 (1.11–1.52)**	1.27 (1.08–1.49)**	
Secondary	4.78 (3.99–5.72)***	2.00 (1.62–2.47)***	5.96 (4.75–7.46)***	2.39 (1.84–3.11)***	1.23 (1.06–1.43)**	1.15 (0.98–1.33)*	
Higher	9.45 (7.41–12.03)***	3.25 (2.47–4.29)***	12.89 (9.49–17.49)***	4.13 (2.92–5.84)***	0.94 (0.69–1.29)	0.91 (0.67–1.24)	
Interviewed household head	1.12 (0.96–1.31)	0.97 (0.81–1.16)	1.23 (1.04–1.47)**	1.06 (0.88–1.28)	0.77 (0.68–0.89)***	0.89 (0.77–1.03)	
Wealth status &							
Poorest	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Poorer	1.48 (1.05–2.10)**	1.42 (0.99–2.03)*	1.35 (0.85–2.15)	1.25 (0.79–2.02)	1.07 (0.89–1.28)	1.03 (0.85–1.23)	
Middle	1.57 (1.15–2.17)**	1.42 (1.02–1.98)**	1.29 (0.85–1.99)	1.07 (0.70–2.02)	1.03 (0.85–1.27)	0.98 (0.81–1.20)	
Richer	2.60 (1.90–3.54)***	1.74 (1.26–2.40)***	2.50 (1.70–3.68)***	1.42 (0.94–2.14)*	1.24 (1.01–1.51)**	1.13 (0.91–1.41)	
Richest	5.35 (4.04–7.09)***	1.94 (1.36–2.77)***	5.64 (3.88–8.20)***	1.44 (0.96–2.24)	1.19 (0.96–1.47)	1.11 (0.84–1.48)	

AOR, adjusted odds ratio; OR, odds ratio

[†] The adjusted models include the following covariates: age, gender, current marital status, region, rural/urban, highest educational level, interviewed household head, and wealth status.

[‡] The HIV stigmatizing attitudes scale was generated by summing the total number of responses to five questions about persons with HIV, with responses indicating a negative view of persons with HIV coded to equal "1". The scale ranges from 0–3, with higher values indicating a greater degree of stigma.

[§] The household asset wealth index is calculated by applying principal components analysis to a set of household possessions and housing characteristics. The index is then defined as the first principal component extracted from the principal components analysis and used to categorize participants into quintiles of household asset wealth. Further details on the construction of the asset index can be found in Filmer D, Pritchett LH. Demog 2001;38:115–132.

[‡] p<0.10;

* p<0.05;

** p<0.01;

*** p<0.001

Table 4

Gender-stratified, adjusted associations between HIV stigma and recent condom usage, consistent condom usage, and self-reported STDs

	Recent condom usageAOR (95% CI) [^]	Consistent condom usageAOR (95% CI)	Self-reported STDsAOR (95% CI)
Stigmatizing attitudes (individual)			
Male	0.86 (0.77–0.96) [*]	0.81 (0.71–0.93) ^{***}	1.03 (0.92–1.14)
Female	0.91 (0.81–1.02)	0.84 (0.72–0.98) ^{***}	1.05 (0.98–1.14)
Interaction	p=0.49	p=0.75	p=0.65
Stigmatizing attitudes (community)			
Male	0.85 (0.62–1.16)	0.79 (0.50–1.28)	1.60 (1.15–2.24) ^{**}
Female	1.31 (0.88–1.95)	1.29 (0.82–2.03)	2.33 (1.64–3.32) ^{***}
Interaction	p=0.08	p=0.11	p=0.07
Disclosure concerns (individual)			
Male	0.97 (0.80–1.17)	1.00 (0.81–1.24)	0.80 (0.63–1.02) [†]
Female	0.76 (0.57–1.00) [†]	0.72 (0.51–1.00) [†]	1.34 (1.13–1.58) ^{**}
Interaction	p=0.13	p=0.07	p=0.001
Disclosure concerns (community)			
Male	1.46 (0.65–3.31)	1.89 (0.77–4.65) [†]	1.63 (0.79–3.36)
Female	0.49 (0.21–1.15)	0.38 (0.13–1.07) [†]	3.79 (1.68–8.55) ^{**}
Interaction	p=0.03	p=0.002	p=0.07

AOR, adjusted odds ratio;

[^] The adjusted models include the following covariates: age, gender, current marital status, region, rural/urban, highest educational level, interviewed household head, and wealth status;

[†] p<0.10;

^{*} p<0.05;

^{**} p<0.01;

^{***} p<0.001