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Association of Age at First Sex with HIV-1, HSV-2 and other Sexual Transmitted Infections among Women in Northern Tanzania

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Abstract

Background—To examine the association between age at first sex and the prevalence of sexually transmitted infections (STIs) including, HIV-1, and HSV-2 in women in Moshi urban district, northern Tanzania.

Methods—A total of 2,019 women aged 20–44 were randomly selected in a two-stage sampling from Moshi urban district, northern Tanzania. Information on demographics and sexual behaviors were obtained. Blood and urine samples were drawn for testing of HIV-1, HSV-2 and other STIs.

Results—Women who had their first sexual intercourse at age 18–19 (OR=0.66; 95% CI=0.50–0.86) or 20+ (OR=0.46; 95% CI=0.36–0.60) were less likely to have STIs, including HIV-1 and HSV-2, than women who had their first intercourse before their 18th birthday. The hazards of having had first sex at an earlier age were significantly higher for women who tested positive for STIs (HR=1.52; 95% CI: 1.37–1.69) or had STI symptoms (HR=1.17; 95% CI: 1.05–1.30). Early age at first sex was associated with having a regular non-cohabiting partner (HR=1.40; 95% CI: 1.23–1.58), female circumcision (HR=1.20; 95% CI: 1.02–1.40), and coercion at first intercourse (HR=1.47; 95% CI: 1.15–1.89).

Conclusions—In sub-Saharan Africa, where the prevalence of HIV and other STIs is high, a better understanding of the determinants of the age at first sex is crucial for HIV/STI prevention programs. Prevention programs should not only aim at delaying the age at first sex but also address factors leading to early age at first sex.

Keywords

Age of at first sex; sexually transmitted infections; marginal Cox model; mixed models; sub-Saharan Africa

Introduction

Herpes simplex virus (HSV-2) infection and other sexually transmitted infections (STIs) can increase the risk of human immunodeficiency virus (HIV) acquisition and transmission^{1, 2}.

The prevalence rates of STIs reported from studies in sub-Saharan Africa are high^{3, 4}. We recently reported prevalence rates of STIs among women in Moshi Urban District, northern Tanzania, that were consistent with reports from the sub-region^{5–7}. The STIs prevalence rates were 43% and 11% for HSV-2 and HIV-1, respectively; the incidence rates of syphilis, Chlamydia and gonorrhea were below 5.0%^{5, 7}. Enhanced recognition of risk factors, treatment and prevention of STIs in sub-Saharan Africa, where antiretroviral therapy may not be readily available, may reduce the risk of acquiring HIV.

Early age at first sexual intercourse among women has been associated with high incidence of STIs, decreased condom and contraceptive use, and multiple sexual partners^{8–11}. The age at first sexual intercourse continues to decline in many countries, including sub-Saharan Africa^{11–15}. Ferry et al., in a study of sexual behavior and HIV infection in four African cities, reported that young women in cities with higher HIV prevalence tended to start their sexual debut earlier than in cities with lower HIV prevalence¹⁶. Further knowledge about the association between age at first sex and acquisition of STIs might have important public health implications for the prevention of STIs, including HIV. However, there is limited research on the relationship between age at first sex and the risk of acquiring STIs, including HIV, in sub-Saharan Africa¹⁴. Recent studies of age at first sexual intercourse and STIs have involved subjects recruited from convenience samples (e.g., women attending family planning clinics, women reporting sexual abuse)^{14, 17}.

We hypothesized that early age at first sexual intercourse is associated with a higher risk of acquiring an STI (e.g., HIV-1 and HSV-2). To test this hypothesis, we re-analyzed data from a community-based survey in the Moshi urban district of northern Tanzania. We investigated the relationship between age at first sex and STIs using both the presence of STIs symptoms (syndromic) and laboratory-confirmed tests for STIs. It is important to assess whether the syndromic approach provides a valid measure of STIs since laboratory tests to confirm STIs are rarely available in Tanzania or more broadly in sub-Saharan Africa¹⁸.

Materials and Methods

Study Participants

The rationale, organization, and recruitment of the Moshi Infertility survey have been described in detail elsewhere^{7, 19}. In brief, the survey was conducted from November 2002 to March 2003 in the Moshi urban district of Tanzania and involved a two-stage sampling. In the first stage of sampling, 150 clusters were selected and then a number of households were randomly selected from each of the 150 clusters. A total of 2,019 out of 2,192 women aged 20–44 were interviewed from the selected households. Information was collected on socio-demographic characteristics, sexual practices, fertility, and infertility. Blood and urine samples were drawn to test for STIs.

Study Measures

Explanatory variables—Demographic characteristics including age, highest education completed, whether the women had a husband or partner at the time of the interview, ethnicity, religion, and female circumcision were considered. Moreover, participants' first sexual experience (elicited by asking the following questions: How would you describe the first time that you had sex? Would you say that you wanted to have sex, or did not want to have sex but it happened anyway? Were you forced to have sex?), partner at first sex, and age at first sex were included as explanatory variables.

Outcome Variables

Sex Free Survival: Sex free survival (SFS) or survival until age at first sex was defined as the time from birth to age at first sex. Age at first sex was treated as time-to-event data. Participants who had not had sexual intercourse by the time of the survey were censored, i.e., they were not considered as events in the analysis.

Symptoms of STIs: An STI symptom was defined as a positive response to at least one of the following questions: abdominal pain, abnormal genital discharge, foul smell in the genital area, excessive genital secretions, swellings in the genital area, itching in the genital area, burning pain on micturition, pain during intercourse, and genital ulcers.

Testing of STIs: Blood samples were collected for HIV-1, HSV-2 and syphilis testing. HIV-1 infection was determined by using two enzyme-linked immunosorbent assays (ELISA). Antibodies to HSV-2 were detected using enzyme immune assay (EIA) according to the manufacturer's instructions (HerpeSelect 2 ELISA, Focus Technologies, Cypress, CA). The Rapid Plasma Reagin (RPR) card test and/or the Treponema Pallidum Hemagglutination Assay (TPHA) were used for syphilis diagnosis. Urine samples were tested for Chlamydia, gonorrhea, trichomonas and mycoplasma genitalium by using a real-time multiplex polymerase chain reaction (M-PRC) assay described previously ⁶.

Statistical Analysis

Univariate analyses were carried out using Pearson's Chi-square and log-rank tests. Kaplan-Meier curves were plotted for sex free survival. Multivariate analyses were carried out to model the survival data on explanatory variables of interest using marginal Cox models for clustered survival data. Marginal Cox models were used instead of the standard Cox proportional hazard models because the SFS times of women from the same cluster may be dependent. Thus, we used the robust sandwich variance estimator in order to obtain the correct inferences and standard errors of the correlated survival data ²⁰.

For women who had experienced their first sexual intercourse; multivariate analyses were employed using mixed effects regression models in assessing the effects of age at first sex on STIs. These models allowed for the two-level nested nature of the data, with women nested within geographic clusters. Random intercepts were included in the two-level mixed effects regression models to model the combined effect of all unobserved cluster-specific covariates.

Results

Characteristics of the Study Population and Distribution of Study Outcomes by Age at First Sexual Intercourse

The characteristics of the study population by age at first sex are shown in Table 1. Ninety seven percent (N=1957) of study participants reported having had sex. The proportion of women who had their first sex before age 18, 18–19, and 20 + years were 32%, 26%, and 42%, respectively. Age at first sex significantly varied by both religion and ethnic group ($p < 0.01$). Furthermore, age at first sex was associated with educational attainment, with having a husband/partner, female circumcision, first sexual experience, and partner at first sex. Only 13% of the women who had experienced sexual activity before their eighteenth birthday had secondary or higher education. However, among the women who had their first sexual experience at age 20+, 42% had secondary or higher education. The prevalence of female circumcision was 28%, 25%, and 16% among women who reported first sex at age < 18, 18–19 and 20+ years, respectively. Surprisingly, as many as 16% of the women who had their first sex before age 18 years were forced to have sex compared to 6% of women who

had first sex at age 20+ years. The proportion of women who experienced first sex within marriage or cohabitation was lowest among women who reported first sex at age <18 years and increased steadily with increasing age at first sex.

The proportion of women who tested positive for any STI, including HIV-1 and HSV-2, at age <18, 18–19 and 20 years were 61%, 51% and 40%, respectively (Table 2). The proportion of women who tested positive for HIV-1 were 17%, 9% and 7% for ages <18, 18–19, and 20+ years, respectively. The proportions of HSV-2 were 53%, 43% and 35% for ages <18, 18–19, and 20+ years, respectively. Women who reported symptoms of STIs had the same age of sexual onset pattern as women who tested positive for STIs.

Median Sex Free Survival (SFS) by Study Outcomes and Determinants of Age at First Sex

Table 3 presents the median SFS by HIV-1, HSV-2, test positive for STIs and symptoms of STIs. The median SFS was 17 years for HIV-1 positive and 19 years for HIV-1 negative women. The median SFS for HSV-2-positive and HSV-2-negative women were 18 and 19 years, respectively. Sex-free survival rates differed significantly among women who tested positive or negative for at least one STI, including HIV-1 and HSV-2 (log rank p-value<0.01). Similarly, SFS rates were significantly different between women who reported STI symptoms and women who did not report STI symptoms (log rank p-value<0.01). The SFS rates were consistently higher for the women who tested negative for an STI (including HIV-1 and HSV-2), or had no symptoms of STIs (Figure 1).

A multivariate marginal Cox model was used to assess the determinants of age at first sex. All the variables that were thought to have been present before or at the age of sexual onset and were associated with age at first sex at the 0.02 level in the univariate analysis were included in the marginal Cox model as covariates. As shown in Table 4, the adjusted hazard of experiencing first sex was significantly higher for circumcised women (HR=1.20; 95% CI: 1.02–1.40), women who were forced at first sex (HR=1.47; 95% CI: 1.15–1.89), and women who had first sex with a non-cohabiting partner (HR=1.40; 95% CI=1.23–1.58).

Age at first sex and STIs or symptoms of STIs

Two-level mixed models with women nested in clusters were used to examine the associations between age at first sex, testing positive for STIs and symptoms of STIs for women who had experienced sexual activity. Adjustments were made for education, husband/partner, female circumcision, religion and ethnicity. As shown in Table 5, women who began to have sex at age 18–19 or age 20+ were less likely to have STIs, including HIV-1 and HSV-2, than women who had sex before age 18. Symptoms of STIs did not vary significantly by age at first sex; however, women with secondary or above education were less likely to report symptoms of STIs compared to women with pre-secondary education.

Discussion

We found a significant association between early age at first sex and the incidence of STIs including, HIV-1 and HSV-2 in women in the Moshi urban district of Tanzania. About a third of the 1,957 women, who gave information about age at first sex, had sexual debut before their 18th birthday. The majority of the women analyzed (58%) were sexually active by age 20. This finding is consistent with other studies of sexual behavior and age at first sex in sub-Saharan Africa^{21–23}. Women residing in cities with high prevalence of HIV in the sub-region have early onset of sexual debut¹⁶. Furthermore, there are reports that age at first sex is on the decline in the sub-region^{14, 15}. Therefore, the association between early age at first sex and prevalence of STIs including HIV is of public health concern.

The finding that early age at first sex increased the risk of STI (e.g., HIV-1 and HSV-2) is consistent with other studies from sub-Saharan Africa^{14, 16, 24}. However, this study has an additional strength of considering both syndromic and laboratory confirmed STIs. Women who had their first sex before 18 years of age were at an increased risk of having an STI. In an urban study in Zimbabwe, having first sex before 15 or 18 years of age was significantly associated with HIV, independent of other risk factors¹⁴. A study in Rwanda showed that having sex at age 17 or younger, was associated with HIV infection²⁵. In a cross-sectional, population-based study conducted in two cities where the prevalence of HIV among adults exceeded 20% (Kisumu, Kenya and Ndola, Zambia) and two cities with a much lower HIV prevalence among adults (Cotonou, Benin and Yaoundé, Cameroon), women in the high HIV prevalence cities had sexual debut earlier than women in the low HIV prevalence cities¹⁶. Our study confirms the association between early age at first sex and HIV in an urban area. Furthermore, this study is one of the first in sub-Saharan Africa to identify the association between early age at first sex and HSV-2. There are reports that HSV-2 infection may facilitate both acquisition and transmission of HIV^{26–29}. The high prevalence of HSV-2 in the study population is of concern and hence the need for urgent comprehensive STIs control programs to curb the spread of HIV. The decline in HIV infections in Uganda is attributed partly to a delay at age of first sex achieved through the ‘ABC’ (abstinence, be faithful, and condom use) program³⁰.

The increased risk of STIs associated with an early age at first sex may be partly due to biological, behavioral, and socio-economic predispositions¹³. Physiologic and immunological immaturity of the female genital tract may increase susceptibility to infections^{13, 14}. The immature genital tract has larger areas of cervical ectopy and trauma during sexual intercourse may facilitate infections³¹. Early age at first sex has important effects on subsequent social abilities, including the regulation of sexual behaviors^{32, 33}. Furthermore, women who start their sexual debut at an early age are more likely to report alcohol abuse, multiple sexual partners and to engage in unprotected sex^{8, 9, 11}.

The significant determinants of early age at first sex among the study participants were forced at first sex, female circumcision, and having sex with a non-cohabiting partner. We found that a significant proportion of the women were forced at first sex; about 55% of these women were less than 18 years. This is consistent with previous studies in both resource-rich and resource-limited countries^{17, 32, 34–36}. Women who are forced at their first sex are more likely to report subsequent risky behaviors, such as unprotected sex, alcohol use, multiple partners, and adverse reproductive health outcomes^{37–40}. In most countries in Africa, gender-power imbalances exist and women have no control over sexual decisions⁴¹. Therefore, intervention programs should target the men who are the perpetrators of forced sex at an early age. Furthermore, efforts should be made to identify early victims of forced sex and appropriate interventions instituted before victims embark on sexual risk-taking behaviors⁴⁰.

Female circumcision was also associated with early age at first sex. Though, the prevalence of female circumcision is on the decline in sub-Saharan Africa, the practice continues in some cultures; it is part of the “right of passage” and it is performed before marriage. Female circumcision is believed to enhance a woman’s value on the marriage market, promote genital hygiene, ensure preservation of virginity, and maintain family honor and dignity⁴². However, it is associated with several long-term genitourinary complications⁴³. There are limited and conflicting reports on the association between female circumcision and HIV^{43–46}. The prevalence of bacterial vaginosis and HSV-2 infection has been observed to be higher among circumcised women than non circumcised women⁴⁷. It is postulated that the association between female circumcision and HSV-2 implies that

circumcised women are more susceptible to HIV infections ⁴⁶. There is a need for studies on the association between female circumcision and HIV.

Women who had formal education tended to have delayed onset of sexual debut. This is consistent with other studies in the sub-region, where formal education was protective against having early sexual debut and STIs ^{14, 22}. In a recent study by Jukes et al. four mechanisms by which schooling may affect sexual behavior based on educational attainment and school attendance were identified: sociocognitive determinants, social networks, socioeconomic/demographic factors, and changes in sexual behavior ⁴⁸. Educated women might have received health education at school and are more likely to continue to access information on STIs/HIV from various media outlets. Moreover, education of a woman may reduce HIV risk by providing the woman employment opportunities, access to resources, assertiveness in decision making with regard to sex, and making her less reliant on male partners ⁴⁸. Formal education of women, therefore, may play a crucial role in the fight against the HIV epidemic.

The present study has several strengths compared to previous studies. It has a large sample size, uses laboratory-confirmed STIs as well as STI symptoms (syndromic) in a population based sample. We observed similar findings using either STI positive tests or syndromic diagnoses; suggesting that in areas where diagnostic testing is not readily available syndromic diagnoses could be used as a proxy. However, our study has some inherent limitations that should be considered when interpreting the results. First, the analysis is based on cross-sectional data, which limits the conclusions about the causality between age at first sex and STIs. Second, the age of first sex was an event that must precede heterosexual infection with HIV, HSV-2, or any STIs (we assumed that all STIs were due to heterosexual infections). Third, the study used data on self-reported behavior, which may be fraught with problems especially when the subject matter is highly sensitive and potentially embarrassing. Therefore, the reported sexual behaviors might be affected by several biases. Fourth, only women who agreed to be tested for STIs were included in the analysis, thereby ignoring the possible systematic differences between women who consented to be tested for STIs and those who did not. Thus, inferences from the women who provided information on STIs can be biased if there were systematic differences between women who were tested for STIs and those who were not.

In conclusion, the analysis of the determinants of age at first sex, a modifiable risk factor, and its association with the acquisition and transmission of STIs has important public health implications for the prevention of STIs, including HIV. Longitudinal studies are needed to establish the causal relationship between age at first sex and the incidence of HIV. This study confirms previous reports that early age at first sexually intercourse has numerous negative effects on the health and well-being of women ^{8–11}. In sub-Saharan Africa, where the prevalence of HIV and other STIs is high, a better understanding of the determinants of the age at first sex is crucial. Prevention programs should not only aim at delaying the age at first sex but also address factors leading to early age at first sex, which in most cases may not be under the control of the woman.

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FIG. 1. Kaplan-Meier estimates of survival until first sex in Moshi women, Tanzania, 2002–2003: (A) STIs (positive or negative); (B) presence or absence of STIs symptoms; (C) HIV-1 (positive or negative); and (D) HSV-2 (positive or negative).

Table 1
 Characteristics of study participants by age at first sex in Moshi, Tanzania, 2002–2003.

Variable	<18 years (N=633)		18–19 years (N=502)		20+ years (N=822)		P-value [†]
	N	%	N	%	N	%	
<i>Age, in years</i>							0.14
20–24	191	30	165	33	248	30	
25–29	150	24	125	25	212	26	
30–34	105	17	97	19	164	20	
35+	186	29	115	23	197	24	
<i>Religion</i>							<0.01
Muslim/other	262	41	201	40	221	27	
Catholic	228	36	176	35	369	45	
Protestant	143	23	124	25	232	28	
<i>Ethnicity</i>							<0.01
Chagga	288	46	221	44	504	61	
Pare	89	14	73	15	76	9	
Other	256	40	208	41	241	29	
<i>Education</i>							<0.01
Pre-secondary	553	87	401	80	479	58	
Secondary and above	80	13	101	20	343	42	
<i>Husband/Partner</i>							<0.01
No	215	34	162	32	400	49	
Yes	418	66	340	68	422	51	
<i>Female Circumcision</i>							<0.01
No	456	72	374	75	691	84	
Yes	175	28	127	25	130	16	
<i>First sexual experience</i>							<0.01
Consensual	425	67	380	76	520	81	
Non-consensual	107	17	76	15	87	13	
Forced	99	16	46	9	36	6	
<i>Partner at first sex</i>							<0.01

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Variable	<18 years (N=633)		18-19 years (N=502)		20+ years (N=822)		P-value [†]
	N	%	N	%	N	%	
Husband/cohabiting partner	203	32	207	41	332	51	
Regular non-cohabiting partner	233	37	188	38	200	31	
Other ^{††}	197	31	105	21	113	18	

[†]Based on Pearson's Chi-square test

^{††}Friend, causal acquaintance, commercial sex customer, relative

Table 2

Distribution of HIV-1, HSV-2, test positive for all STIs and symptoms of all STIs by age at first sex in Moshi Women, Tanzania, 2002–2003

Variable	<18 years		18–19 years		20+ years		P-value [†]
	N [¶]	%	N	%	N	%	
<i>STIs (test positive)</i>							
No	196	39	193	49	350	60	<0.01
Yes	307	61	199	51	238	40	
<i>HIV-1</i>							
No	392	83	339	91	503	93	<0.01
Yes	78	17	35	9	38	7	
<i>HSV-2</i>							
No	222	47	215	57	353	65	<0.01
Yes	248	53	159	43	188	35	
<i>STIs (symptoms)</i>							
No	450	71	383	76	499	77	<0.01
Yes	182	29	119	24	147	23	

[¶]The numbers in the columns vary and reflect the numbers of women who underwent testing.

[†]Based on Pearson's Chi-square test

Table 3

The median sex free survival (SFS) and the hazards of having had first sex at an earlier age by HIV-1, HSV-2, test positive for all STIs and symptoms of all STIs in Moshi Women, Tanzania, 2002–2003.

	N	N (%)	events [†]	N (%)	Median SFS in years	Hazards of having first sex (95% CI)	P-value [*]
<i>HIV-1</i>	1385						
No	1234	1114 (90%)		120 (10%)	19	1.00	
Yes	151	148 (98%)		3 (2%)	17	1.54 (1.30–1.83)	
<i>HSV-2</i>	1385						
No	790	683 (86%)		107 (14%)	19	1.00	
Yes	595	579 (97%)		16 (3%)	18	1.48 (1.32–1.65)	
<i>STIs positive</i>	1483						
No	739	638 (86%)		101 (14%)	19	1.00	
Yes	744	717 (96%)		27 (4%)	18	1.52 (1.37–1.69)	
<i>STIs Symptoms</i>	1780						
No	1332	1332 (100%)		0 (0%)	18	1.00	
Yes	448	448 (100%)		0 (0%)	18	1.17 (1.05–1.30)	

^{*} Log-rank p-value

[†] Number of cases that experienced the event, i.e., had first sex

[‡] Number of cases that did not experience the event, i.e., had not had first sex at the time of the study.

Table 4

Determinants of age at first sex in Moshi Women, Tanzania, 2002–2003

Explanatory variables	<u>Unadjusted Hazard Ratios</u>		<u>Adjusted Hazard Ratios</u>	
	HR (95% CI)	P-value	HR (95% CI)	P-value
<i>Female Circumcision</i>				
No	1.00		1.00	
Yes	1.21(1.07–1.38)	<0.01	1.20(1.02–1.40)	0.03
<i>Religion</i>				
Muslim/other	1.00		1.00	
Catholic	0.78(0.67–0.90)	<0.01	0.80(0.60–1.08)	0.14
Protestant	0.77(0.65–0.91)	<0.01	0.80(0.63–1.02)	0.08
<i>Ethnicity</i>				
Chagga	1.00		1.00	
Pare	1.35(1.14–1.60)	<0.01	1.19(0.90–1.59)	0.23
Other	1.29(1.11–1.49)	<0.01	1.21(0.84–1.74)	0.31
<i>First Sexual Experience</i>				
Consensual	1.00		1.00	
Non-consensual	1.18(1.05–1.34)	<0.01	1.13(0.94–1.36)	0.18
Forced	1.61(1.36–1.89)	<0.01	1.47(1.15–1.89)	<0.01
<i>Partner at first intercourse</i>				
Husband/cohabiting partner	1.00		1.00	
Regular non-cohabiting partner	1.34(1.17–1.54)	<0.01	1.40(1.23–1.58)	<0.01
Other	1.60(1.37–1.86)	<0.01	1.54(0.98–2.40)	0.06

Table 5

Adjusted effects of age at first sex on testing positive for HIV-1, HSV-2, test positive for all STIs in Moshi Women, Tanzania, 2002–2003.

	STIs		HIV-1		HSV-2		STIs Symptoms	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Explanatory variables								
<i>Age at first sex</i>								
< 18 years	1.00		1.00		1.00		1.00	
18–20 years	0.66 (0.50–0.86)	<0.01	0.52 (0.33–0.79)	<0.01	0.66 (0.50–0.88)	<0.01	0.81 (0.61–1.06)	0.12
20+ years	0.46 (0.36–0.60)	<0.01	0.35 (0.23–0.54)	<0.01	0.50 (0.38–0.66)	<0.01	0.90 (0.69–1.18)	0.44
<i>Education</i>								
Pre-secondary	1.00		1.00		1.00		1.00	
Secondary and above	0.98 (0.75–1.27)	0.87	0.99 (0.63–1.57)	0.97	1.17 (0.88–1.55)	0.27	0.48 (0.36–0.65)	<0.01
<i>Husband/Partner</i>								
No	1.00		1.00		1.00		1.00	
Yes	1.05 (0.84–1.31)	0.69	0.61 (0.43–0.88)	<0.01	1.38 (1.09–1.74)	<0.01	0.93 (0.73–1.17)	0.52
<i>Female Circumcision</i>								
No	1.00		1.00		1.00		1.00	
Yes	1.27 (0.98–1.65)	0.07	0.94 (0.61–1.44)	0.76	1.14 (0.87–1.49)	0.35	0.85 (0.65–1.11)	0.24
<i>Religion</i>								
Muslim/other	1.00		1.00		1.00		1.00	
Catholic	0.92 (0.69–1.22)	0.54	1.27 (0.80–2.00)	0.31	0.92 (0.68–1.24)	0.57	1.07 (0.80–1.43)	0.67
Protestant	0.91 (0.67–1.22)	0.51	0.90 (0.54–1.49)	0.68	0.80 (0.59–1.10)	0.17	1.04 (0.77–1.42)	0.79
<i>Ethnicity</i>								
Chagga	1.00		1.00		1.00		1.00	
Pare	1.00 (0.70–1.43)	0.99	1.36 (0.77–2.41)	0.30	0.94 (0.65–1.38)	0.76	1.42 (0.99–2.02)	0.79
Other	1.17 (0.89–1.51)	0.25	1.25 (0.82–1.93)	0.30	1.06 (0.81–1.40)	0.66	1.07 (0.82–1.41)	0.61