ORIGINAL RESEARCH ARTICLE

Marital status and risk of HIV infection in slum settlements of Nairobi, Kenya: results from a cross-sectional survey

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Abstract

Kenya still faces major challenges due to the HIV/AIDS epidemic. This study examined the association between marital status and risk of HIV infection in urban slums of Nairobi. Data were derived from a cross-sectional population-based survey nested in an ongoing Demographic Surveillance System in two urban slums in Nairobi. Descriptive statistics and multivariate logistic regression analysis were used to describe the characteristics of the sample and to assess the association between marital status and risk of HIV infection. HIV prevalence among married men and women was 10.4% and 11.1% and among divorced/separated/widowed men and women was 14.9% and 27.9%. Multivariate results showed the risk of acquiring HIV was significantly associated with being married, divorced/separated/widowed, being in the older age groups and the Luo ethnic group. There is urgent need for appropriate HIV prevention interventions targeted at the urban poor to address the high risk of HIV infections in this population (*Afr J Reprod Health 2013; 17[1]: 103-113*).

Résumé

Le Kenya fait face encore aux défis majeurs en raison de l'épidémie du VIH / sida. Cette étude a examiné le rapport entre l'état civil et le risque d'infection du VIH dans les bidonvilles de Nairobi. Les données ont été obtenues à partir d'une enquête transversale basée sur la population nichée dans un système de surveillance démographique en cours dans deux bidonvilles de Nairobi. Les statistiques descriptives et multi variées d'analyse de régression logistique ont été utilisées pour décrire les caractéristiques de l'échantillon et pour évaluer le rapport entre l'état civil et le risque d'infection du VIH. La prévalence du VIH chez les hommes et les femmes mariés était de 10,4% et de 11,1% chez les hommes et les divorcés / séparés / veufs et les femmes était de 14,9% et 27,9%. L'analyse multi variée a montré que le risque de contracter le VIH était significativement associé au fait d'être marié, divorcé / séparé / veuf, l'appartenance aux groupes plus âgés et au groupe ethnique Luo. Il y a un besoin urgent des interventions de prévention appropriées qui visent les pauvres en milieu urbain pour s'occuper du risque élevé d'infection du VIH dans cette population (*Afr J Reprod Health 2013; 17[1]: 103-113*).

Keywords: Marital status; HIV/AIDS; Men; Women; Urban slums; Kenya

Introduction

According to the UNAIDS, globally, an estimated 33.3 million people were living with HIV at the end of 2009, an increase from 26.2 million in 1999 (a 27% increase). Sub-Saharan Africa continues to be disproportionately affected by the HIV epidemic, accounting for 68% of the global HIV burden[1]. In Kenya, according to the 2008-2009 Kenya Demographic Health Survey (KDHS), the national HIV prevalence for adults aged 15-49 years was 6.3%[2]. Existing data shows that there are considerable differences in HIV prevalence rates across different geographic areas and socio-demographic groups. For example, according to the 2007 Kenya AIDS Indicator Survey (KAIS)[3], a higher proportion of people aged 15-64 years in urban areas (8.4%) were infected with HIV compared to those in rural areas (6.7%), while in Nairobi province, the prevalence rate was 8.8% compared to Nyanza province (14.9%), which had the highest HIV prevalence rate in the country. On the other hand, a research study conducted in the urban informal settlements showed that the prevalence rate was much higher (11.5%) compared to that of the Nairobi city as a whole[4].

Kenya still faces major challenges due to the HIV/AIDS epidemic. According to the Kenya National AIDS Strategic Plan-2009-2013[5] and the

2009 Kenya HIV Prevention Response and Modes of Transmission Analysis report[6], the number of new HIV infections is significantly high. For example, nationally, new HIV infections among those who are in a union or regular partnership accounted for 44% of the total number of new infections. Previous research has shown that a number of factors are associated with the risk of HIV infection. Several studies have shown that marital status is an important predictor of the likelihood of acquiring HIV[6-9]. Marriage is considered as either having a considerable protective effect against HIV infection or exacerbating the risk of getting infected. For example, if both spouses are HIV-negative and get married and remain faithful to each other, marriage affords protection. However, if at the time of marriage or union, one of the spouses is already HIV-positive or engages in risky sexual behavior, then this increases the likelihood of infecting the other partner with HIV. A study in South Africa found that the HIV prevalence rate among married people was higher than that of unmarried individuals[12]. On the other hand, HIV infection was also strongly associated with divorce, separation and widowhood suggesting that infection was acquired in marriage[11]. A number of factors have been cited as driving the increase in HIV infection in marital partnerships. Having multiple and concurrent sexual partners coupled with lack of or inconsistent condom use has been strongly associated with increased risk of HIV transmission among spouses[8, 10, 13-14]. A study by Maharaj and Cleland found that condom use within marital and cohabiting partnerships was low among partners[15]. This was attributed to negative attitudes toward condoms, including the fact that use of condoms suggested infidelity, lack of trust, or a sign that one of the partners may be infected with a sexually transmitted infection.

The role of gender in the risk of contracting HIV has also been examined by previous studies. Evidence shows that men are more likely to have extramarital affairs and less likely to use condoms, hence exposing them to the risk of contracting HIV and subsequently, increasing the likelihood of infecting their partners[6, 15-16]. On the other hand, women are not able to ask their partners to use condoms even in situations where infidelity is evident due to unfavorable gender power-relations and underlying socio-cultural practices, which generally tend to acknowledge that extramarital sex in men is acceptable, but inexcusable in women[10, 17-18]. Other factors that have been cited as key predictors of the risk of HIV infection, included age, ethnicity, education level, and socioeconomic status[19-27].

Analyses of the association between marital status and the risk of HIV infection in the slums have, to our knowledge, not previously been conducted. While several studies have examined the relationship between marital status and HIV infection, the slum population is unique and the relationship between the two might be different. This is because slums have a high proportion of adults living alone as either unmarried or living apart from their spouses, especially men who are more likely to migrate from their homes of origin to the slums in search of employment opportunities in the urban areas to support their families[28]. The nature of sexual partnerships and practices is also different. There is a high level of risky sexual practices, including a greater incidence of multiple sexual partners, non-use of condoms and early sexual debut. Existing evidence shows that compared to non-slum residents, slum residents are less likely to be aware of or adopt preventive measures to protect themselves against HIV/AIDS[29-30].

In addition, one of the criticisms leveled against national-based surveys such as the KDHS is that they tend to mask inequities because in many cases, the data are not disaggregated into smaller sub-groups such as slum areas. The objective of this paper is to examine the association between marital status and the risk of HIV infection in the urban slums of Nairobi. The findings from this study will inform HIV prevention programs, particularly among poor and marginalized groups in the slum settlements.

Methods

Study Area and Population

Data for this study were drawn from a cross-sectional population-based sero-survey nested in the Nairobi Urban Health and Demographic Surveillance System (NUHDSS), a longitudinal

data framework, which is run by the African Population and Health Research Center (APHRC) in Viwandani and Korogocho slum settlements. These slum settlements, like most others in Nairobi, are characterized by extreme poverty, poor access to health facilities, high morbidity and mortality rates, high unemployment rates and low school participation[31]. The sero-survey was implemented in collaboration with the Kenya Medical Research Institute (KEMRI) and carried out in 2006 and 2007.

Sampling and Data Collection

The NUHDSS database was used as the sampling frame and facilitated drawing of a random sample of eligible individuals, who included men aged between 15 to 54 years and women aged 15 to 49 years. The final sample was made up of 4,767 adult men and women who gave informed consent for participating in the study. However, for this study, only a total of 2,721 cases that agreed to participate in both the HIV serologic testing and the survey were selected for the analysis. The sampled individuals could accept the interview only, the blood test only, accept both or refuse both. The field team consisted of trained counselors and phlebotomists, where the former were responsible for conducting interviews and the latter were responsible for drawing blood. Interviews were conducted using a pre-tested questionnaire, which was used to collect information on respondents' socio-demographic data, marriage and sexual activity, and practices such as male circumcision, among others. To ensure confidentiality of the respondents' data, both the questionnaire and the blood sample filter papers did not contain any identifiers. Participants who wanted to know their HIV status were given a voucher and referred for counseling and testing services provided by collaborating providers in the community. The study received ethical approval from the Kenya Medical Research Institute's Scientific and Ethical Review Board.

Data analysis

Descriptive, bivariate and multivariate analyses were carried out using STATA ® version 10 and the data were weighted for non-response using the

pweight STATA command[32]. The descriptive and bivariate analyses were used to describe the characteristics of the sample and explore the associations between the dependent variable (HIV-sero status) and the key independent (marital status, condom use at last sexual contact and relationship of last sex partner) and other independent variables. For the bivariate analysis, chi-square test (X^2) was used to test the association between HIV-sero status and the explanatory variables. The multivariate logistic regression analysis was conducted to examine the association between HIV infection and marital status. Separate analyses were conducted for men and women. The dependent variable was coded as a dichotomous variable where "0" represented HIV-negative and "1" HIV-positive. The independent variables that were included in the multivariate analysis were marital status (i.e., never married (reference category), married, and divorced, separated and widowed), condom use at last sexual contact (coded "1" (yes) and "0" (no)) and relationship of last sex partner (marital partner (reference category), boyfriend/girlfriend, and casual acquaintance). Socio-demographic factors that were controlled for in the regression analysis included age (less than 20 years (reference category), 20-24 years, 25-29 years, 30-34 years, 35-39 years, 40-44 years, and 45+ years), education (primary or below (reference category) and secondary school and higher), ethnicity, (Kikuyu (reference category), Luhya, Luo, Kamba, and Other), slum of residence (Viwandani (reference category) and Korogocho), and wealth status index, (richest 20% (reference category), poorest 20%, second poorest, third poorest, and fourth poorest.

Results

Descriptive Analysis

The background characteristics of the study sample are described in Table 1. Twelve percent of women and 10% of men had been infected with HIV. A majority of the respondents were married, while 7% of men and 13% of women were divorced, separated or widowed. Only 11% of women and 17% of men had used condoms at last sexual contact, while 7% of men and 2% of

women had engaged in sex with casual partners at last sexual intercourse. The majority of the respondents had primary school education or below, while 38% and 25% of men and women, respectively, had secondary education and higher. The highest proportion of study respondents were from the Kikuyu ethnic group and Korogocho slum settlement.

Bivariate analysis (Table 2) showed that married women and those who were divorced, separated or widowed were significantly associated with the risk of HIV infection. The results were similar for men; however, the findings were only marginally significant. Further analysis between marital status and condom use at last sexual contact showed that married and formerly married (divorced, separated or widowed) individuals were significantly less likely to have used condoms compared to never married individuals (results not shown). Across both sexes, respondents in the older age categories were associated with a higher HIV prevalence compared to those in the younger age categories. Ethnicity was also associated with the risk of being infected with HIV. Specifically, respondents from the Luo ethnic group had the highest HIV prevalence of 22% and 17% among men and women, respectively, compared to individuals from all the other ethnic categories.

Multivariate Analysis

Table 3 shows multivariate results for the association between HIV status and marital status. In the adjusted analysis for both men and women, married respondents and those who were divorced, separated or widowed were significantly more likely to be infected with HIV compared to respondents who were never married. However, among the men, the odds were much higher for married (AOR=5.71; p<0.001) and divorced, separated or widowed (AOR=10.23; p<0.01) individuals compared to women who were divorced, separated or widowed women (AOR=3.97; p<0.001). The results for married women were not statistically significant. Men who reported that their last sex partner was a girlfriend were three times more likely to be infected with HIV (AOR=3.34; p<0.05) compared to those who had sex with a marital partner. Among the women,

the results were not statistically significant. Age was significant predictor of HIV infection. Among men, after controlling for all other variables, individuals in the age category of 45 years and older were four times more likely (AOR=3.78; p<0.05) to be infected with HIV compared to those in the less than 20 years age category. For women, the age effect was only statistically significant in the unadjusted analysis, where higher odds of acquiring HIV was associated with those aged 25 years and older relative to individuals aged less than 20 years. However, after adjusting for other confounding factors, the effect of age disappeared. Education was an important predictor for HIV infection, but, the effect was only significant for women. Specifically, women with secondary education and higher had lower odds of being infected with HIV (AOR=0.49; p<0.01) compared to women with primary education or less.

Ethnicity was also significantly associated with the likelihood of acquiring HIV. Men from the Luhya (AOR=2.99; p<0.05) and Luo (AOR=13.52; p<0.001) ethnic groups were significantly associated with higher odds of being HIV-positive compared to the Kikuyu ethnic group. Women from the Luo ethnic group were 2.8 times (p<0.001) more likely to be HIV-positive compared to women from the Kikuyu ethnic group. In both sexes, condom use at last sexual contact and slum of residence were not significantly associated with HIV infection. Wealth status was not a significant predictor for HIV infection, except in the unadjusted results for women, where those in the second poorest wealth category were two times more likely to be infected with HIV relative to women in the richest.

Discussion

The objective of this paper was to examine the association between marital status and the risk of HIV infection in the informal settlements of Nairobi. The study findings from the multivariate analysis showed that across both sexes, marital status was a significant risk factor for HIV infection. In addition, the bivariate analysis revealed that married and formerly married individuals were less likely to have used condoms during the last sexual intercourse relative to never married individuals. These results suggest that

Table 1: Socio-demographic characteristics, HIV-sero status and marital status of men and women in Nairobi slums

	Men		Women	
	N	%	N	%
Age of respondent				
Less than 20 years	128	12.70	285	16.64
20-24 years	155	15.38	481	28.08
25-29 years	197	19.54	367	21.42
30-34 years	184	18.25	225	13.13
35-39 years	142	14.09	172	10.04
40-44 years	86	8.53	119	6.95
45+ years	116	11.51	64	3.74
Education level				
Primary or below	608	60.32	1,256	73.32
Secondary and higher	385	38.19	428	24.99
Don't know	15	1.49	29	1.69
Ethnicity				
Kikuyu	274	27.18	553	32.28
Luhya	161	15.97	288	16.81
Luo	183	18.15	338	19.73
Kamba	243	24.11	274	16.00
Other	147	14.58	260	15.18
Slum of residence				
Viwandani	471	46.73	659	38.47
Korogocho	537	53.27	1,054	61.53
Wealth index				
Poorest 20%	186	18.45	206	12.03
2nd	228	22.62	289	16.87
3rd	212	21.03	373	21.77
4th	179	17.76	415	24.23
Richest 20%	203	20.14	430	25.10
Marital status				
Never married	290	28.83	443	25.89
Married	646	64.21	1,051	61.43
Divorced/Separated/Widowed	70	6.96	217	12.68
Condom use at last sexual contact				
No	747	83.00	1,280	88.22
Yes	153	17.00	164	11.30
Relationship to last sex partner				
Marital partner	610	67.78	1,097	75.60
Boyfriend/Girlfriend	218	24.22	318	21.92
Casual acquaintance	61	6.78	28	1.93
Don't know	11	1.22	8	0.55
HIV sero-status				
Negative	909	90.18	1,500	87.57
Positive	99	9.82	213	12.43

those who had extramarital affairs were less likely to have used condoms and hence were at risk of acquiring HIV. The results corroborate those of previous research, which found that married respondents and those who were formerly married (i.e., divorced, separated or widowed) were at higher risk of HIV infection[5-8, 11, 19, 22]. The risk of contracting HIV in marriage has been associated with unsafe sexual practices, such as lack of condom use especially where partners are engaged in extramarital affairs. A study by Shisana and colleagues[10] on marital status and risk of HIV in South Africa found that married partners did not use condoms for fear of being accused of engaging in extramarital affairs. The high risk among the formerly married could be due to the fact that HIV/AIDS was the cause of the dissolution of the marriage either through death or separation. This

Table 2: Bivariate analysis for associations between HIV-sero status and explanatory variables

	Men			Women		
	Negative	**Positive**		**Negative**	**Positive**	
	N (%)	N (%)	*p*-values	N (%)	N (%)	*p*-values
Marital status						
Never married	280 (95.96)	10 (4.04)		413 (95.65)	30 (4.35)	
Married	569 (89.59)	77 (10.41)	0.055	932 (88.88)	119 (11.12)	***
Divorced/Separated/Widowed	58 (85.01)	12 (14.99)		153 (72.10)	64 (27.90)	
Condom use at last sexual contact						
No	670 (90.52)	77 (9.48)	0.066	1,123 (88.19)	164 (11.81)	0.137
Yes	139 (94.96)	14 (5.04)		124 (84.13)	40 (15.87)	
Relationship to last sex partner						
Marital partner	544 (90.38)	66 (9.62)		958 (87.77)	139 (12.23)	
Boyfriend/Girlfriend	201 (92.42)	17 (7.58)	0.704	264 (88.01)	54 (11.99)	
Casual acquaintance	54 (93.84)	7 (6.16)		18 (75.64)	10 (24.36)	0.248
Don't know	10 (94.67)	1 (5.33)		7 (95.17)	1 (4.83)	
Age of respondent						
Less than 20 years	124 (96.04)	4 (3.96)		268 (94.16)	17 (5.84)	
20-24 years	150 (97.81)	5 (2.19)		440 (91.80)	41 (8.20)	
25-29 years	182 (93.10)	15 (6.90)		314 (86.60)	53 (13.40)	
30-34 years	166 (90.92)	18 (9.08)	**	187 (83.97)	38 (16.03)	***
35-39 years	119 (85.54)	23 (14.46)		141 (82.60)	31 (17.40)	
40-44 years	77 (90.67)	9 (9.33)		100 (84.59)	19 (15.41)	
45+ years	91 (79.19)	25 (20.81)		50 (76.55)	14 (23.45)	
Education level						
Primary or below	544 (92.08)	64 (7.92)		1,083 (89.77)	173 (10.23)	
Secondary and higher	352 (93.15)	33 (6.85)	0.508	390 (92.17)	38 (7.83)	0.220
Don't know	13 (83.97)	2 (16.03)		27 (95.39)	2 (4.61)	
Ethnicity						
Kikuyu	260 (95.61)	14 (4.39)		499 (93.00)	54 (7.00)	
Luhya	143 (92.98)	18 (7.02)		254 (91.17)	34 (8.83)	
Luo	139 (78.22)	44 (21.78)	***	264 (82.69)	74 (17.31)	**
Kamba	227 (94.60)	16 (5.40)		247 (90.95)	27 (9.05)	
Other	140 (95.34)	7 (4.66)		236 (92.24)	24 (7.76)	
Slum of residence						
Viwandani	444 (93.81)	27 (6.19)	0.174	595 (91.64)	64 (8.36)	0.192
Korogocho	465 (90.33)	72 (9.67)		905 (89.29)	149 (10.71)	
Wealth index						
Poorest 20%	183 (93.46)	20 (6.54)		392 (93.04)	38 (6.96)	
2nd	167 (88.40)	19 (11.60)		173 (88.42)	33 (11.58)	
3rd	206 (92.97)	22 (7.03)	0.381	242 (86.05)	47 (13.95)	0.098
4th	195 (94.56)	17 (5.44)		324 (90.00)	49 (10.00)	
Richest 20%	158 (92.27)	21 (7.73)		369 (91.75)	46 (82.50)	

* *p*<0.05; **p<0.01; ***p<0.001 | All data are weighted

evidence reinforces the notion that marriage is not as protective as has been previously thought.

Other significant predictors of HIV risk infection included type of sexual partner (i.e., men with girlfriends), age (i.e., being in the older age groups), education (i.e., women with secondary education and higher) and ethnicity (i.e., belonging to the Luo and Luhya ethnic groups). Men who last sex partner was a girlfriend were associated with higher likelihood of having HIV, which suggests that level of condom use and other forms of protection against HIV/AIDS are low. Existing evidence has suggested that the increased risk of HIV infection among individuals with girlfriends or boyfriends is compounded by low condom use because such partners are considered "safe"[6]. As noted by previous research[23-27], our study findings

Table 3: Unadjusted and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for HIV sero-status and marital status

	Men				Women			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	ORs	95% CIs	AORs	95% CIs	ORs	95% CIs	AORs	95% CIs
Marital status								
Never married	REF.		REF.		REF.		REF.	
Married	2.75	0.88-8.57	5.71***	2.00-16.29	2.75***	1.61-4.69	1.56	0.61-3.99
Divorced/Separated/Widowed	4.18*	1.12-15.60	10.23**	2.18-47-91	8.51***	4.60-15.74	3.97***	1.70-9.25
Condom use at last sexual contact								
No	REF.		REF.		REF.		REF.	
Yes	0.50	0.24-1.05	0.39	0.12-1.20	1.40	0.89-2.21	1.38	0.80-2.37
Relationship to last sex partner								
Marital partner	REF.		REF.		REF.		REF.	
Boyfriend/Girlfriend	0.76	0.27-2.17	3.34*	0.99-11.24	0.97	0.63-1.50	1.14	0.56-2.29
Casual acquaintance	0.61	0.23-1.60	2.42	0.70-8.32	2.31	0.95-5.57	1.12	0.42-2.99
Don't know	0.52	0.06-4.44	1.32	0.13-12.70	0.36	0.41-3.17	0.54	0.08-3.41
Age of respondent								
Less than 20 years	REF.		REF.		REF.		REF.	
20-24 years	0.54	0.10-2.69	0.27	0.05-1.40	1.44	0.77-2.67	1.02	0.45-2.30
25-29 years	1.80	0.42-7.61	0.74	0.19-2.90	2.49**	1.37-4.54	1.86	0.82-4.19
30-34 years	2.42	0.58-10.13	1.38	0.36-5.31	3.08***	1.63-5.78	1.89	0.80-4.49
35-39 years	4.10*	1.00-16.77	2.04	0.53-7.87	3.39***	1.76-6.54	1.68	0.69-4.08
40-44 years	2.49	0.54-11.37	1.63	0.41-6.40	2.93**	1.43-6.03	1.69	0.66-4.31
45+ years	6.37**	1.52-26.69	3.78*	1.06-13.45	4.94***	2.14-11.37	1.79	0.60-5.28
Education level								
Primary or below	REF.		REF.		REF.		REF.	
Secondary and higher	0.85	0.46-1.57	0.63	0.34-1.15	0.74	0.47-1.16	0.49**	0.32-0.76
Don't know	2.21	0.43-11.19	1.14	0.15-8.65	0.42	0.09-1.89	0.32	0.08-1.29
Ethnicity								
Kikuyu	REF.		REF.		REF.		REF.	
Luhya	1.64	0.66-4.07	2.99*	1.03-8.65	1.28	0.75-2.18	1.24	0.70-.21
Luo	6.06***	2.32-15.82	13.52***	3.93-46.53	2.78***	1.71-4.52	2.79***	1.59-4.88
Kamba	1.24	0.51-3.01	1.69	0.53-5.38	1.32	0.70-2.47	1.14	0.51-2.55
Other	1.06	0.35-3.16	2.14	0.51-8.90	1.11	0.54-2.29	1.28	0.64-2.57
Slum of residence								
Viwandani	REF.		REF.		REF.		REF.	
Korogocho	1.62	0.80-3.26	0.95	0.32-2.79	1.31	0.87-1.98	1.14	0.69-1.89
Wealth index								
Richest 20%	REF.		REF.		REF.		REF.	
Poorest 20%	1.87	0.65-5.36	1.67	0.61-4.54	1.75	0.84-3.62	1.26	0.57-2.75
2nd	1.08	0.50-2.29	0.78	0.33-1.86	2.16*	1.16-4.04	1.24	0.60-2.57
3rd	0.82	0.36-1.84	0.77	0.32-1.82	1.48	0.81-2.70	1.00	0.50-1.99
4th	1.19	0.54-2.62	1.07	0.45-2.53	1.20	0.65-2.18	1.02	0.52-2.02

* *p*<0.05; **p<0.01; ******p*<0.001 | REF: Reference category | All data are weighted**

showed that age is an important predictor of the risk of acquiring HIV. Specifically, individuals in the older age groups were at a much higher risk of acquiring HIV relative to those in the younger age categories. Lack of perceived risk for HIV infection among individuals in the older age groups, which in turn lowers the probability of adopting safer sex practices, has been associated with increased risk of infection in this sub-population[33]. These results suggest the need for educational campaigns aimed at creating awareness among older individuals in the slum settlements about the need to adopt HIV prevention strategies.

Our findings suggested that higher education attainment among women had a protective effect against the risk of contracting HIV. Specifically, women with secondary education and higher were significantly less likely to be HIV-positive. These findings corroborate those of previous studies[34-35],

which found that higher education attainment among women was associated with a lower risk of HIV infection. One of the pathways through which education reduces the risk of HIV infection is through exposure to prevention information and improved understanding of the link between an individual's sexual behavior and risk of HIV infection. These data suggest that instituting mechanisms aimed at increasing education attainment among girls in the slum settlements will have a positive effect with regard to reducing the risk of HIV infection. Previous studies[36-39], however, have shown that education attainment is an important strategy but not sufficient in addressing the risk of HIV infection among women. Due to the challenges posed by the inequities in gender-power relations between men and women and, which are reinforced by cultural practices that give men more dominance in sexual negotiations and family decision-making, women are unable to protect themselves hence increasing their vulnerability to HIV. In addition to increasing education attainment among girls, recommendations have been made to increase male involvement in the fight against AIDS and institute mechanisms for addressing social constructions of gender roles and masculinity that increase women's vulnerability to HIV [40-42]. With regard to ethnicity, the Luo ethnic group was significantly associated with the risk of contracting HIV compared to the Kikuyu ethnic group. Some of the factors that may be responsible for this observation include socio-cultural practices, such as wife inheritance and lack of male circumcision (traditionally, the members of the Luo community do not practice circumcision and, therefore, are not exposed to the protective effect of male circumcision on HIV acquisition)[43-46]. In addition, in the men's analysis, the Luhya ethnic group was associated with a higher likelihood of contracting HIV relative to the Kikuyu ethnic group. A national survey carried out in 2008 showed that HIV prevalence (7%) among the Luhya ethnic group was ranked second after the Luo ethnic group at 14%[2], which suggests that increased targeted prevention strategies are needed both in the slum settlements and nationally.

Our study findings have important policy implications. Given the high prevalence of HIV among married and formerly married individuals in urban slum settlements, there is need for HIV prevention interventions to adopt a more targeted approach, particularly with regard to designing and implementing programs geared toward addressing the increased risk of HIV infection among this target group. For example, HIV prevention efforts should device strategies of promoting greater acceptance and use of condoms, particularly in marital and cohabiting relationships. Married people and those who were formerly married should be encouraged to use HIV voluntary counseling and testing (VCT) services in order to know their HIV status, so that they can take appropriate measures to protect themselves against HIV or manage HIV infection if found to be HIV-positive. Given that the HIV prevalence among older age groups and the Luo ethnic group is much higher than the national average; our study highlights the need to develop policies and preventive initiatives targeted at these sub-groups in the slum settlements to address the increased risk of acquiring HIV. Also, based on our results, education among women had a protective effect against the risk of HIV infection and, therefore, strategies aimed at increasing education attainment of girls in the urban slums will have a positive effect on HIV risk reduction.

Limitations

Our study had a number of limitations that need to be highlighted. The self-reported nature of the data, particularly on sexual behavior characteristics may be subject to a variety of biases, including social desirability bias, which may encourage respondents to provide socially desirable responses to sensitive questions relating to their sexual behavior. It is also plausible that the characteristics (for example, perceived risk of infection) of those who volunteered to be interviewed and took a blood test differed from individuals who declined both; however, it was not possible to account for these differences in our analysis. In addition, due to the cross-sectional nature of the data, we were not able to determine the causal direction of the association between marital status and the risk of HIV infection.

Conclusions

Our findings suggest that more efforts are needed to address the growing proportion of HIV infections in marital or regular partnerships. Our study has highlighted key issues related to the risk factors associated with HIV infection among poor and marginalized groups in the urban slums. There is need for the government to design and implement appropriate programs targeted at the urban poor to address the increased risk of HIV infections in married people and those who were formerly married (i.e., divorced, separated or widowed). The government should also develop policies and programs that specifically target older individuals and the Luo and Luhya ethnic groups in the urban slums to address the increased risk of HIV infection among these groups. Increasing education attainment of girls in the urban slums is an important strategy in the fight against the AIDS epidemic.

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Contributions of Authors

JKK conceptualized the study, conducted the data analyses, participated in the literature review, and prepared the first draft of the manuscript. RE made substantive contribution that informed the data analyses and reviewed the manuscript. AKZ made substantive contribution to the conceptualization of the study and reviewed the manuscript. NY was involved in revising the manuscript for intellectual content and interpretation of data. All authors have approved the manuscript and are aware that it is being submitted to the journal.

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