

Understanding ethnic variations in HIV prevalence in Kenya: The role of cultural practices

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Abstract

Patterns of HIV prevalence in Kenya suggest that areas where various cultural practices are prevalent bear a disproportionate burden of HIV. This paper examines (i) the contextual effects of cultural practices (polygyny, male circumcision) and related sexual behaviour factors on HIV prevalence and (ii) the extent to which specific cultural practices in a community/county explain existing ethnic variations in HIV prevalence in Kenya. The analysis applies multilevel logistic regression to data from the 2012/13 Kenya AIDS Indicator Survey. The results reveal striking ethnic variations in HIV prevalence in Kenya. The prevalence of polygyny in a community is positively associated with HIV prevalence, while a higher level of male circumcision in a county is protective for both men and women. The effects of these factors are stronger for men than women at both individual and contextual (community/county) levels. These cultural practices and associated risk factors partly explain existing ethnic differences in HIV prevalence in Kenya, but there remain significant ethnic variations that are not explained by these cultural practices or related sexual behaviour factors. These call for stronger empirical evidence to offer stronger theoretical explanations and inform effective policy and practice to address HIV epidemic in adversely affected communities in Kenya and similar settings in sub-Saharan Africa.

Keywords: HIV prevalence; ethnic variations; cultural practices; contextual effects; Kenya.

Introduction

There exists marked regional (provincial and county) variation in HIV prevalence in Kenya (KNBS and ICF Macro 2010; NASCOP 2014) that may be partly attributed to different cultural practices among different ethnic groups in the country. Patterns of HIV prevalence across different regions in Kenya show an apparent link with the pervasiveness of various cultural practices. The region where perceived high-risk cultural practices are most common (i.e. Nyanza Province) bears a disproportionate burden of HIV in the country. This paper considers two cultural practices that have been linked to HIV transmission across settings in sub-Saharan Africa (SSA): polygamy and male circumcision. Cultural practices are closely aligned with ethnicity in Kenya. Our overarching research objective is to examine the extent to which polygyny male circumcision and other cultural practices explain existing ethnic variations in HIV prevalence in Kenya.

Association between HIV and polygamy/partnership concurrency in SSA

The practice of polygamy (a person having more than one spouse) is widespread across all continents, and in SSA, it usually takes the form of polygyny where men marry multiple wives (Reniers and Watkins 2010). This paper focuses on polygyny but recognises that some of the studies referred to have used the term polygamy. Existing research on the relationship between polygyny/partnership concurrency and HIV transmission in SSA show mixed results. Despite the widely accepted view that the high HIV prevalence in SSA is due to the practice of long-term concurrent heterosexual partnerships (Bove and Valeggia 2009; Kenyon and Zondo 2011), most empirical evidence suggest that long-duration partnering is protective against HIV (Tanser et al. 2011; Reniers and Tfaily 2012; Sawers and Isaac 2017).

While studies based on mathematical modelling or theoretical explanations have suggested that concurrency is likely to heighten the speed of HIV spread in a population, empirical studies have failed to provide conclusive supportive evidence (Kretzschmar and Caraël 2012). It has been argued that incorporating realistic degrees of coital dilution in the simulations is likely to dramatically reduce the role of concurrency in accelerating the spread of HIV, suggesting that concurrency is unlikely to be an important driver of HIV epidemics in SSA, and alternative explanations are needed (Sawers, Isaac and Stillwaggon 2011). Two large cross-sectional multi-country studies of the relationship between polygyny and HIV infection across African countries observed a negative association between HIV prevalence and polygyny at national and sub-national level, HIV prevalence being lower in countries where polygyny was common, and in regions within country with higher polygyny levels (Reniers and Watkins 2010; Reniers and Tfaily 2012). Proposed explanations for the protective effect of polygyny in these studies include: the relatively low coital frequency in conjugal dyads of polygynous marriages (coital dilution); and the restricted access to sexual partners for younger men in populations where polygynous men presumably monopolize the women in their community (monopolizing polygynists) (Reniers and Tfaily 2012). These studies attributed the apparent link between polygyny and higher HIV prevalence to the sexual network structure characteristic of polygyny; and a disproportionate selection of HIV-positive women into polygynous unions.

Studies linking polygyny to heightened HIV risk have mainly attributed this to sexual concurrency or extramarital partnerships (Kenyon, Buyze and Colebunders 2013; Eaton et al. 2014; Fox 2014), arguing that unstable polygamous marriages are likely to increase extra marital affairs and HIV infection (Eaton et al. 2014). Bove and Valeggia (2009) argue that

polygamy is likely to accelerate the rate of HIV transmission because it permits multiple sexual partnerships, and correlates with low levels of condom use, poor communication between spouses, and age and power imbalances, among other factors.

Male circumcision and risk of HIV transmission

The link between male circumcision and HIV transmission in Africa at both population and individual level has received considerable research attention. At the population level, a general inverse correlation between male circumcision and HIV prevalence has been observed, with areas where circumcision is less common having higher HIV prevalence (Bongaarts et al. 1989; Moses et al. 1990). However, it has been noted that the ecological association may not mean much without looking at individuals within populations and taking into consideration other factors associated with circumcision (Bailey , Egesah, and Rosenberg 2008).

At the individual level, there is strong empirical evidence of the protective effect of male circumcision on HIV infection (Gazimbi , Magadi, and Kruger 2019). However, the validity of existing evidence has been questioned by some who argue that the protective effect of male circumcision may be modified by diverse factors such as sexual behaviour following circumcision, surgical safety, traditional education about sex, sexuality and male responsibility at the time of circumcision, and confounding factors which had not been effectively controlled for in previous studies. (e.g. Greely et al. 2013; Maughan et al. 2015; Ombere, Nyambedha, Bukachi 2015). Indeed, there is reported evidence of an increased risk of HIV infection due to modified sexual behaviour post-circumcision (Greely et al. 2013), and circumcision using unhygienic procedures (Brewer et al. 2007). Furthermore, empirical evidence on the effect of male circumcision on HIV acquisition among women is inconclusive (see Gazimbi, Magadi and Kruger 2019).

Within the Kenyan context, male circumcision rates are lowest in Luo-Nyanza, the region with the highest HIV prevalence (KNBS and ICF Macro 2010). It is, therefore, not surprising that most studies on the link between male circumcision and HIV transmission in Kenya have focused on the Luo in Nyanza. A randomised control trial (RCT) on male circumcision for HIV prevention in young men in Kisumu reported a 60% protective effect of circumcision and observed no evidence of behavioural risk compensation after circumcision (Bailey et al. 2007). This was consistent with findings from a qualitative study on sexual behaviour post circumcision (Mattson 2008) which observed no evidence of risk compensation. However, one qualitative study observed that men developed false beliefs that circumcision provided full protection against HIV infection post circumcision (Ombere, Nyambedha and Bukachi 2015). The prevalence of condom use reported in this study was very low among migrant fishermen and risky sexual behaviour was very high post circumcision.

Background context: culture and HIV transmission among the Luo in Kenya

The Luo, a Nilotic-speaking people, are mainly settled in Nyanza Province of Kenya. They have some unique traditions and customs, distinct from other Kenyan ethnic groups, that predispose them to a higher risk of HIV infection. These traditions and customs are further modified and/or reinforced by the dominant economic activities along the Lake Victoria – fishing, that has also been linked to heightened risk of HIV transmission (Camlin et al. 2014). The Luo people comprise the fourth largest ethnic group in Kenya, with a population of

approximately four million people (KNBS 2010). Despite strong evidence of the protective effect of male circumcision against HIV infection, a population survey in 2008-09 recorded only 21.5% of Luo men as circumcised (KNBS and ICF Macro 2010), the community being among ethnic groups with the lowest circumcision rates in the country, along with the Teso and Turkana.

Besides low rates of male circumcision, the predominance of perceived high-risk cultural practices such as polygyny, intertwined with other cultural practises, predispose the Luo to particularly high risks of HIV infection. Following the death of a husband, a Luo widow is required to engage in sexual intercourse with a “cleanser,” to remove the impurity and evil spirits associated with the husband’s funeral ceremonies (Ntozi 1997). After being “cleansed” in this way, all widows were inherited by an in-law with only a few women rejecting the practice if they were past menopause (Oluoch and Nyongesa 2013). However, there is evidence that in-laws are becoming less willing to inherit the widows because of fear of acquiring HIV, where husband’s death may have been linked to HIV (Ambasa-Shisanya 2007; Ayikukwei et al. 2008). This has led some men (non-relatives) to commercialise the practice, serially or concurrently inheriting widows from different families for payment (Ambasa-Shisanya 2007). Other cultural norms involve engaging in sexual intercourse with spouse during key events, including establishment of a home, during agricultural cycles, and when participating in funeral or wedding ceremonies of relatives (Luginaah et al. 2005; Ambasa-Shisanya 2007). Fulfilling these sexual rituals often means engaging in sex without using a condom (Luginaah et al. 2005; Ambasa-Shisanya 2007; Agot et al. 2010), fuelling the risk of HIV transmission.

Theoretical framework and research questions

The social structural theory of gender and power developed by Connell (1987) examines the inequalities and the power imbalances in gender. The theory has been used in various studies on gender, sexual behaviour and HIV infection (Wingood and DiClemente 2000; Conroy, Ruark and Tan 2019; Stoner et al. 2019). A study of women in polygamous relationships in Cameroon cited the lack of power in sexual health decision-making (Oppong, Francisca and Nzefa 2019) that led to risks in sexual behaviour. Depadilla et al. (2011) modelled the constructs of gender and power and their associations with sexual behaviour in a randomized controlled HIV prevention trial and found evidence of direct and indirect associations between social and behavioural risk factors and condom use.

While the theory of gender and power has been mostly applied to examine risk factors for women’s acquisition of HIV, this study uses the framework to examine the factors of ethnicity and the cultural practices in HIV acquisition in Kenya. As noted above, it has been argued that polygyny is likely to accelerate the rate of HIV transmission because it permits multiple sexual partnerships, and correlates with low levels of condom use, poor communication between spouses, and age and power imbalances, among other factors (Bove and Vallengia 2009). The cultural practice of polygyny reflects gender roles while male circumcision may influence sexual behaviour of both genders. Power play in sexual relationships and sexual behaviour is within the context of gender roles and expected social norms.

Existing research on the role of different cultural practices (polygyny and male circumcision) on HIV transmission in SSA has undoubtedly made an important contribution to our understanding of the role of these practices in curbing/fuelling HIV transmission within

the region, but a number of questions remain unanswered. Despite a strong theoretical argument that polygyny has contributed to the high HIV prevalence in SSA, most empirical evidence suggests the contrary, especially at the aggregate/population level. For male circumcision, the empirical evidence of the impact on HIV infection among women remains inconclusive, and a number of earlier studies had failed to control for key factors that may moderate the relationship, especially at the aggregate/population level. There is therefore need for improved understanding of the contextual effects of these cultural practices on HIV prevalence among both men and women in most affected communities of SSA.

This paper examines the extent to which existing ethnic variations in HIV prevalence in Kenya may be attributable to various cultural practices among different communities. Specific research questions addressed in this paper are: (i) What is the contextual (cluster and county) effect of cultural practices (polygyny and male circumcision) and related sexual behaviour factors on HIV prevalence among men and women in Kenya? and (ii) To what extent do specific cultural practices in a community or county explain existing ethnic variations in HIV prevalence in Kenya?

Data and Methods

The data

This paper is based on secondary analysis of cross-sectional household-based surveys in Kenya with HIV test data on nationally representative samples of the population. The data used in the analysis come from the 2012-13 Kenya AIDS Indicator Survey (KAIS), the most recent national survey with HIV test data. It is supplemented with earlier Kenya Demographic and Health Surveys (KDHS) with HIV test data, conducted in 2003 and 2008 to provide information on trends. These surveys all included HIV test data on nationally representative samples of the population, providing a unique opportunity to link HIV test data with background socio-economic, cultural and demographic characteristics at individual-level.

The overall analysis sample comprise 6188 (2917 men and 3271 women) in 2003 KDHS, 6895 (3191 men and 3804 women) in 2008 KDHS and 11626 (4836 men and 6790 women) in 2012 KAIS respondents with valid HIV test data. All three surveys adopted a multi-stage sampling design, involving the selection of clusters (census enumeration areas) from the national master sampling frame, followed with systematic sampling of households within selected clusters, from which eligible men and women of reproductive age were included in the survey. The samples were constructed to allow estimation of key indicators by region (i.e. the 8 provinces) of Kenya and by urban/rural residence, and for 2012/13 KAIS, by county as well. Forty-four of the overall 47 counties in Kenya were included in the KAIS. Detailed description of these surveys, including sampling design, survey implementation and ethical approval process are available elsewhere (KNBS and ICF Macro 2010; NASCOP 2014).

Study variables

The outcome variable is HIV status. During the 2012 KAIS and 2003 and 2008 KDHS, survey respondents (men and women of reproductive age) were asked to voluntarily provide blood samples for HIV testing. The HIV test results were then anonymously linked to the full survey records.

The main explanatory variable is ethnicity, the main aim of the paper being to understand ethnic variations in HIV prevalence in Kenya. The ethnicity variable has been recoded into seven distinct categories, the first six categories representing the major ethnic groups in Kenya with sufficient samples for the analysis (Kalenjin, Kamba, Kikuyu, Kisii, Luhya and Luo), while the final group represents all other ethnic groups combined. Besides ethnicity, other key explanatory variables include various cultural practices (polygyny, male circumcision) and related sexual behaviour factors. Contextual variables for cultural practices and associated sexual behaviour factors were derived from individual level measures based on the proportion of respondents in a cluster or county with specific characteristics.

Related sexual behaviour factors considered (i.e. age at first sex, multiple sex partners, non-marital sex, sexual activity, widow re-marriage (proxy for widow inheritance) and spousal age gap) comprised variables identified in the literature to moderate/explain the perceived link between HIV-risk and cultural practices considered in this paper, while period since last sexual activity has been used as a proxy for coital dilution (Sawers , Isaac and Stillwaggon 2011). It has been noted that polygyny is likely to increase HIV-risk as it leads to multiple partnerships, and age and power imbalances among other factors associated with increased HIV-risk (Bove and Vallengia 2009). Thus, it is necessary to take into account factors such as multiple partnerships and spousal age-gap to unpack the nature of the relationship between polygyny and HIV prevalence.

Methods of analysis

The analysis included bivariate associations, followed with multivariate analysis, simultaneously controlling for factors that could potentially confound or moderate the relationships of interest. Bivariate analysis included: an examination of trends in ethnic variations in HIV prevalence in Kenya between 2003 and 2012/13; ethnic differences in HIV prevalence by cultural practices and related sexual behaviour risk factors as well as background socio-economic demographic characteristics; and bivariate county-level correlations between HIV prevalence and risk factors related to cultural practices and associated sexual behaviour factors.

The bivariate analysis was followed with multilevel analysis of HIV predictors, with county as level 3, community (or cluster) as level 2 and individuals as level 1. The multilevel analysis was necessary to cater for the hierarchical data structure due to the multi-stage sampling design adopted in KAIS 2012/13 (NASOP 2014) and allow examination of contextual determinants of HIV prevalence with respect to cultural practices and associated predictors. We considered three-level random slopes models, but there was no evidence that the effect of any of the key factors on HIV prevalence varied significantly across clusters or counties. Thus, the final models fitted were based on three-level random intercept models of the form:

$$\text{Logit } \pi_{ijk} = X'_{ijk}\beta + u_{jk} + v_k$$

where: π_{ijk} is the probability of being HIV positive for an individual i , in the j^{th} cluster in the k^{th} county; X'_{ijk} is the vector of explanatory variables defined at individual, cluster or county level; β is the associated vector of regression parameter estimates; and u_{jk} and v_k are the residuals at the cluster and county level, respectively. These random effect estimates are assumed to

have normal distributions with mean zero and variances σ_u^2 and σ_v^2 , respectively (Goldstein 2003).

The multilevel models first considered the effect of ethnicity in HIV prevalence (controlling for basic demographic characteristics (sex and age group) before including individual-level background socio-economic factors and contextual cultural practices and associated sexual behaviour factors to examine the extent to which these factors explained the observed ethnic variations in HIV prevalence.

Findings

Descriptive analysis

Ethnic Variations in HIV prevalence

Evidence from existing national datasets shows striking ethnic variations in HIV prevalence in Kenya for both men and women across years, with the Luo consistently having markedly higher prevalence than other ethnic groups (Table 1). Overall trends suggest a modest decline in national HIV prevalence between 2003 and 2012, especially among women, leading to a narrowing of the gender gap - the female: male ratio of HIV prevalence being 1.89, 1.78 and 1.57 in 2003, 2008 and 2012/13 respectively. However, an increase in HIV prevalence was observed among Luo men between these periods

(TABLE 1 ABOUT HERE)

Besides overall prevalence, another notable difference between the Luo and other ethnic groups is gender disparity, with the Luo exhibiting a narrower gender gap than the other ethnic groups (Figure 1).

(FIGURE 1 ABOUT HERE)

A further examination of the disparity between the Luo and other communities in Kenya based on the most recent 2012/13 KAIS reveals notable differences by other demographic and socio-economic characteristics (Table 2): HIV prevalence tends to peak earlier (late 20s to early 40s) among the Luo than non-Luo communities (late 30s to early 50s); although urban/rural residence is not significant among the Luo, the direction of the relationship (urban – 20.3%; rural 21.8%) is opposite the overall pattern which shows a significantly higher prevalence in urban than rural areas; the patterns by wealth status differ between Luo and non-Luo ethnic groups - among the Luo, those in the richest quintile have the lowest HIV prevalence, while among the non-Luo, the poorest have the lowest prevalence; and in every region/province, the Luo have significantly higher HIV prevalence than non-Luo, but the gap varies by region (percentages should be interpreted with caution due to limited cases).

(TABLE 2 ABOUT HERE)

Cultural practices and risk of HIV infection

In this and subsequent sections, we explore the role of polygyny and male circumcision on observed ethnic variations in HIV prevalence in Kenya. Key risk factors that constitute potential pathways through which cultural practices may be linked to HIV infection (including non-marital sex, multiple sex partners, early sexual debut and spousal age-gap) are taken into consideration. Individual-level associations between key cultural practices and HIV prevalence (Table 3) reveal that: those in polygynous unions have significantly higher HIV prevalence than those in monogamous unions (about triple for men; and almost double for women); and male circumcision is associated with a significantly lower HIV prevalence among men (circumcised-3%; uncircumcised-17%).

(TABLE 3 ABOUT HERE)

An examination of other related factors suggests that with respect to marital status, HIV prevalence is highest among both men and women who are widowed, and women who are separated/divorced have marked higher prevalence than male counterparts. Indeed, the overall disproportionate higher burden of HIV prevalence among women than men in Kenya may be attributed to the relatively higher HIV prevalence among unmarried (i.e. never married, widowed or divorced/separated) women than men. For those who are married, HIV prevalence is higher among men (14%) than women (9.7%) in polygynous unions, and there is no significant difference between men (5.4%) and women (5.1%) in monogamous unions. With respect to other related factors, multiple sex partnerships are associated with higher HIV prevalence among both men and women, as is engaging in non-marital sex among women, but there is no evidence that concurrent partnerships are associated with higher HIV prevalence. Age of sexual debut shows a linear association (with early age of sexual debut being associated with higher HIV prevalence) for women, but not for men.

A comparison of bivariate association between HIV prevalence and cultural practices among the Luo versus non-Luo ethnic groups (Table 4) suggests that: (i) among non-Luo, HIV prevalence in polygynous unions is about double the prevalence among those in monogamous unions, while among the Luo, there is hardly any difference in HIV prevalence between those in polygynous and monogamous unions; and (ii) male circumcision is associated with a significantly lower HIV prevalence among the Luo (12.4% versus 25.0%), but there is no evidence of a significant difference in HIV prevalence by circumcision status among the non-Luo.

(TABLE 4 ABOUT HERE)

Contextual factors derived at county level (table not shown) suggest that, compared to national figures, all of the four predominant Luo counties (Homabay, Siaya, Kisumu and Migori) have higher HIV prevalence, polygyny rates, proportion of couples with 10+ age gap, early sexual debut, multiple sex partnerships (except Homabay), and widow re-marriage. However, these counties have lower male circumcision, and non-marital sex (except Kisumu). Bivariate correlations of relevant county-level rates show significant correlations between HIV prevalence and key cultural practices considered in the analysis: polygyny and male circumcision (Table 5). In particular, the rate of male circumcision in a county is strongly negatively correlated to HIV prevalence ($r = -0.85$; $p < 0.001$). Risk factors that have significant direct positive correlations with HIV prevalence are widow re-marriage and multiple partnerships. Furthermore, factors not directly correlated to HIV may have indirect

associations with HIV prevalence through other risk-factors. For instance: early sexual debut shows a significant positive correlation with polygyny, and a negative correlation with male circumcision; a large spousal age gap is positively correlated with polygyny, and negatively correlated with male circumcision and multiple partnerships; and non-marital sex is positively correlated to multiple sex partnerships.

(TABLE 5 ABOUT HERE)

Multivariate multilevel analysis

A three-level logistic regression model for HIV prevalence show evidence of significant variations in HIV prevalence across communities and across counties in Kenya. The initial model (Model 0) adjusting only for sex and age-group suggest cluster and county intra-class correlations (ICCs) of 0.13 (i.e. $0.55/(0.55+0.4+3.29)$) and 0.22 (i.e. $0.4+0.55)/(0.55+0.4+3.29)$) respectively, implying that after controlling for any variations in gender and age groups, about 13 % of the total variation in HIV prevalence is attributable to county-level factors while 22% is attributable to community (i.e. cluster) factors, with the remaining 65% attributable to individual characteristics (Table 6). The county variations are largely explained by ethnicity (Model 1– Table 6). Since parameter estimates for other ethnic groups, besides the Luo, were quite similar, ethnicity variable is dichotomised as Luo versus non-Luo in the models presented.

(TABLE 6 ABOUT HERE)

The results for Model 1 (Table 6) reveal that those belonging to the Luo ethnic group are about six times more likely to be infected with HIV than their non-Luo counterparts of similar gender and age group. The modelling introduced contextual measures of key cultural practices of interest (polygyny and male circumcision) rates at community and county levels and associated risk factors (e.g. widow re-marriage, multiple partnerships, non-marital sex, early sexual debut, spousal age gap) to assess the extent to which these risk factors explained the ethnic variations in HIV prevalence. The average odds ratio (OR) for Luo versus non-Luo reduces from 6.08 (Model 1) to 3.58 (Model 2), suggesting that part of the ethnic variations in HIV prevalence in Kenya is explained by contextual factors relating to cultural practices, especially male circumcision.

Among the cultural practices considered, only prevalence of polygyny in a community (cluster) and male circumcision in a county were significantly associated with HIV prevalence. Higher prevalence of male circumcision in a county was associated with lower HIV prevalence while higher polygyny practice in a community was associated with higher HIV prevalence. After controlling for individual demographic (age and sex) and socio-economic (residence, education and wealth) characteristics as well as ethnicity, those in counties where male circumcision is not practised have about five times higher odds of being HIV positive compared to counterparts of similar characteristics in counties where male circumcision is universal. A community where polygyny is universal is predicted to have about three times higher odds in HIV prevalence than a community where polygyny is not practised at all, controlling for significant individual characteristics and contextual factors.

Discussion

This paper set out to (i) examine the contextual (cluster and county) effect of cultural practices (polygyny and male circumcision) on HIV prevalence among men and women in Kenya; and (ii) establish the extent to which specific cultural practices or associated risk factors in a community or county explain existing ethnic variation in HIV prevalence in Kenya. The results provide evidence that polygyny is associated with higher HIV prevalence while circumcision is associated with lower prevalence at both individual and contextual level (cluster and county). These cultural practices (especially circumcision) and associated risk factors partly explain existing ethnic variations in HIV prevalence in Kenya. However, there remains significant ethnic differences at individual level that are not explained by cultural practices or related sexual behaviour factors.

The relationship between polygyny and HIV transmission from existing studies shows mixed patterns and vary depending on the level of analysis. The higher risk of HIV transmission associated with polygyny at the individual level observed in this paper is consistent with patterns from existing research which show higher HIV prevalence among individuals, especially men, in polygynous compared to monogamous unions (Reniers and Watkins 2010; Fox 2014). However, the positive community-level association does not support findings from most existing empirical research which suggest that polygyny or long-duration concurrent partnering is protective against HIV transmission at community/population level (Reniers and Watkin 2010; Reniers and Tfaily 2012; Sawers and Isaac 2017). Thus, our results do not support the coital dilution or monopolising polygynists hypotheses (Reniers and Tfaily 2012). Nevertheless, coital dilution may explain the observed lower HIV prevalence among women than men in polygamous unions – analysis of frequency of sex by marital status (not shown) shows lower coital frequency for women than men in polygynous union. The higher risk of HIV among individuals in polygynous unions observed in previous studies had been attributed to increased HIV risk behaviours, including unprotected sex or low condom use, concurrency and multiple partnerships, increased extramarital affairs or infidelity among individuals in polygynous unions, (Bove and Vallengia 2009; Kenyon, Buyze and Colebunders 2013; Eaton et al. 2014). Our analysis controlled for these and other HIV risk factors linked to polygyny such as early sexual debut and spousal age gap, but polygyny prevalence in a community remained positively associated with HIV prevalence, suggesting that these factors do not fully explain the observed relationship.

Our findings with respect to polygyny do not support the social structural theory of gender and power (Connell 1987) which highlights the inequalities and the power imbalances in gender. It has been argued that women in polygynous unions suffer from financial, emotional/physical burdens and lack of power in sexual decision making (Oppong, Francisca and Nzefa 2019), which would predispose them to a higher risk of HIV. This is contrary to the patterns observed here which suggest that men in polygynous unions have a higher risk of HIV than women counterparts. However, our findings suggest that the theory may be relevant to women in unstable relationships where sexual risk behaviour and power play is more evident.

Observed patterns with respect to male circumcision support findings from previous studies showing a consistent inverse association between HIV risk and male circumcision, both at individual (Gazimbi, Magadi and Kruger 2019) and at population (Bongaarts 1989) levels. However, the effect of male circumcision on HIV risk among women from previous studies is inconclusive (Grund et al. 2017; Baeten et al. 2010) and a number of studies have argued that the protective effect of male circumcision on HIV acquisition among men may be

modified by risky sexual behaviour after circumcision and other confounders (Greely et al. 2013; Maughan et al. 2015). The protective effect of male circumcision observed in this paper persisted even after controlling for related risky sexual behaviour and ethnicity, confirming an independent protective effect of male circumcision at community level for both men and women.

The second objective was to explore the extent to which the cultural practices considered here and related sexual behaviour factors explained existing ethnic variations in HIV prevalence in Kenya. Our analysis highlight marked ethnic variations in HIV prevalence in Kenya, with the Luo bearing a disproportionate burden of the epidemic across years. The relatively higher prevalence of polygyny and lower prevalence of male circumcision partly explain the disproportionate burden of HIV epidemic among the Luo. At an individual level, the disproportionate risk of HIV prevalence among the Luo persists (albeit reduced) even after controlling for these cultural practices and related sexual behaviour factors, suggesting that these factors do not fully explain existing ethnic differences. The county-level variations in HIV prevalence in Kenya is almost fully explained by Luo ethnicity and prevalence of specific cultural practices, especially male circumcision.

Conclusions and recommendations

Overall, this paper highlights important ethnic variations in HIV prevalence in Kenya, and the role of polygyny and male circumcision. Besides improving our understanding of the role of specific cultural practices or associated risk factors in explaining existing ethnic variation in HIV prevalence in Kenya, the paper has revealed important patterns in ethnic variations in HIV prevalence in relation to demographic (gender, age and marital status) characteristics and urban/rural residence that have important implications for policy. Compared to other ethnic groups in Kenya, the Luo have a lower gender disparity; HIV prevalence peaks earlier; and rural residence is associated with particularly high prevalence, highlighting the need for HIV efforts to particularly target rural residents, men (especially those who are polygynous and/or uncircumcised), and youth in settings of high HIV prevalence. HIV peaking earlier among the Luo is consistent with patterns reported elsewhere, showing that the majority of all new adult HIV infections in predominant Luo counties occur among young people aged 15- 24 years (Ministry of Health 2016: 42), supporting the need for particular focus on the youth. The disproportionate HIV burden among unmarried women (never married, widowed/divorced/separated) may be attributable to these women being more likely to engage in transactional sex that has been linked to the fishing economy around the Lake Victoria region of Kenya (Camlin et al. 2014). These key sub-populations require urgent research and policy attention.

It has been noted that cultural practices affecting sexual behaviour and HIV risk (e.g. male circumcision and sexual cleansing) are important determinants of a knowledge/behaviour gap for avoidance and mitigation of HIV infection throughout SSA (Gould 2016). In the Kenyan context, it is possible that the issue of ethnic identity /rivalry between the Luo and other ethnic groups with different cultural practices may inhibit the potential for cultural change in practices such as male circumcision and polygyny. Our findings highlight the need for targeted research on factors driving the epidemic within the Luo community to effectively inform efforts to address the epidemic. Besides widow inheritance, other distinctive features of the Luo community outlined in above lack reliable

data that would allow a comprehensive investigation to inform effective policies and programmes to address the epidemic. These require future research attention.

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Table 1: Ethnic variation in HIV prevalence in Kenya: 2003 - 2012

Respondent sex			2003 KDHS		2008/9 KDHS		2012-13 KAIS	
			HIV+	Cases	HIV+	Cases	HIV +	cases
Men	ethnicity	Kalenjin	1.8	293	1.4	287	2.0	488
		Kamba	1.7	279	2.2	251	2.5	428
		Kikuyu	2.7	617	2.9	502	1.8	962
		Kisii	0.6	191	4.0	176	5.1	358
		Luhya	5.2	460	2.1	520	4.0	729
		Luo	18.3	338	17.5	434	19.4	512
		other	2.6	739	3.3	921	2.0	1359
	Total		4.6	2917	4.5	3091	4.4	4836
Women	ethnicity	Kalenjin	4.9	287	2.1	362	3.5	630
		Kamba	8.7	314	5.4	297	5.8	582
		Kikuyu	6.6	752	5.8	668	4.9	1357
		Kisii	7.6	208	5.2	210	5.8	476
		Luhya	7.9	531	12.0	584	6.5	1052
		Luo	25.8	357	22.9	525	22.6	686
		other	4.6	822	3.9	1158	4.4	2007
	Total		8.7	3271	8.0	3804	6.9	6790
Total	ethnicity	Kalenjin	3.3	580	1.8	649	2.7	1118
		Kamba	5.4	593	3.9	548	4.1	1010
		Kikuyu	4.8	1369	4.5	1170	3.4	2319
		Kisii	4.1	399	4.6	386	5.4	834
		Luhya	6.6	991	7.0	1104	5.3	1781
		Luo	22.0	695	20.3	959	21.0	1198
		other	3.6	1561	3.7	2079	3.2	3366
	Total		6.7	6188	6.4	6895	5.7	11626

Table 2: Bivariate associations between HIV prevalence and background demographic and socio-economic characteristics among the Luo versus non-Luo people in Kenya (2012-13 KAIS)

Characteristic	Luo		Non-Luo		All	
	HIV + (%)	Cases	HIV+ (%)	Cases	HIV+ (%)	Cases
Sex	P=0.165		P<0.001		P<0.001	
- Male	19.4	512	2.6	4324	4.4	4836
- Female	22.6	686	5.0	6104	6.9	6790
Age group	P<0.001		P<0.001		P<0.001	
- 15-19	3.6	216	0.7	1695	1.0	1911
- 20-24	11.8	242	1.8	1666	3.2	1907
- 25-29	30.0	197	3.3	1589	6.4	1786
- 30-34	32.8	123	4.1	1301	6.7	1424
- 35-39	33.6	107	6.3	1116	8.8	1223
- 40-44	34.6	75	7.3	910	9.4	985
- 45-49	28.2	80	7.4	635	9.9	715
- 50-54	27.8	67	6.2	668	8.3	735
- 55-59	12.0	48	3.6	475	4.4	523
- 60-64	13.0	43	2.7	374	3.9	417
Residence	P=0.526		P=0.094		P=0.001	
- urban	20.3	560	4.3	3565	6.6	4125
- rural	21.8	638	3.6	6863	5.2	7501
Region	P=0.006		P=0.047		P<0.001	
- Nairobi	12.6	174	3.7	1140	4.9	1314
- Central	20.0	10	3.6	1413	3.8	1423
- Coast	14.6	38	4.0	1424	4.4	1462
- Eastern	-	3	3.7	2318	3.7	2321
- Nyanza	22.9	881	5.5	750	15.1	1631
- Rift Valley	29.2	40	3.2	2027	3.7	2067
- Western	6.5	52	4.7	1356	4.8	1408
Educational attainment	P=0.277		P=0.438		P=0.028	
- None	12.1	61	2.9	1277	3.5	1338
- Primary incomplete	18.1	95	3.4	893	5.0	988
- Primary complete	22.4	423	3.8	3271	6.0	3694
- Secondary +	21.3	619	4.0	4987	5.9	5606

Wealth quintile	P=0.005		P=0.011		P<0.001	
- Poorest	18.1	213	2.8	2221	4.2	2434
- Poorer	23.0	285	4.2	2212	6.5	2497
- Middle	27.2	214	3.8	2104	6.1	2318
- Richer	22.5	236	4.8	1941	6.9	2177
- Richest	13.9	250	3.5	1950	4.7	2200
All	21.0	1198	3.8	10428	5.7	11626

Table 3: Bivariate associations between HIV prevalence and cultural practices including related risk factors (2012/13 KAIS)

Characteristic	Men		Women	
	HIV+ (%)	Cases	HIV+ (%)	Cases
Marital status	***		***	
- Never married	1.6	1876	4.0	1655
- Widowed	15.2	39	21.8	495
- Separated/divorced	6.0	185	14.3	389
- Married- polygamous	14.0	193	9.7	613
- Married- monogamous	5.4	2540	5.1	3637
Ever widowed	***		***	
- No	3.8	4637	5.5	6095
- Yes	19.3	199	20.2	695
Widow re-married	(p=0.896)		(p=0.052)	
- No	18.3	53	21.8	541
- Yes	19.1	146	13.9	154
Age at first sex	***		***	
- 15 years or younger	4.7	1075	10.2	1433
- 16-17 years	4.2	854	7.9	1361
- 18 year or older	5.4	2170	6.5	3204
- never had sex	1.0	737	1.2	792
Multiple sex partners	***		***	
- No	1.1	1347	3.8	3422
- Yes	5.6	3455	9.9	3291
Concurrent sex partners	(p=0.637)		(p=0.582)	
- multiple concurrent	5.8	356	10.0	51
- multiple non-concurrent	6.3	98	8.1	39
- Single	5.0	3020	6.6	4577
Non-marital sex	(p=0.155)		**	
- No	4.6	3747	6.6	6109
- Yes	3.7	1089	9.7	681
Last sexual activity	***		*	
- within one week	4.4	1622	5.8	2583
- within one month	6.0	683	7.5	901
- within one year	5.6	1020	8.4	936
- more than a year	6.5	150	4.9	248
- ns/never had sex	2.3	1361	7.8	2122
Circumcised	***		N/A	
- No	17.0	430		
- Yes	3.1	4395		
Age gap for women	N/A		***	
- about same or younger			4.9	3050
- Partner older (10+)			8.0	1200
All	4.4	4836	6.9	6790

* Chi-Square $p < 0.05$; ** Chi-Square $p < 0.01$; *** Chi-Square $p < 0.001$;

Table 4: Bivariate associations between HIV prevalence and factors relating to cultural practices among the Luo versus non-Luo ethnic groups in Kenya (2012-13 KAIS)

Cultural practice	Luo		Non-Luo	
	HIV+ (%)	Cases	HIV+ (%)	Cases
Current marital status	P<0.001		P<0.001	
- Never married/cohabited	7.4	370	2.0	3161
- widowed	44.2	81	17.0	453
- separated/divorced	38.9	35	9.3	539
- married– polygamous	26.6	150	6.5	656
- married- monogamous	24.5	562	3.2	5615
Widow re-married [§]	P=0.316		P<0.001	
- No	42.5	91	17.6	503
- Yes	50.8	57	7.0	243
Male circumcision [£]	P<0.001		P=0.476	
- No	25.0	279	1.7	151
- Yes	12.4	232	2.6	4163
All	21.0	1198	3.8	10428

§ - ever widowed sub-sample ; £ - male sub-sample

Table 5: County correlations between HIV prevalence and associated risk factors based on the 2012-13 KAIS (n=44)

		HIV prevalence	polygyny	Spousal age- gap	Male circumc ision	Early sexual debut	Multiple sex partners	Non- marital sex
Polygyny	Coefficient-r	.368*						
	p-value	.014						
Spousal age gap	Coefficient-r	.158	.742**					
	p-value	.307	.000					
Male circumcision	Coefficient-r	-.847**	-.512**	-.339*				
	p-value	.000	.000	.024				
Early sexual debut	Coefficient-r	.234	.509**	.275	-.379*			
	p-value	.127	.000	.071	.011			
Multiple sex partners	Coefficient-r	.368*	-.256	-.427**	-.063	.070		
	p-value	.014	.094	.004	.686	.651		
Non-marital sex	Coefficient-r	-.016	-.168	-.264	.124	.184	.380*	
	p-value	.916	.275	.083	.422	.232	.011	
Widow re- marriage	Coefficient-r	.462**	.474**	.355*	-.562**	.404**	.035	-.090
	p-value	.002	.001	.018	.000	.006	.823	.563

Table 6 Multilevel determinants of HIV infection in Kenya: 2012-13 KAIS

Parameter (ref. in brackets)	Model 0			Model 1			Model 2		
	Est ^{\$}	SE	OR	Est	SE	OR	Est	SE	OR
Sex (Men)									
Women	0.59*	0.099	1.81	0.62*	0.097	1.86	0.66*	0.101	1.93
Age group (15-19)									
20-24	1.17*	0.304	3.22	1.18*	0.297	3.26	1.26*	0.310	3.51
25-29	2.11*	0.288	8.22	2.10*	0.281	8.14	2.23*	0.294	9.30
30-34	2.30*	0.291	9.93	2.33*	0.284	10.28	2.49*	0.298	12.04
35-39	2.59*	0.289	13.38	2.63*	0.283	13.85	2.81*	0.296	16.58
40-44	2.67*	0.294	14.48	2.74*	0.287	15.41	2.89*	0.301	17.92
45-49	2.53*	0.303	12.54	2.56*	0.297	12.91	2.74*	0.310	15.43
50-54	2.50*	0.306	12.19	2.54*	0.299	12.73	2.73*	0.315	15.35
55-59	1.75*	0.352	5.77	1.83*	0.345	6.26	1.93*	0.368	6.86
60-64	1.48*	0.387	4.40	1.53*	0.379	4.62	1.77*	0.394	5.85
Ethnicity (non-Luo)									
Luo				1.81*	0.143	6.08	1.28*	0.188	3.58
Residence (rural)									
Urban							0.44*	0.139	1.55
Education (none)									
Primary incomp							0.70*	0.245	2.02
Primary complete							0.73*	0.201	2.08
Secondary +							0.62*	0.196	1.86
Wealth (Lowest)									
Second							0.39*	0.154	1.48
Middle							0.39*	0.161	1.47
Fourth							0.42*	0.174	1.52
Highest							-0.12	0.216	0.89
Contextual factors									
Polygyny cluster							1.13*	0.485	3.09
Nonmarital_cluster							1.29*	0.614	3.63
Circumcision_county							-1.59*	0.460	0.20
Random Variance									
County	0.55*	0.163		0.07	0.044		0.02	0.029	
Cluster	0.40*	0.095		0.28*	0.079		0.18*	0.069	

\$ - Estimates based on PQL second order; * - significant at 5% level (p<0.05)

Figure 1: HIV prevalence among the Luo versus other ethnic groups in Kenya, by gender

