Evidence to End FGM/C

Research to Help Girls and Women Thrive

ASSOCIATIONS BETWEEN FGM/C AND HIV IN ETHIOPIA, THE GAMBIA, KENYA AND SIERRA LEONE: A LIMITED ANALYSIS OF DHS DATA

July 2019

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ASSOCIATIONS BETWEEN FGM/C AND HIV IN ETHIOPIA, GAMBIA, KENYA AND SIERRA LEONE: A LIMITED ANALYSIS OF DHS DATA

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July 2019

The Evidence to End FGM/C: Research to Help Girls and Women Thrive generates evidence to inform and influence investments, policies, and programmes for ending female genital mutilation/cutting in different contexts. Evidence to End FGM/C is led by the Population Council, Nairobi in partnership with the Africa Coordinating Centre for the Abandonment of Female Genital Mutilation/Cutting (ACCAF), Kenya; the Gender and Reproductive Health & Rights Resource Center (GRACE), Sudan; the Global Research and Advocacy Group (GRAG), Senegal; Population Council, Nigeria; Population Council, Egypt; Population Council, Ethiopia; MannionDaniels, Ltd. (MD); Population Reference Bureau (PRB); University of California, San Diego (Dr. Gerry Mackie); and University of Washington, Seattle (Prof. Bettina Shell-Duncan).

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Suggested Citation: Noah Pinheiro Y. A., Moore Z., and Gathara D. 2019. "Associations between FGM/C and HIV in Ethiopia, Gambia, Kenya, and Sierra Leone: A Limited Analysis of Demographic and Health Survey Data." *Evidence to End FGM/C: Research to Help Women Thrive.* New York: Population Council.

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Funded by:

This document is an output from a programme funded by the UK Aid from the UK government for the benefit of developing countries. However, the views expressed and information contained in it are not necessarily those of, or endorsed by the UK government, which can accept no responsibility for such views or information or for any reliance placed on them.

Table of Contents

List of Tables

List of Figures

Acronyms

AIDS	Acquired Immune Deficiency Syndrome
AOR	Adjusted Odds Ratio
DFID	Department for International Development
DHS	Demographic and Health Survey
FGM/C	Female Genital Mutilation/Cutting
HIV	Human Immunodeficiency Virus
HIV+	HIV Positive
KDHS	Kenya Demographic and Health Survey
OR	Odds Ratio
SSA	Sub-Saharan Africa
STI	Sexually Transmitted Infection
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

Acknowledgements

Funding for this work was provided by UK Aid and the UK Government through the DFID-funded project “Evidence to End FGM/C: Research to Help Girls and Women Thrive” coordinated by the Population Council.

The authors would like to thank Dennis Matanda, Sanyukta Mathur, Jacinta Muteshi and Jerry Okal of the Population Council for their expert review and contributions to this report. Editorial support was provided by Janet Munyasya and Robert Pursley of Population Council.

Executive Summary

Background

Worldwide an estimated 200 million women and girls have been subjected to female genital mutilation (FGM/C), a traditional practice involving partial or total removal of external genitalia for non-medical reasons. Previous research suggests that FGM/C may be associated with increased risk of acquiring human immunodeficiency virus (HIV). However, there is limited research on the association between HIV and FGM/C. Studies investigating the association between male circumcision and HIV have demonstrated the protective effect of male circumcision. Given that, in some settings, FGM/C and male circumcision are considered “equivalent” procedures, it is important to investigate the effect of FGM/C on the likelihood of HIV infection for women in practising communities.

Methods

This study examined the relationship between HIV prevalence, FGM/C status and key background characteristics such as age, education, household wealth, marital status, parity and residence among women aged 15 to 49 years. We analysed cross-sectional data from the Demographic and Health Surveys (DHS) implemented in the four sub-Saharan Africa countries for which data on HIV and FGM/C were available: Ethiopia (2005), The Gambia (2013), Kenya (2003 and 2008-09), and Sierra Leone (2008 and 2013). Datasets were analysed separately for each country. Using datasets where a statistically significant association was observed between HIV prevalence and FGM/C status, we adjusted for potential confounders and applied multilevel logistic models to explore the correlates of HIV infection and their association with FGM/C.

Results

The rate of FGM/C was high (>70%) in all countries except Kenya (28.7% in 2008-9 and 33.1% in 2003). FGM/C types I (partial or complete removal of the clitoris and/or the clitoral hood) and II (partial or complete removal of the clitoris and labia minora; and, in some cases, the labia majora) were predominant in all countries except Ethiopia. In Ethiopia type III (removal of the labia minora and/or labia majora, followed by forcing the wound edges together to create a seal, for example through stitching) was common. HIV prevalence ranged from 1.7 percent (Ethiopia 2005) to 8.7 percent (Kenya 2003). There was no statistically significant association between FGM/C status and HIV prevalence among women in Ethiopia, The Gambia and Sierra Leone. In contrast, in the Kenya 2003 and 2008-2009 samples, cut women were less likely than uncut women to be HIV+, and this difference was statistically significant both in the bivariate analysis (OR 0.65, $p<0.022$ in 2008-09; OR 0.56, $p<0.001$ in 2003) and after adjustment for potential confounders (AOR 0.49, $p=0.002$ in 2008-09; AOR 0.60, $p=0.01$ in 2008-09).

Conclusions

Findings are inconclusive. The reason for the inconsistent findings across the countries studied is unclear, but may be related to study limitations such as the cross-sectional design (which limits causal inferences), the possibility of other pathways of association (not included in the analyses) and the considerable geographical variation in HIV prevalence (which makes it difficult to assess its association with FGM/C particularly in low HIV-prevalence settings). Considering that FGM/C causes trauma to the genitalia, which can increase susceptibility to sexually transmitted infections, further research is warranted.

Introduction

Background

Female genital mutilation/cutting (FGM/C) is the partial or total removal of the external female genitalia for non-medical reasons. About 200 million women and girls across a range of African, Middle Eastern and Asian countries have experienced FGM/C (UNFPA-UNICEF, 2016), with millions more at risk of being cut during their lifetimes.

Apart from its known association with complications such as obstructed labour and urinary fistulas (Mwanri and Gatwiri, 2017), psychological distress (Adelufosi et al., 2017), and sexual dysfunction (Abdel-Azim, 2013, Biglu et al., 2016), FGM/C has been postulated to increase the risk of HIV infection (e.g. Brady, 1999). However, HIV as an additional consequence of FGM/C has not been extensively studied.

The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimates that approximately 37 million people were living with HIV worldwide as of 2016 and that almost the same number had died of HIV-related complications over the previous 25 years (UNAIDS, 2016). Two-thirds of all new HIV infections occur in sub-Saharan Africa, where women (and girls) are at higher risk of infection than men (and boys). This gender difference can be attributed to socio-cultural and gender norms that tend to disempower women in sexual relationships and may affect women's ability to negotiate safer sex with male partners (see e.g. Ramjee and Daniels, 2013). The gender disparity may also reflect biological factors, as susceptibility to HIV infection may be higher for women than for men (Mastro and de Vincenzi, 1996, Royce, Sena, Cates et al., 1997).

The prevalence of HIV shows regional variation throughout sub-Saharan Africa. Rates of HIV infection are highest in some parts of Southern Africa, where, incidentally, FGM/C is rarely practised, as well as in some parts of Western Africa, where the milder forms of FGM/C (types I[1] and II[2]) predominate. In African regions where the most severe form of FGM/C (type III[3]) is common, HIV prevalence tends to be low.

Existing Literature

At the population level, FGM/C appears to have a negative association with HIV. However, at the individual level, some experts have suggested that FGM/C may increase HIV risk among women (Brady, 1999). A recent literature review (Noah-Pinheiro, 2017) identified 14 quantitative studies conducted in several African countries with relevant data for an investigation of FGM/C and HIV at the individual level. The studies from both peer-reviewed (n=11) and grey literature (n=3), were selected based on the following predetermined criteria, even if they did not explicitly set out to explore a link between FGM/C and HIV: (1) FGM/C was an independent variable, and (2) HIV status was confirmed by a laboratory test.

Though observational in design, the selected studies were acceptable because the review's aim was to investigate an association between FGM/C and HIV, not to establish a causal relationship. The review assessed the measurement of FGM/C status (exposure) and HIV infection (outcome); control for potential confounders; sample source; sample size/power considerations (including prevalence of FGM/C and HIV); and response rate. The 14 studies were then rated based on criteria outlined in a Department for International Development (DFID) guidance document[4]: conceptual framing, openness and transparency, cogency, appropriateness and rigour, validity,

[1] Partial or complete removal of the clitoris and/or the clitoral hood
[2] Partial or complete removal of the clitoris and labia minora, and may include removal of the labia majora
[3] Removal of labia minora and/or labia majora, forcing the wound edges together to create a seal, by stitching, for example
[4] How to Note: Assessing the Strength of Evidence. DFID Practice Paper. www.managingforimpact.org/sites/default/files/resource/DFID_htn_-_strength_of_evidence.pdf

reliability and cultural sensitivity. Additional rating criteria included effect size and journal impact factor.

Findings from the rating exercise were as follows:

- Three of the 14 studies were determined to be low quality, 10 were of moderate quality, and one was of high quality.
- Important limitations in study design affecting most studies included:
  - Poor statistical power
  - Limited adjustment for potential confounders
  - Measurement of FGM/C status by self-reporting
- Four studies failed to find a statistically significant association between FGM/C and HIV, six found a negative association, two found a positive association and two reported indirect associations.
- In general, studies that examined data from non-representative samples of women (such as antenatal clinic clients or hospitality workers) were equivocal. Those using data from nationally-representative samples of women mostly found a negative association, except for the two studies set in Kenya, which elicited indirect associations (positive and negative). No generalities could be made about data sources where a positive association was found.
- The review concluded, with limited confidence, that FGM/C has the anticipated positive association with HIV, and called for further research.

Aim

This study adds to existing literature by examining the relationship between HIV prevalence, self-reported FGM/C status and key background and sexual behaviour-related characteristics of women aged 15 to 49 years in four countries: Ethiopia, The Gambia, Kenya and Sierra Leone.

Methods

Design

We analysed cross-sectional data from Demographic and Health Surveys (DHS) implemented in the four countries where data on HIV and FGM/C status was available. These countries included: Ethiopia (2005), The Gambia (2013), Kenya (2003, 2008-2009) and Sierra Leone (2008, 2013). Demographic and Health Surveys are nationally-representative household surveys that provide population, health and nutrition data for monitoring and impact evaluations.

Data

Analytical datasets comprised data from women with both FGM/C and HIV status data. Samples comprised 6,110 women from Ethiopia, 4,369 from The Gambia, 3,413 from Sierra Leone in 2008 and 7,853 in 2013, and 3,339 women from Kenya in 2003 and 3,699 in 2008-2009. Although the DHS was implemented in Ethiopia in 2016 and Kenya in 2014, these rounds were excluded as they did not include HIV testing. Further details on the sampling and data collection procedures are available in the published country DHS reports (Central Bureau of Statistics [Kenya], Ministry of Health [Kenya], & ORC Macro, 2004; Central Statistical Agency [Ethiopia] & ORC Macro, 2006; Kenya National Bureau of Statistics & ICF Macro, 2010; Statistics Sierra Leone (SSL) & ICF Macro. 2009; SSL & ICF International, 2014; The Gambia Bureau of Statistics & ICF International, 2014). The datasets analysed during the current study are publicly available in the USAID MEASURE/ DHS data repository: http://dhsprogram.com/data/available-datasets.cfm.

Variables

FGM/C status was the primary independent variable. Respondents were asked, "Have you ever been circumcised?" Response options were “yes”, “no”, or “don’t know”. Only women who responded “yes” were classified as being cut.

We included sociodemographic variables that have been found to be associated with FGM/C and/or HIV for descriptive purposes and for use as controls in multivariate analyses: age (Igwegbe & Egbuonu, 2000; Johnson & Way, 2006), rural-urban residence (Yoder et al., 2004), region (Johnson & Way, 2006, Yoder et al., 2004), religion (Okonofua et al., 2002, Yoder et al., 2004), ethnicity (Okonofua et al., 2002, Yoder et al., 2004), household wealth status (Johnson & Way, 2006), education (Igwegbe & Egbuonu, 2000, Okonofua et al., 2002) and marital status (Johnson & Way, 2006, Okonofua et al., 2002). We used standard five-year age cohorts in this analysis: ages 15-19; 20-24; 25-29; 30-34; 35-39; 40-44; and 45-49. Household wealth was assessed using a wealth index constructed through a principal components analysis of items, assessing housing characteristics and amenities as well as household ownership of various assets. We also included the following reproductive, behavioural and health-related measures that may be associated with FGM/C and/or HIV: parity (Humphrey et al., 2007), number of lifetime sexual partners (Choudhry et al., 2015), recent sexual activity (sexual intercourse in the 12 months preceding the survey), experience of sexually transmitted infections (STIs) or STI symptoms such as abnormal vaginal discharge or a genital sore or ulcer (Okonofua et al., 2002) in the 12 months preceding the survey, and exposure to mass media (LaCroix et al., 2014).

Statistical Analysis

We computed descriptive statistics to explore variations in women’s HIV prevalence by FGM/C status and by key background characteristics. Due to sample size limitations (HIV prevalence was relatively low in three out of the four countries) we conducted a limited analysis to explore associations between FGM/C status and HIV prevalence in Ethiopia, The Gambia and Sierra Leone. For Kenya, which had data with relatively high HIV prevalence, we conducted a multivariate analysis. We calculated confidence intervals (CIs) around the HIV prevalence point estimates for women with and without FGM/C and noted statistically significant differences. Datasets were analysed separately for each country (and for each survey round for Kenya and Sierra Leone) and were not pooled.

For the 2003 and 2008-2009 Kenya datasets (where a significant association was observed between FGM/C status and HIV prevalence), multilevel logistic modelling was applied to explore the determinants of HIV and their association with FGM/C. Models included the following variables: FGM/C status, residence, age group, education, wealth quintile, marital status, parity, recent sexual activity (past 12 months), number of lifetime sexual partners, STI or STI symptoms within the last 12 months and exposure to mass media.

The DHS data have a hierarchical structure with individuals nested within clusters, which are nested within regions. In the multilevel analysis, regions constituted the highest (third) level, while clusters (primary sampling units) within regions constituted the second level. Each of the independent variables were included separately as a fixed effect to determine its association with HIV (univariate analysis, Model 1). In Model 2, we adjusted the association of HIV and FGM/C for these independent variables. In all analyses, including the bivariate analysis, we accounted for clustering and the hierarchical nature of the data by including random effects of clusters nested within regions nested within a country. In addition, we applied sample weights as provided in the DHS datasets. In all analyses, a *p*-value less than 0.05 was considered statistically significant.

Results

HIV Prevalence and FGM/C Status

As shown in Table 1, rates of FGM/C were high (>70%) in all countries except Kenya (28.7% in 2008-9 and 33.1% in 2003). Types I and II FGM/C were predominant in all countries apart from Ethiopia, where Type III was common (data not shown). Overall, HIV prevalence ranged from 1.7% (Ethiopia) to 8.7% (Kenya 2003).

Table 1. HIV prevalence by FGM/C status, according to country and survey year

FGM/C Status	HIV Status		Total	Number of women
	HIV-Negative	HIV-Positive		
ETHIOPIA DHS 2005				
Uncut	97.9%	2.4%	100.0%	1,400
Cut	98.5%	1.5%	100.0%	4,541
Don't Know	95.3%	4.7%	100.0%	169
Total	98.3%	1.7%	100.0%	6,110
Number of women	6,004	106	6,110	
THE GAMBIA DHS 2013				
Uncut	98.6%	1.5%	100.0%	1,066
Cut	97.6%	2.4%	100.0%	3,300
Don't Know	100.0%	0.0%	100.0%	3
Total	97.9%	2.1%	100.0%	4,369
Number of women	4,276	93	4,369	
SIERRA LEONE DHS 2008				
Uncut	98.4%	1.9%	100.0%	249
Cut	98.3%	1.7%	100.0%	3,164
Total	98.3%	1.7%	100.0%	3,413
Number of women	3,355	58	3,413	
SIERRA LEONE DHS 2013				
Uncut	98.1%	1.9%	100.0%	794
Cut	98.4%	1.6%	100.0%	7,059
Total	98.3%	1.7%	100.0%	7853
Number of women	7,723	130	7,853	
KENYA DHS 2003				
Uncut	89.7%	10.3%	100.0%	2,235
Cut	94.2%	5.8%	100.0%	1,104
Total	91.2%	8.7%	100.0%	3,339
Number of women	3,045	291	3,339	
KENYA DHS 2008-09				
Uncut	90.7%	9.3%	100.0%	2,636
Cut	94.9%	5.1%	100.0%	1,063
Total	92.0%	8.0%	100.0%	3,699
Number of women	3,402	297	3,699	

In Kenya, HIV prevalence was significantly lower among cut women compared to uncut women in both surveys (Table 2). Figures 1 and 2 show the HIV prevalence by FGM/C status in the 2003 and 2008-09 surveys, respectively. HIV prevalence was not associated with FGM/C status in the other countries (Table 2).

Table 2. HIV prevalence by FGM/C status, with confidence intervals and p-values according to country and survey year

FGM/C Status	HIV prevalence (%)	95% Confidence interval	p-value	Number of women
ETHIOPIA DHS 2005				
Uncut	2.4	(1.6, 3.6)	0.051	1,400
Cut	1.5	(1.1, 2.2)		4,541
THE GAMBIA DHS 2013				
Uncut	1.5	(0.8, 2.6)	0.117	1,066
Cut	2.4	(1.8, 3.2)		3,300
SIERRA LEONE DHS 2008				
Uncut	1.9	(0.8, 4.4)	0.846	249
Cut	1.7	(1.3, 2.3)		3,164
SIERRA LEONE DHS 2013				
Uncut	1.9	(1.0, 3.7)	0.621	794
Cut	1.6	(1.3, 2.0)		7,059
KENYA DHS 2003				
Uncut	10.3	(8.8, 12.0)	<0.001	2,235
Cut	5.8	(4.4, 7.6)		1,104
KENYA DHS 2008-09				
Uncut	9.3	(7.7, 11.1)	0.008	1,063
Cut	5.1	(3.4, 7.4)		3,699

Figure 1: HIV Prevalence by FGM/C Status, Kenya DHS 2003

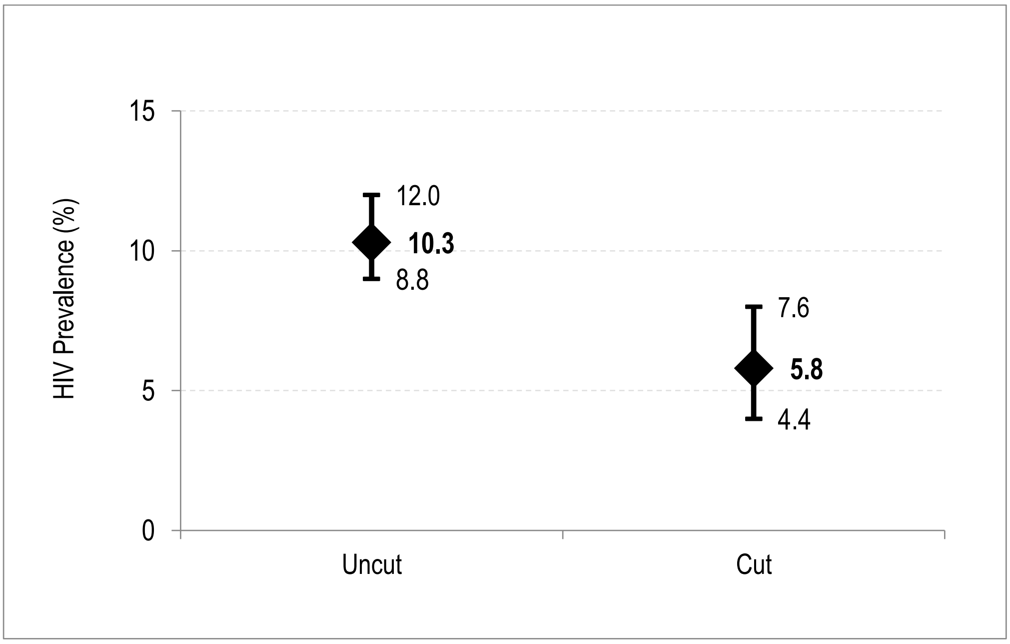
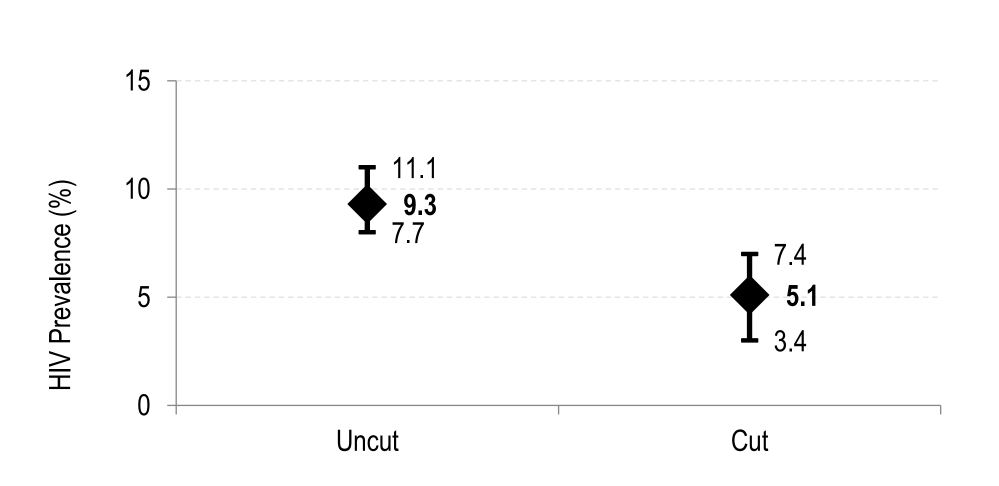


Figure 2: HIV Prevalence By FGM/C Status, Kenya DHS 2008-09



Analyses of Kenya DHS 2003 and 2008-2009

The results of the additional analyses on the relationship between HIV prevalence and FGM/C status in the 2003 and 2008-09 Kenya DHS (KDHS) datasets are shown in Table 3 (descriptive analysis) and Table 4 (adjusted analysis).

Table 3. Proportion of HIV positive women by FGM/C status, and various background and sexual behaviour-related characteristics, Kenya (2003 and 2008-09)

Characteristic		2008-09 KDHS %	2008-09 KDHS Number	2003 KDHS %	2003 KDHS Number
FGM/C Status					
	Not cut	9.3	2,773	10.2	2,235
	Cut	5.1	1,062	5.8	1,104
Residence					
	Urban	10.6	880	12.3	725
	Rural	7.4	2,955	7.7	2,613
Age Group					
	15-19	2.9	791	3.0	767
	20-24	6.5	768	9.5	687
	25-29	10.6	678	12.8	548
	30-34	11.1	531	11.5	459
	35-39	9.0	383	11.7	365
	40-44	14.3	362	9.8	294
	45-49	6.6	323	4.0	218
Education					
	No education	6.1	327	4.4	425
	Primary	9.1	2,193	9.9	1,984
	Secondary	6.7	1,034	8.0	753
	Higher	8.2	281	8.7	177
Wealth Quintile					
	Poorest	6.3	694	4.0	564
	Second	9.0	664	8.9	652

Characteristic		2008-09 KDHS %	Number	2003 KDHS %	Number
	Middle	6.8	668	7.2	657
	Fourth	7.5	857	9.9	706
	Richest	10.3	952	12.4	760
Marital Status					
	Never married	3.7	1,190	4.8	959
	Monogamous	6.0	1,938	7.2	1,629
	Polygamous	12.3	280	11.8	357
	Don't know	7.9	32	7.3	40
Parity					
	0	2.3	1,016	3.6	910
	1	12.2	529	13.3	482
	2-4	10.7	1,412	11.5	1,125
	5+	8.2	877	8.0	821
Recent Sexual Activity					
	No	7.8	1,103	5.9	967
	Yes	8.2	2,722	9.9	2,366
Number of Lifetime Sexual Partners					
	0	7.4	3,337	7.5	2,925
	1	13.2	472	16.0	376
	Multiple	11.6	16	34.4	33
	Missing	12.3	10	15.3	5
Experience of STI/STI Symptoms					
	No	7.5	3,647	8.3	3,224
	Yes	20.0	188	19.6	115
Exposure to Mass Media (Radio)					
	None	6.9	526	7.4	508
	Less than once a week	9.3	350	8.4	280
	At least once a week	8.2	2,959	9.0	2,551

In general, women who were cut were less likely than those who were uncut to be HIV+ in both unadjusted (OR 0.65 [0.45, 0.94]) and adjusted (AOR 0.49 [0.31, 0.76]) models in the 2008-2009 Kenya sample (Table 4). A similar pattern is observed using the 2003 sample of Kenyan women (OR 0.56 [0.40, 0.78] and AOR 0.60 [0.41, 0.89], respectively).

Age

In the sample, Kenyan women who were aged 20 years or older were generally more likely to be HIV+ than those ages 15 to 19 years in both Kenya survey rounds, in the unadjusted analysis. After adjustment, however, a mixed pattern is observed. In the 2008-2009 multivariate models, age cohort was no longer associated with HIV status, whereas in 2003, women in all age groups between 20 and 44 years were more likely to be HIV+ compared to those aged 15–19 years, with the highest odds among those aged 25–29 years (AOR 3.58 [1.73, 7.42]) and 30–34 years (AOR 3.07 [1.36, 6.91]).

Residence

Rural Kenyan women in the sample were less likely than their urban counterparts to be HIV+ in the unadjusted (OR 0.54 [0.38, 0.78]) analyses in 2008-2009. However, the adjusted odds ratio is only marginally statistically significant (AOR 0.59 [0.35, 1.01]). Loss of statistical significance in the adjusted analysis of 2003 data is similarly observed.

Education

No clear pattern was observed by women's education level in the 2008-2009 KDHS. In the 2003 KDHS, women with primary education were more likely than those without any education to be HIV+ (AOR 2.55 [1.17, 5.56]). Those with secondary and higher education were just as likely as women without education to be HIV+.

Household Wealth

In the 2008-2009 adjusted model, women in the richest quintile were significantly more likely to be HIV+ than women in the poorest quintile (AOR 2.16 [1.05, 4.43]). In the 2003 KDHS, the odds of being HIV+ rose with increasing wealth in the unadjusted analysis. However, only women in the richest two quintiles were significantly more likely to have HIV (AOR 2.28 [1.14, 4.55] and AOR 2.57 [1.18, 5.58], respectively) than women in the poorest quintile in the multivariate analysis.

Marital Status

In both surveys, women in monogamous and polygamous unions had higher odds of being HIV+ than never married women in the unadjusted models (2008-09: 1.85 [1.29, 2.67]; OR 2.79 [1.71, 4.54], respectively) and (2003: OR 1.84 [1.26, 2.67]; OR 2.99 [1.81, 4.93], respectively). Marital status was not associated with HIV status in the multivariate models in either survey.

Parity

In general, women with one or more children were more likely to be HIV+ in the unadjusted analysis for both surveys, compared to those with no children. After adjustment, in the 2008-2009 survey, this finding still holds, except for the odds ratio related to having five or more children, which was only marginally statistically significant (AOR 2.25 [0.99, 5.10]). In 2003, only women with one child were more likely than those with no children to be HIV+.

Lifetime Number of Sexual Partners

In 2008-2009 survey, only women with one partner were more likely to be HIV+ than the reference group. After adjustment, models including the categories "multiple partners" and "missing" did not converge in both survey rounds due to small cell sizes, so no inferences can be made about whether the associations observed hold in multivariate models. In the unadjusted models based on the 2003 KDHS, women with one (OR 2.04 [1.45, 2.85]) or multiple (OR 4.11 [1.69, 10.04]) partners were more likely to be HIV+ than women who reported no sexual partners.

Recent Sexual Activity

Recent sexual activity was not associated with HIV status in the 2008-09 sample. In 2003, women reporting recent sexual activity had a higher likelihood of being HIV+ in the unadjusted models. However, this association was non-significant in the adjusted model.

Sexually Transmitted Infection within the Past 12 months

Women who reported STI or STI symptoms in the 12 months preceding the survey were more likely to be HIV+ than those who report otherwise, in both unadjusted and adjusted analysis, in both surveys (AOR 2.09 [1.20, 3.66] in 2008-09; AOR 1.91 [1.01, 3.62] in 2003).

Exposure to Mass Media

There was no relationship between women's exposure to mass media (radio) and HIV status in both surveys.

Table 4: Unadjusted and adjusted odds ratios for the association between FGM/C and HIV, Kenya (2003 and 2008-09)

		2008-09 KDHS				2003 KDHS			
		Unadjusted		Adjusted		Unadjusted		Adjusted	
Characteristic		OR (95% CI)	P value	AOR (95% CI)	P value	OR (95% CI)	P value	AOR (95% CI)	P value
FGM/C Status									
	Not cut	ref		ref		ref		ref	
	Cut	0.65(0.45-0.94)	0.022	0.49(0.31-0.76)	0.002	0.56(0.40-0.78)	0.001	0.60(0.41-0.89)	0.01
Residence									
	Urban	ref		ref		ref		ref	
	Rural	0.54(0.38-0.78)	0.001	0.59(0.35-1.01)	0.055	0.48(0.34-0.68)	<0.001	0.65(0.40-1.08)	0.097
Age Group									
	15-19	ref		ref		ref		ref	
	20-24	1.97(1.20-3.23)	0.007	0.89(0.49-1.62)	0.693	2.75(1.67-4.51)	<0.001	1.98(1.09-3.58)	0.024
	25-29	3.70(2.27-6.02)	<0.001	1.47(0.76-2.82)	0.254	4.40(2.68-7.24)	<0.001	3.53(1.84-6.77)	0
	30-34	5.06(3.08-8.31)	<0.001	1.43(0.69-2.94)	0.336	4.17(2.51-6.94)	<0.001	3.58(1.73-7.42)	0.001
	35-39	4.15(2.45-7.01)	<0.001	1.42(0.65-3.11)	0.384	4.08(2.39-6.99)	<0.001	3.07(1.36-6.91)	0.007
	40-44	4.30(2.48-7.44)	<0.001	1.52(0.66-3.48)	0.326	3.14(1.74-5.67)	<0.001	3.11(1.26-7.69)	0.014
	45-49	2.88(1.60-5.17)	<0.001	0.92(0.36-2.32)	0.861	1.47(0.66-3.26)	0.348	1.16(0.30-4.54)	0.833
Education									
	No education	ref		ref		ref		ref	
	Primary	0.90(0.55-1.46)	0.659	0.83(0.43-1.58)	0.569	1.99(1.17-3.40)	0.012	2.55(1.17-5.56)	0.019
	Secondary	0.67(0.39-1.15)	0.144	0.50(0.24-1.04)	0.063	1.54(0.86-2.76)	0.15	1.32(0.56-3.09)	0.523
	Higher	0.59(0.30-1.16)	0.129	0.51(0.22-1.22)	0.129	1.36(0.64-2.88)	0.429	0.89(0.32-2.46)	0.824
Wealth Quintile									
	Poorest	ref		ref		ref		ref	
	Second	1.36(0.87-2.12)	0.172	1.63(0.93-2.88)	0.089	1.90(1.07-3.39)	0.029	1.83(0.94-3.58)	0.077
	Middle	1.18(0.74-1.88)	0.488	1.44(0.79-2.63)	0.232	2.06(1.15-3.69)	0.015	1.57(0.78-3.16)	0.211
	Fourth	1.23(0.78-1.96)	0.369	1.44(0.77-2.69)	0.249	3.10(1.78-5.40)	<0.001	2.28(1.14-4.55)	0.019
	Richest	1.68(1.06-2.67)	0.027	2.16(1.05-4.43)	0.036	3.55(2.03-6.20)	<0.001	2.57(1.18-5.58)	0.017
Marital Status									
	Never married	ref		ref		ref		ref	
	Monogamous	1.85(1.29-2.67)	0.001	0.86(0.35-2.11)	0.738	1.84(1.26-2.67)	0.001	1.21(0.48-3.08)	0.69
	Polygamous	2.79(1.71-4.54)	<0.001	1.36(0.54-3.42)	0.513	2.99(1.81-4.93)	<0.001	1.97(0.76-5.08)	0.16
	Don't know	2.42(0.67-8.73)	0.176	0.99(0.22-4.34)	0.986	1.74(0.49-6.13)	0.389	1.12(0.25-4.92)	0.882

		2008-09 KDHS				2003 KDHS			
		Unadjusted		Adjusted		Unadjusted		Adjusted	
Characteristic		OR (95% CI)	P value	AOR (95% CI)	P value	OR (95% CI)	P value	AOR (95% CI)	P value
Parity									
	0	ref		ref		ref		ref	
	1	3.51(2.17-5.69)	<0.001	3.14(1.72-5.72)	<0.001	4.32(2.74-6.83)	<0.001	2.20(1.23-3.94)	0.008
	2-4	4.88(3.21-7.42)	<0.001	3.43(1.74-6.75)	<0.001	3.82(2.52-5.77)	<0.001	1.28(0.65-2.50)	0.471
	>5	3.65(2.32-5.76)	<0.001	2.25(0.99-5.10)	0.052	2.31(1.45-3.68)	<0.001	0.62(0.27-1.44)	0.266
Recent Sexual Activity									
	No	ref		ref		ref		ref	
	Yes	1.19(0.90-1.58)	0.23	1.04(0.46-2.32)	0.929	1.68(1.22-2.30)	0.001	1.24(0.52-2.94)	0.634
Number of Lifetime Sexual Partners									
	0	ref		ref		ref		ref	
	1	1.88(1.37-2.59)	<0.001	1.36(0.58-3.20)	0.48	2.04(1.45-2.85)	<0.001	1.59(0.67-3.74)	0.292
	Multiple	1.23(0.26-5.78)	0.791			4.11(1.69-10.04)	0.002	0.79(0.09-7.04)	0.835
	Missing	1.73(0.20-15.09)	0.62			5.85(0.53-65.08)	0.151		
Experience of STI/STI Symptoms									
	No	ref		ref		ref		ref	
	Yes	3.24(2.15-4.89)	<0.001	2.09(1.20-3.66)	0.01	2.54(1.50-4.30)	0.001	1.91(1.01-3.62)	0.046
Exposure to Mass Media (Radio)									
	None	ref		ref		ref		ref	
	Less than once a week	1.39(0.83-2.33)	0.215	1.07(0.54-2.11)	0.85	1.20(0.68-2.12)	0.534	1.09(0.52-2.26)	0.826
	At least once a week	1.02(0.70-1.48)	0.918	0.98(0.61-1.56)	0.917	1.03(0.69-1.56)	0.871	0.96(0.55-1.67)	0.882

Discussion

This study represents a limited analysis of six nationally-representative population-based surveys to explore the association between HIV prevalence and FGM/C status among women aged 15 to 49 years in four countries (Ethiopia, The Gambia, Kenya and Sierra Leone). We found no difference in HIV prevalence between women who have undergone FGM/C and uncut women in Ethiopia, The Gambia and Sierra Leone. In contrast, we found a negative association between FGM/C status and HIV prevalence in both the Kenyan surveys. The negative association remained significant when we controlled for demographic and behavioural variables that in other studies have been associated with HIV prevalence such as marital status, whether a woman was sexually active, parity, lifetime number of sexual partners and experiencing an STI.

The negative association between FGM/C and HIV found in the Kenya samples conflicts with the theory that FGM/C increases risk of HIV for cut women. The reasons for this finding are not immediately clear. However, previous studies using Kenya DHS data have proposed that cut women may limit engagement in sexual intercourse and may be less likely to engage in pre-marital and extra-marital sex (e.g. Yount and Abraham, 2007). In addition, the regional variation in FGM/C and HIV status in Kenya — the north eastern region ranking highest in FGM/C prevalence while simultaneously having one of the lowest HIV prevalence — makes it difficult to ascertain an association between HIV and FGM/C. Previous studies using Kenya DHS data (Maslovskaya et al., 2009, Yount and Abraham, 2007) found that FGM/C and HIV may be indirectly associated through various pathways.

Study findings should be interpreted in light of several limitations. Firstly, HIV prevalence is relatively low in three of the four countries (Ethiopia, The Gambia, Sierra Leone). Thus, the number of HIV+ women when assessed by FGM/C status (and, further, by background sub-groups) is very small (<25) in three of the four countries. The small numbers of HIV+ women make it difficult to reach meaningful conclusions on the association between HIV prevalence and FGM/C status, whether nationally, or by background or behavioural characteristics. The Kenya 2003 and 2008-2009 surveys are the only ones with large enough numbers of HIV+ women to reach somewhat reliable conclusions, although as stated earlier, the marked regional variation in HIV and FGM/C prevalence may mask any associations. Future research should use data from moderate HIV prevalence countries to yield more robust analyses.

Secondly, the DHS datasets used self-reported FGM/C status, which is known to be less reliable than clinical exam (Elmusharaf, Elhadi & Almroth, 2006). While recognising that it is not feasible to conduct clinical exams during DHS implementation, studies using other types of samples or data sources may benefit from augmentation with clinical records, where available.

Lastly, only women who affirmatively responded that they had been cut were classified as having FGM/C. It is possible, however, that some of those who responded "don't know" may have been cut. Future analyses should compare the characteristics of women who answered "don't know" to those who answered "yes" and to those who answered "no", to explore the possibility of recoding FGM/C status, for sensitivity analyses.

Conclusions

Findings were inconsistent across the country samples studied. This study found no statistically significant difference in HIV prevalence between women with FGM/C and those without in Ethiopia, The Gambia and Sierra Leone. In contrast, cut women in Kenya were less likely to be HIV positive than uncut women. The reason for the lack of consistency of findings is unclear but may be related to study limitations, such as the possibility of indirect pathways of association that were not considered in the analyses and the considerable geographical variation in HIV prevalence that makes it difficult to assess its association with FGM/C, particularly in low HIV-prevalence settings.

Considering that FGM/C causes trauma to the genitalia which can increase susceptibility to sexually transmitted infections further research is warranted. Such research would benefit from the use of samples with adequate numbers of HIV+ women for more robust analysis while exploiting more sophisticated statistical techniques. Additionally, self-reported FGM/C status data should be supported or verified with clinical records where possible and, where not possible, the recoding of the responses of women who report not knowing their FGM/C status should be explored.

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