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RESEARCH ARTICLE

Empirical linkages between female genital mutilation and multiple sexual partnership: evidence from the 2018 Mali and 2013 Sierra Leone Demographic and Health Surveys

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Abstract
Female genital mutilation (FGM) is very pervasive in Africa, with significant regional variations in the prevalence of this traditional practice. This study examined the linkages between FGM and multiple sexual partnership in Mali and Sierra Leone – two African countries with a high prevalence of FGM. Data were from the 2018 Mali and 2013 Sierra Leone Demographic and Health Surveys, and the study sample comprised 4750 women from Mali and 16,614 from Sierra Leone. Multilevel logistic regression was used for the data analysis, with reported adjusted odds ratios (aOR) and associated 95% confidence intervals. In Mali, women who had not undergone FGM were less likely to have multiple sexual partners (aOR=0.60, CI=0.38–0.96) compared with those who had undergone FGM. In Sierra Leone, women who had undergone FGM (aOR=1.15, CI=1.02–1.30) were more likely to have multiple sexual partners compared with those who had not undergone FGM. Age, level of education, wealth quintile, sex of household head, community socioeconomic status, mass media exposure, and community literacy level were found to be associated with the likelihood of multiple sexual partnership among women in Mali and Sierra Leone. Comprehensive, age-group-based risk-reduction strategies, such as abstinence education and decision-making skills (assertiveness) training, are needed to reduce girls' and young women's engagement in multiple sexual partnerships. Policy interventions, such as anti-FGM legislation and initiatives like the 'Schooling for the Female Child' initiative aimed at reducing social inequality among girls and women, might help decrease FGM and the likelihood of health-compromising behaviours like multiple sexual partnership.

Keywords: Female genital mutilation; Multiple sexual partnership; Global health

Introduction

Sexuality issues are often considered 'private affairs'. However, reproductive health, early pregnancy, HIV and other sexually transmitted infections, and other gender-based issues (e.g. decision-making and violence) have received considerable attention because they impact the developmental agenda of developing societies (Carmargo, 2006; Corrêa & Jolly, 2008; Evans,

2020; Fiaveh, 2011). One clarion call towards the developmental narratives is the protection of the girl child from harmful socio-cultural practices such as female genital mutilation (FGM), also known as female genital cutting (Evans, 2020).

According to the World Health Organization (WHO), FGM involves procedures leading to the partial or total removal of the external parts of the female genitalia and/or injury to the female genital organs for non-medical reasons (WHO, 2013). The term 'female genital mutilation' emerged from the terms 'female circumcision' and 'female genital cutting', with the word 'mutilation' differentiating the practice from male circumcision and emphasizing its rigorousness (Groeneveld, 2013). Within practising countries, FGM is considered as an important initiation rite or marker for girls going into their next stage of life through the transition from childhood to adulthood, and is often connected with cultural and habitual rites purported to enhance girls' marriage prospects (Almroth *et al.*, 2001; Hernlund & Shell-Duncan, 2007; Mulongo *et al.*, 2014). Several socio-cultural reasons that have strongly accounted for the practice of FGM include special religious/ethnic beliefs, social norms, customs, rituals and social hierarchies, as well as political and socio-economic systems (Mulongo *et al.*, 2014; Ahinkorah *et al.*, 2020a).

Female genital mutilation is very pervasive in Africa, with significant regional variations in the prevalence of this traditional practice. Approximately 101 million girls over the age of 10 years have undergone FGM in Africa alone, with a further 3 million being at risk of undergoing FGM annually (WHO, 2013, 2020; Njue *et al.*, 2019). According to UNICEF (2018), FGM is practised in over 28 African countries located around the Atlantic coast of the continent. In Africa, Mali and Sierra Leone are among the countries with an FGM prevalence of over 80% – specifically, 89% and 88%, respectively (UNICEF, 2013, 2016, 2018; WHO, 2020). What makes the practice of FGM in Mali and Sierra Leone more serious is that, in both countries, there is no legal ban on FGM and no explicit laws against the practice (Cetorelli *et al.*, 2020; Ameyaw *et al.*, 2020).

Despite global efforts to eliminate FGM over the past decades by governments, non-governmental organizations, reputable institutions (e.g. UNICEF, WHO), and civil society groups, reports and research evidence indicate that this traditional procedure is still practiced in many societies, including Mali and Sierra Leone (Makhlouf Obermeyer, 2005; Van Rossem & Gage, 2009; WHO, 2013; Njue *et al.*, 2019; WHO, 2020). The continuous practice of FGM is primarily driven by some socio-cultural narratives such as dignity and honour, control over sexuality, purity, rites of passage, tradition, and aesthetics (Yoder *et al.*, 1999; Jones *et al.*, 2004; Rajadurai & Igras, 2005; Shaaban & Harbison, 2005). For example, maintaining honour and dignity is considered vital for preserving a family's good name, with 'despicable' behaviour (e.g. inappropriate sexual behaviour) negatively affecting the family's image. Therefore, girls and women are required to maintain their virginity before marriage (Hicks, 1993; Gruenbaum, 2001).

What is unclear from these socio-cultural norms is whether FGM, rather than protecting women from sexual risk, instead exposes them to early sexual encounters with one or multiple partners to test their sexual readiness (i.e., sexual skills) for later adult life. Van Rossem and Gage (2009) contended that there should be a strong link between FGM and woman's sexual history, including her age at first sex, the possibility of premarital sex and/or multiple sexual partnership (MSP). Hence, FGM might trigger a sense of security and encourage 'deviant' sexual behaviour (Hicks, 1993; Gruenbaum, 2001).

Most research on FGM has been dedicated to its health implications, criticizing the procedure, policies, personal experiences of women, and interventions (Makhlouf Obermeyer, 2005). There seems to have been little attention made to how FGM practice might relate to the sexual behaviour of girls and women (Mpofu *et al.*, 2017). To help attain the goal of averting the continuance of FGM, it is essential to better understand the socio-cultural factors that reinforce the procedure and facilitate appropriate interventions. These interventions could help change the socio-cultural practices that facilitate FGM and hinder the continuation of the practice. The current study was grounded on the premise that FGM, which is highly prevalent in Mali and Sierra Leone, might lead to MSP. Therefore, the central aim of this study was to ascertain whether undergoing FGM

could be associated with MSP in these countries. Based on previous evidence, it is hypothesized that girls and women who have undergone FGM are more likely to have multiple sexual partners than their counterparts who have not undergone FGM.

Methods

Study design

The study used data from the women's file of the 2018 Mali and 2013 Sierra Leone Demographic and Health Surveys (DHS). The DHS is a nationally representative survey that is conducted in over 85 low-and middle-income countries globally. The survey focuses on essential maternal and child health markers, including FGM and MSP (Corsi *et al.*, 2012). It employs a two-stage stratified sampling technique, which makes the data nationally representative (see Aliaga & Ruilin, 2006, for details of the sampling process). A total of 4750 women in Mali and 16,614 women in Sierra Leone who had complete information on all the variables of interest were included in the present study.

Definition of variables

Outcome variable

The outcome variable was 'multiple sexual partnership'. This was derived from the question, 'Apart from your spouse, have you had any other sexual partners in the last 12 months?' Those who indicated that they had had at least one other sexual partner apart from their spouse were considered to practice MSP (yes=1), with those indicating otherwise considered not to practise MSP (no=0).

Independent variable

The study considered FGM to be the independent variable. To derive this variable, respondents were asked if their genital area 'was nicked with nothing removed', '[had] something removed' or '[was] sewn shut', with the responses 'yes' and 'no'.

Control variables

Nine control variables were considered, grouped broadly into individual-, household- and community-level categories. Individual and household variables included age, educational level, employment status, wealth, exposure to mass media and sex of household head. The original DHS coding of age, wealth quintile and sex of household head was maintained, and the rest of the individual- and household-level variables were re-coded to make them suitable for the analyses. In the DHS, age was coded as 15–19, 20–24, 25–29, 30–34, 35–39, 40–44 and 45–49. Wealth quintile was coded as poorest, poorer, middle, richer and richest. Sex of household head was coded as male and female. Educational level was re-coded as no education, primary and secondary/higher, and employment status as not working and working. Exposure to media was coded as 'yes' for women who either read newspapers/magazines, listened to the radio, or watched television at least once a week and 'no' for those who did not read newspapers/magazines, listen to the radio or watch television at all.

The community-level factors included place of residence, community literacy level, and community socioeconomic status. Place of residence was coded as rural and urban. Community literacy level was defined as the proportion of women in the community who could read and write. This variable was not directly available in the datasets but generated from the variable that measured literacy through a method of aggregation at the cluster level and coded as low, middle, and high (Solanke & Rahman, 2018). Community socioeconomic status was defined as the proportion

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of women in the community in the richest wealth quintile. This variable was also not directly available in the datasets but generated from household wealth quintile through a method of aggregation at the cluster level and coded as low, middle, and high. These variables were not determined *a priori*, but were based on parsimony, theoretical relevance, and practical significance with multiple sexual partnership among women (e.g. Exavery *et al.*, 2015; Gaffoor *et al.*, 2016; Mlambo *et al.*, 2016; Ahinkorah *et al.*, 2020b).

Statistical analysis

The data were analysed with Stata version 14.0. Analyses were done in four steps. The first step was a graphical representation of the proportion of MSP and FGM in each country. The second step was a univariate analysis to calculate the proportion of sampled women with their percentages across the independent variables. The third step was a bivariate analysis that calculated the proportions of MSP among women across the independent variables with their significance levels (see Table 1). Statistical significance was considered at $p<0.05$. Variables that showed statistical significance in the bivariate analysis were further analysed using multilevel logistic regression in the final step. Before conducting the multilevel logistic regression analysis, a multi-collinearity test was carried out among all the statistically significant variables to determine if there was evidence of multicollinearity between them. Using the variance inflation factor (VIF), the multicollinearity test showed that there was no evidence of collinearity among the explanatory variables: mean VIF = 1.94, maximum VIF = 4.43, minimum VIF = 1.03 for Mali; and mean VIF = 2.20, maximum VIF = 5.31, minimum VIF = 1.06 for Sierra Leone.

For the multilevel logistic regression, a two-stage approach was employed. The two-level modelling indicated that women were nested within clusters while clusters were considered as random effects to cater for the unexplained variability at the contextual level (Solanke *et al.*, 2019). Four models were generated from the multilevel modelling, consisting of the null model (Model 0), Model I, Model II and Model III. The multilevel logistic regression models consisted of both fixed and random effects and models fitted were specified as:

$$\text{logit}\left(\Pr(Y_{ij}=1)\right)=\alpha_0+\alpha_{oj}+\alpha_1 x_{1ij}+\ldots+\alpha_k x_{kij}+\beta_1 z_{1j}+\ldots+\beta_m z_{mj},$$

where $\alpha_{oj}\sim N(0,\tau^2)$; Y_{ij} = binary response for whether a woman i in community j has a multiple sexual partner; α_0 = fixed intercept; α_{0j} = cluster specific random effects; τ^2 = denotes a variance parameter; x_{ij}–x_{kij} = individual- and household-level characteristics; z_{1j}–z_{mj} = community-level characteristics.

The main independent variable (FGM) was taken care of as one of the x variables in the equation. This was not included in the present article.

Intra-community correlation

The intra-community correlation (ICC) was calculated as:

$$\frac{\sigma_{uj}^2}{\overset{2}{\acute{o}}_{uj}+\left[\frac{\pi^2}{3}\right]},$$

where σ_{uj}^2 shows the variation in multiple sexual partnership due to community-level factors. The ICC values range from 0 to 1 and measure the importance of the community-level factors in explaining the outcome. Model 0 showed the variance in MSP attributed to the distribution of the primary sampling units (PSUs) in the absence of the explanatory variables. In Model I, FGM, together with the individual-level variables that showed statistical significance with MSP among women at the bivariate analysis, were entered to assess their association with MSP among women. The community-level variables that showed statistical significance with MSP among women at the bivariate analysis were also entered in the second model to assess their association

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Table 1. Distribution of sample women by prevalence of multiple sexual partnership (MSP) and female genital mutilation (FGM) and socio-demographic characteristics, Mali and Sierra Leone

	Mali				Sierra Leone			
Variable	Weighted *N*	Weighted %	MSP (%)[a]	*p*-value	Weighted *N*	Weighted %	MSP (%)[a]	*p*-value
Female genital mutilation				0.015				<0.001
No	370	7.8	4.1		1703	10.2	43.7	
Yes	4380	92.2	6.1		14,911	89.8	22.8	
Age (years)				<0.001				<0.001
15–19	971	20.5	12.6		3863	23.3	43.6	
20–24	865	18.2	9.9		2675	16.1	36.3	
25–29	914	19.2	4.6		2838	17.1	20.2	
30–34	693	14.6	2.5		2281	13.7	12.6	
35–39	627	13.2	1.4		2257	13.6	13.7	
40–44	407	8.6	0.9		1359	8.2	13.4	
45–49	273	5.7	0.5		1342	8.1	10.0	
Educational level				<0.001				<0.001
No education	3047	64.2	2.7		9271	55.8	13.1	
Primary	632	13.3	7.7		2325	14.0	21.9	
Secondary/higher	1070	22.5	14.0		5018	30.2	48.2	
Employment status				0.573				<0.001
Not working	1905	10.1	6.0		4531	27.3	40.2	
Working	2845	59.9	5.9		12,083	72.7	19.2	
Wealth quintile				<0.001				<0.001
Poorest	852	17.9	4.4		3085	18.6	16.4	
Poorer	816	17.2	2.9		3041	18.3	15.9	
Middle	907	19.1	2.9		3134	18.9	20.5	
Richer	1006	21.2	6.9		3371	20.3	28.6	
Richest	1169	24.6	10.5		3984	24.0	38.6	
Mass media exposure				<0.001				<0.001
No	884	18.6	3.9		5891	35.5	15.7	
Yes	3866	81.4	6.4		10,723	64.5	30.0	
Sex of household head				0.019				<0.001
Male	4074	85.8	5.6		11,780	70.9	20.0	
Female	676	14.2	7.9		4834	29.1	36.8	
Place of residence				<0.001				<0.001
Urban	1268	26.7	10.9		5913	35.6	36.9	
Rural	3482	73.3	4.1		10,701	64.4	18.3	
Community literacy level				<0.001				<0.001
Low	1636	34.4	2.9		6202	37.3	13.5	

(*Continued*)

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Table 1. (*Continued*)

Variable	Mali				Sierra Leone			
	Weighted *N*	Weighted %	MSP (%)[a]	*p*-value	Weighted *N*	Weighted %	MSP (%)[a]	*p*-value
Medium	1477	31.1	4.8		5313	32.0	23.7	
High	1638	34.5	10.0		5099	30.7	40.1	
Community socioeconomic status				<0.001				<0.001
Low	2682	56.4	3.5		9386	56.5	17.4	
Moderate	510	10.8	3.4		2091	12.6	24.8	
High	1557	32.8	10.9		5136	30.9	38.8	

[a]MSP (%): proportion of women who engaged in multiple sexual partnership.

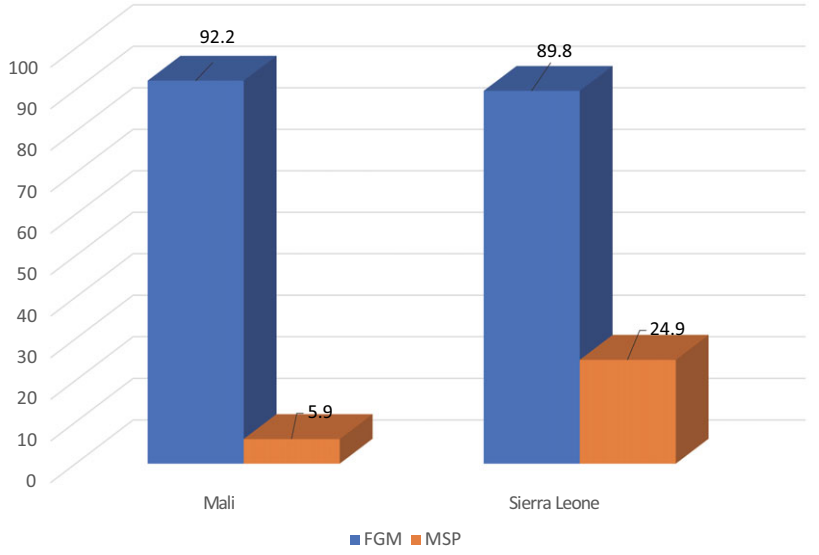

Figure 1. Prevalence of female genital mutilation and multiple sexual partnership in Mali and Sierra Leone. Sources: 2018 Mali DHS and 2013 Sierra Leone DHS.

with MSP among women (see Model II). In the final model, FGM and all the independent variables (individual and household variables as well as community-level variables) were entered. An applied sample weight (v005/1,000,000) to correct for over- and under-sampling, as well as the *svy* command to account for the complex survey design and generalizability of the findings, were employed.

Results

Prevalence of FGM and MSP in Mali and Sierra Leone

Figure 1 shows the prevalence of FGM and MSP among women in Mali and Sierra Leone. In Mali, 92.2% of women had undergone FGM and 5.9% had engaged in MSP. In Sierra Leone, 89.8% had undergone FGM and 24.9% had engaged in MSP.

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Distribution of MSP by FGM and socio-demographic characteristics

Table 1 presents the distribution of MSP by FGM and the socio-demographic characteristics among women in Mali and Sierra Leone. In Mali, 20.5% of the respondents were aged 15–19, 64.2% had no education, 59.9% were working and 24.6% were in the richest wealth quintile. Furthermore, 81.4% were exposed to mass media, 85.8% had male household heads, 73.3% lived in rural areas, 34.5% were in communities with a high literacy level and 56.4% were in low socio-economic status communities. In Sierra Leone, 23.3% were aged 15–19, 55.8% had no education, 72.2% were working and 24.0% were in the richest wealth quintile. Furthermore, 64.5% were exposed to mass media, 70.9% had male household heads, 64% resided in rural areas, and 37.3% and 56.5% were in low literacy level and socioeconomic status communities, respectively.

Association between FGM and MSP

Tables 2 and 3 show the fixed and random effects results of the association between FGM and MSP among women in Mali and Sierra Leone, respectively. In Mali (Table 2), those who had not undergone FGM were less likely to have MSP (aOR=0.60, CI=0.38–0.96) compared with those who had undergone FGM. The odds of MSP decreased with age, with women aged 45–49 (aOR=0.03, CI=0.00-0.22) having lower odds of MSP compared with those aged 15–19. Women with no education (aOR=0.31, CI=0.22–0.45) had lower odds of having MSP, compared with those having higher education. However, women in the poorest wealth quintile (aOR=2.48, CI=1.13–5.48) had higher odds of having MSP, compared with those in the richest wealth quintile. Women in households with male heads had lower odds of having MSP compared with those living in households with female heads (aOR=0.55, CI=0.38–0.79). For the community-level factors, women living in low socioeconomic status communities (aOR=0.30, CI=0.14-0.65) were less likely to have MSP than those in high socioeconomic status communities.

In the Null model, there were substantial but insignificant variations in the likelihood of MSP across the clustering of the PSUs (σ^2=0.83, CI=0.52–1.32) (see Table 2). Model 0 shows that 20% of the total variance in MSP was attributed to between-cluster variation of the characteristics (ICC=0.20). The between-cluster variations decreased by 8% in Model 1 – from 20% in the empty model to 12% in Model I. From Model I, the ICC declined to 10% (ICC=0.10) in Model II but increased to 11% in the complete model (Model III), which had both the individual/household- and community-level factors. With the lowest AIC (1780.626) and highest log-likelihood (–867.31319), Model III was chosen as the best-fit model for predicting MSP among women in Mali.

In Sierra Leone (Table 3), those who had undergone FGM (aOR=1.15, CI=1.02–1.30) were more likely to have MSP, compared with those who had not undergone FGM. The odds of MSP reduced with age, with women aged 45–49 (aOR=O.22, CI=0.18–0.27) being less likely to engage in MSP compared with those aged 15–19. Women with no education (aOR=0.39, CI=0.35–0.4) were less likely to have MSP compared with those with secondary/higher education. Similarly, women in the middle wealth quintile (aOR=1.22, CI=1.01–1.47) were more likely to have MSP, compared with women those in the richest wealth quintile. Furthermore, women who were not exposed to mass media (aOR=0.72, CI=0.65–0.80), those in households with male heads (aOR=0.50, CI=0.46–0.55) and those in low literacy level communities (aOR=0.57, CI=0.45–0.72) had lower odds of MSP.

In the Null model, there were substantial and significant variations in the likelihood of MSP across the clustering of the PSUs (σ^2=0.54, 95% CI=0.45–0.65) (see Table 3). Model 0 shows that 14% of the total variance in MSP was attributed to between-cluster variation of the characteristics (ICC=0.14). The between-cluster variations decreased from 14% to 5% in Model 1. From Model I, the ICC declined further to 4% (ICC=0.04) in Model II but increased to 5% in Model III, which had both the individual/household- and community-level factors. With the lowest AIC (15711.83) and highest log-likelihood (–7832.914), Model III was chosen as the best-fit model for predicting MSP among women in Sierra Leone.

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Table 2. Fixed and random effects results on the association between female genital mutilation and multiple sexual partnership among women in Mali

Variable	Null Model	Model I	Model II	Model III
Female genital mutilation				
No		0.62* (0.39–0.99)		0.60* (0.38–0.96)
Yes		1		1
Age (years)				
15–19		1		1
20–24		0.72* (0.52–1.00)		0.73 (0.52–1.01)
25–29		0.34*** (0.24–0.53)		0.35*** (0.24–0.53)
30–34		0.20*** (0.12–0.34)		0.19*** (0.11–0.33)
35–39		0.13*** (0.06–0.26)		0.13*** (0.06–0.26)
40–44		0.10*** (0.04–0.26)		0.10*** (0.04–0.25)
45–49		0.03*** (0.00–0.23)		0.03*** (0.00–0.22)
Educational level				
No education		0.30*** (0.21–0.43)		0.31*** (0.22–0.45)
Primary		0.58** (0.39–0.85)		0.59** (0.40–0.87)
Secondary/higher		1		1
Wealth quintile				
Poorest		0.69 (0.41–1.16)		2.48* (1.13–5.48)
Poorer		0.43** (0.24–0.76)		1.49 (0.67–3.30)
Middle		0.39*** (0.23–0.65)		1.28 (0.62–2.68)
Richer		0.76 (0.53–0.65)		1.33 (0.87–2.02)
Richest		1		1
Mass media exposure				
No		0.96 (0.61–1.49)		1.04 (0.66–1.62)
Yes		1		1
Sex of household head				
Male		0.55** (0.39–0.80)		0.55** (0.38–0.79)
Female		1		1
Place of residence				
Urban			1	1
Rural			0.92 (0.58–1.45)	0.78 (0.46–1.31)
Community literacy level				
Low			0.56 (0.30–1.05)	0.94 (0.46–1.89)
Medium			0.80 (0.49–1.31)	1.05 (0.61–1.82)
High			1	1
Community socioeconomic status				
Low			0.39** (0.21–0.71)	0.30** (0.14–0.65)

(*Continued*)

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Table 2. (*Continued*)

Variable	Null Model	Model I	Model II	Model III
Moderate			0.35** (0.18–0.70)	0.33** (0.14–0.65)
High			1	1
Random effect results				
PSU variance (95% CI)	0.83 (0.52–1.32)	0.47 (0.24–0.91)	0.35 (0.17–0.74)	0.41 (0.20–0.85)
ICC	0.20	0.12	0.10	0.11
LR test	$\chi^2 = 53.50$, $p<0.001$	$\chi^2 = 17.93$, $p<0.001$	$\chi^2 = 13.46$, $p = 0.001$	$\chi^2 = 14.21$, $p = 0.001$
Wald χ^2		216.43	80.88	231.45
Model fitness				
Log-likelihood	−1023.6432	−879.06194	−985.14368	−867.31319
AIC	2051.286	1794.124	1948.287	1780.626
N	4750	4750	4750	4750

Exponentiated coefficients; 95% confidence intervals (CIs) in brackets; AOR=adjusted Odds Ratios; *N*=sample size; PSU=Primary Sampling Unit; ICC=Intra-Class Correlation; LR test=Likelihood ratio test; AIC=Akaike's Information Criterion.
The Null model is a baseline model without any explanatory variables; Model I is adjusted for individual/household-level variables; Model II is adjusted for the community-level variables; Model III is the final model adjusted for individual/household- and community-level variables.
*$p<0.05$; **$p<0.01$; ***$p<0.001$.

Discussion

Female genital mutilation remains an unending cultural practice that is not only a public health problem but discriminatory against females in many societies globally (WHO, 2008; Wadesango, *et al.*, 2011; Ibekwe, *et al.*, 2012; Pashael, *et al.*, 2012). This study sought to estimate the linkages between FGM and MSP in Mali and Sierra Leone. Preliminary assessment revealed that the prevalence of FGM in Mali (92.2%) and Sierra Leone (89.9%) remain high, with Mali having a higher prevalence than Sierra Leone. This finding is similar to many previous studies in sub-Saharan Africa, which have found that FGM prevalences are high and remain a big problem (Mitike & Deressa, 2009; Guttmacher Institute, 2012; Sipsma *et al.*, 2012; Yirga, *et al.*, 2012; Bjälkander *et al.*, 2013; Abeya, *et al.*, 2017). Socio-cultural beliefs attached to FGM in these countries (e.g. women's social status and the maintenance of family honour, chastity and marriageability) might account for the consistently high figures. The prevalence of MSP among women who have undergone FGM in Mali is low (nearly 6%) compared with that of Sierra Leone (approximately 25%), and similar to that of a recent survey in South Africa, which found the rate of concurrent relationships in the last 12 months to be 5% (Steffenson, 2011). Doyle *et al.* (2012) found the prevalence of MSP to range from 0.4% in Ethiopia and Niger to 12% in Liberia, showing more similarity with the MSP prevalence in Mali than that of Sierra Leone.

The study found that women who had undergone FGM were more likely to engage in MSP. This finding confirms the contention by Van Rossem and Gage (2009) of a strong link between FGM and woman's sexual history, including her age at first sex, the possibility of premarital sex and/or MSP. Other scholars have explained that FGM might trigger a sense of security and encourage 'deviant' sexual behaviour (Hicks, 1993; Gruenbaum, 2001). Apart from these reasons, economics could, in part, explain the variation in the linkages between FGM and MSP in these countries. It is possible that buoyant economic developmental interventions might be more dominant in Mali than in Sierra Leone – a country still recovering from the ravages of civil war (Jang, 2015). Limited economic opportunities might seriously restrict women's autonomy and financial

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Table 3. Fixed and random effects results on the association between female genital mutilation and multiple sexual partnership among women in Sierra Leone

Variable	Null Model	Model I	Model II	Model III
Female genital mutilation				
No		1		1
Yes		1.13* (1.00–1.28)		1.15* (1.02–1.30)
Age (years)				
15–19		1		1
20–24		0.87* (0.78–0.98)		0.86* (0.77–0.97)
25–29		0.49*** (0.43–0.56)		0.48*** (0.42–0.55)
30–34		0.30*** (0.25–0.35)		0.29*** (0.25–0.34)
35–39		0.32*** (0.27–0.37)		0.31*** (0.26–0.36)
40–44		0.29*** (0.24–0.36)		0.29*** (0.24–0.35)
45–49		0.22*** (0.18–0.27)		0.22*** (0.18–0.27)
Educational level				
No education		0.37*** (0.33–0.41)		0.39*** (0.35–0.4)
Primary		0.42*** (0.37–0.48)		0.44*** (0.39–0.49)
Secondary/higher		1		1
Employment status				
Not working		1		1
Working		0.90* (0.82–1.00)		0.92 (0.84–1.02)
Wealth quintile				
Poorest		0.79** 0.67–0.93)		1.18 (0.96–1.45)
Poorer		0.73*** (0.62–0.86)		1.07 (0.87–1.31)
Middle		0.88 (0.76–1.03)		1.22* (1.01–1.47)
Richer		1.03 (0.92–1.17)		1.20** (1.05–1.37)
Richest		1		1
Mass media exposure				
No		0.70*** (0.63–0.77)		0.72*** (0.65–0.80)

(*Continued*)

Table 3. (*Continued*)

Variable	Null Model	Model I	Model II	Model III
Yes		1		1
Sex of household head				
Male		0.49*** (0.45–0.53)		0.50*** (0.46–0.55)
Female		1		1
Place of residence				
Urban			1	1
Rural			0.86 (0.71–1.04)	0.92 (0.74–1.14)
Community literacy level				
Low			0.30*** (0.24–0.37)	0.57*** (0.45–0.72)
Medium			0.58*** (0.48–0.69)	0.74** (0.60–0.90)
High			1	1
Community socioeconomic status				
Low			0.84 (0.65–1.08)	0.93 (0.64–1.24)
Moderate			0.94 (0.76–1.16)	0.94 (0.73–1.20)
High			1	1
Random effect results				
PSU variance (95% CI)	0.54 (0.45–0.65)	0.18 (0.13–0.24)	0.13 (0.09–0.18)	0.16 (0.11–0.21)
ICC	0.14	0.05	0.04	0.05
LR test	$\chi^2 = 803.75$, $p < 0.001$	$\chi^2 = 130.69$, $p < 0.001$	$\chi^2 = 101.03$, $p < 0.001$	$\chi^2 = 108.44$, $p < 0.001$
Wald χ^2		2148.91	535.44	2175.21
Model fitness				
Log-likelihood	−9066.5826	−7859.6325	−8885.3788	−7832.914
AIC	18,137.17	15,755.27	17,784.76	15,711.83
N	16,614	16,614	16,614	16,614

Exponentiated coefficients; 95% confidence intervals (CIs) in brackets; AOR=Adjusted Odds Ratios; *N*=sample size; PSU=Primary Sampling Unit; ICC=Intra-Class Correlation; LR test=Likelihood ratio test; AIC=Akaike's Information Criterion.

The Null model is a baseline model without any explanatory variables; Model I is adjusted for individual/household-level variables; Model II is adjusted for the community-level variables; Model III is the final model adjusted for individual/household- and community-level variables.

*$p<0.05$; **$p<0.01$; ***$p<0.001$.

independence, increasing their vulnerability to having the multiple sexual partners who often provide them with financial and personal support.

The study found that women's age was a strong determinant of MSP, with those aged 15–19 being more likely to have multiple partners than their older counterparts. Given that FGM is commonly believed to boost sexual morality (by promoting premarital chastity, protecting virginity, encouraging marital fidelity and controlling girls'/women's sexuality, as well as being a prerequisite for marriage) and is seen as the cornerstone of moral virtue (Williams-Breault, 2018), there should be a strong relationship between FGM and a girl's/woman's sexual history, including her age at first sex, age at first marriage and likelihood of having premarital sex (Van Rossem & Gage, 2009). According Van Rossem and Gage (2009), a counter-argument to the FGM morality perspective is that FGM does not necessarily provide moral security, but instead gives girls and women a false sense of security and encourages 'deviant', often concealed, sexual behaviour (Hicks, 1993; Gruenbaum, 2001). Therefore, the youthful exuberance and experimentation often seen in adolescent girls and young women might increase their likelihood of early sexual initiation and having multiple sexual partners. This is supported by the anomie theory, which asserts that when people are denied the things that they think are their legitimate rights, they are more likely to indulge in those things by resorting to different mechanisms, some of which are illegitimate (Marks, 1974). From this perspective, when girls are subjected to FGM with the expectation of preventing them from indulging in illicit sexual behaviour (e.g. having multiple sexual partners), they instead feel that society is infringing their rights. Hence, they might initiate sex early and experiment with multiple partners as a way of regaining their rights (Oyefara, 2014). Nnebue *et al.* (2016) reiterated that, as adolescent girls are maturing, they think that they have adequate knowledge and the skills to navigate sexual relationships successfully, and hence might be tempted to explore with multiple partners. However, their rate of sexual experimentation deceases with age.

Women with no education were found to be less likely to have multiple sexual partners compared with their counterparts with secondary or higher education. Women with no formal education tend to live in rural settings and hold on to a self-reinforcing socio-cultural belief in the conventional norm of chastity being associated with marriageability, as part of family honour, dignity and self-respect. These norms might deter them from engaging in negative sexual behaviours, such as having multiple sexual partners. In most indigenous societies in sub-Saharan Africa, uneducated young girls tend to be entrenched in traditional practices that typify group identity and culture, and hence may strongly uphold the traditions of marriage, family and other gender roles (Freymeyer & Johnson, 2007). These women are strongly influenced by living with their elderly relatives and grandparents while learning about issues related to their culture and the need to uphold them through vicarious experiences over time. Therefore, sexual morals (e.g. premarital chastity and marital fidelity) are seen as proof of morality, granting young girls/woman social respect or recognition (Berg & Denison, 2013; Williams-Breault, 2018).

Women in the richest wealth quintile were less likely to have multiple sexual partners compared with those in the poorest–middle wealth quintiles. This finding implies that women's risk of having multiple sexual partners is higher in low–middle wealth households than in rich households, and that better socioeconomic status (wealth) is inversely associated with FGM practice and risky sexual behaviours. While wealth is usually connected with other social parameters (e.g. place of residence and/or household level of education), it undoubtedly remains associated with a decreased risk of FGM and risky sexual behaviour in some countries (Andro *et al.*, 2016). Strong economic and/or working opportunities increase women's autonomy and financial independence, thus reducing their vulnerability to having multiple sexual partners as a source of livelihood. Mmbaga *et al.* (2012) found that adolescents whose parents were wealthier postponed their sexual debut to much later than did those whose parents had a low income. Greater wealth has been found to delay sexual initiation among women (Amo-Adjei & Touyire, 2018). Similarly, women who attend schools of high socioeconomic status tend to delay their sexual initiation

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(Kim, 2015). Well-off women have been shown to have strong decision-making power on negative practices such as FGM and number of sexual partners (Setegn *et al.*, 2016).

Respondents in this study who were exposed to mass media were more likely to have multiple sexual partners. Previous studies in Ethiopia have indicated that young respondents' primary source of information is mass media (Hussein, 2013; Bogale, 2014; Abeya *et al.*, 2017). Mass media exposure promotes the dissemination of health information and other educational campaigns on the harmful effects of the FGM and its associated risky sexual behaviours, including multiple sexual partnership. However, in the present study women from Sierra Leone who were not exposed to the media had lower odds of having multiple sexual partners. It is speculated that media outlets in Sierra Leone might be inadvertently promoting negative behaviours such as the use of aphrodisiacs and alcohol through advertisements, which might encourage negative sexual behaviours. Well-groomed women may stay away from such negative media publicity.

Most of the study respondents reported males as the household head in both study sites. Men, due to the patriarchal norms in sub-Sahara Africa, usually make household decisions and enforce a strict disciplinary code, prohibiting women from engaging in negative sexual practices. Such women are less likely to have multiple partners, especially where FGM might serve as a proxy for family identity, societal respect and honour.

The study had its limitations and strengths. The strengths are that it used nationally representative data to study an important public health issue of global interest and had a large sample size obtained using a multi-stage sampling approach allowing generalization of the findings to the whole population. However, the study's use of cross-sectional survey data made it difficult to establish causality rather associations. In addition, since data on the main independent and dependent variables were taken retrospectively, there is the possibility of recall bias. Also, the data may have been subject to social desirability bias, resulting in the under- or over-reporting of FGM and multiple sexual partnerships by respondents.

The national FGM and MSP prevalences reported in this study could mask significant within- and/or between-country, as well as sub-regional, variations. Understanding these would help refine policies and programmes, and provide useful insights into interventions are working to promote change or help identify specific areas that require modification or adjustment. The marked variance in the prevalence of FGM and MSP across age cohorts will inform policymakers about efforts that need to be put in place to alleviate FGM and MSP. Using this approach might boost the progressive, long-term decline in these practices, especially among the younger generation. More research is required to investigate the possible influences of social changes as a result of increased girls' education, economic development and women's empowerment (Shell-Duncan *et al.*, 2016). Female genital mutilation and sexual behaviours are deeply rooted in complex socio-cultural systems, with diverse common rationales ranging from assurance of girls'/women's social status, marriageability, traditional initiation into womanhood, religious identity in the maintenance of family dignity and respect across many societies (Gruenbaum, 2001; Shell-Duncan *et al.*, 2011). How FGM directly or indirectly influences sexual behaviour within a broader societal social context requires investigation, as does the investigation of the determinants of FGM, and how, for example, social change such as improvement in socioeconomic status education and decision-making might lead to the abandonment of FGM and promote healthy sexual behaviours, among girls/women. Furthermore, qualitative exploration of the unique socio-cultural beliefs and deeper meanings ascribed to FGM within diverse societies, and their patterns of influence on sexual behaviours over time, could provide useful insights about which community-based social reform strategies would be most effective. More research is required in different countries to provide a more reliable and accurate picture of the current situation in sub-Saharan Africa.

In conclusion, this study of the linkages between FGM and multiple sexual partnership among women in Mali and Sierra Leone found that, in both countries, women who had undergone FGM were more likely to have multiple sexual partners, after controlling for potential confounding variables. Other socio-demographic factors, including age, level of education, wealth index, sex of

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household head, community socioeconomic status, mass media exposure and community literacy level, were also found to be associated with the likelihood of having multiple sexual partners among these women. Circumcised girls/women in Mali and Sierra Leone continue to be vulnerable to risky sexual behaviours. Based on the current findings, age-group-based comprehensive risk reduction strategies such as abstinence education and help with decision-making skills (assertiveness training) are needed in these settings to reduce multiple sexual partnership among girls and young women. Anti-FGM legislation and other interventions such as the 'Schooling for the Female Child' initiative, aimed at reducing social inequality among girls/women, particularly economic dependency and educational disadvantage, and the provision of more employment opportunities, might help reduce FGM and health-compromising behaviours such as multiple sexual partnership. These interventions should take into consideration the significant socio-demographic characteristics of girls/women identified in this study.

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Ethical Approval. Ethical clearance was obtained from the Ethics Committee of ORC Macro Inc., as well as the ethics boards of the partner organizations of the two study countries. The DHS follows the standards for ensuring the protection of respondents' privacy. Inner City Fund (ICF) International ensured that the survey complied with the US Department of Health and Human Services regulations for the respect of human subjects. The study employed a secondary analysis of DHS data available in the public domain (www.DHSprogram.com), so no further approval was required. Further information about DHS data usage and ethical standards are available at http://goo.gl/ny8T6X.

References

Abeya SG, Chuluko BG and Gemeda DD (2017) Factors associated with female genital mutilation among women of reproductive age in Gewane Woreda, Afar National Regional State, Ethiopia. *Remedy Open Access* **2**, 1051.

Ahinkorah BO, Hagan JE, Ameyaw EK, Seidu AA, Budu E, Sambah F and Schack T (2020a) Socio-economic and demographic determinants of female genital mutilation in sub-Saharan Africa: analysis of data from demographic and health surveys. *Reproductive Health* **17**(1), 1–14.

Ahinkorah BO, Hagan Jr JE, Seidu AA, Torgbenu E, Budu E and Schack T (2020b) Understanding the linkages between male circumcision and multiple sexual partnership among married Ghanaian men: analysis of data from the 2014 Ghana Demographic and Health Survey. *SSM-Population Health* **11**, 100622.

Aliaga A and Ruilin R (2006) Cluster optimal sample size for Demographic and Health Surveys. In *7th International Conference on Teaching Statistics–ICOTS*, Vol. 7, pp. 2–7.

Almroth L, Almroth-Berggren V, Hassanein OM, El Hadi N, AlSaid SSE, Hasan SSA *et al.* (2001) A community-based study on the change of practice of female genital mutilation in a Sudanese village. *International Journal of Gynecology & Obstetrics* **74**, 179–185.

Ameyaw EK, Tetteh JK, Armah-Ansah EK *et al.* (2020) Female genital mutilation/cutting in Sierra Leone: are educated women intending to circumcise their daughters? *BMC International Health and Human Rights* **20**, 19.

Amo-Adjei J and Tuoyire DA (2018) Timing of sexual debut among unmarried youths aged 15–24 years in sub-Saharan Africa. *Journal of Biosocial Science* **50**(2), 161–177.

Andro A, Lesclingand M, Grieve M and Reeve P (2016) Female genital mutilation: overview and current knowledge. *Population* **71**(2), 217–296.

Berg RC and Denison E (2013) A tradition in transition: factors perpetuating and hindering the continuance of female genital mutilation/cutting (FGM/C) summarized in a systematic review. *Health Care for Women International* **34**(10), 837–859.

Bjälkander O, Grant DS, Berggren B, Bathija H and Almroth B (2013) Female Genital Mutilation in Sierra Leone: forms, reliability of reported status, and accuracy of related Demographic and Health Survey questions. *Obstetrics and Gynecology International* **2013**, 680926. URL: http://doi.org/10.1155/2013/680926

Bogale D, Markos D and Kaso M (2014) Prevalence of female genital mutilation and its effect on women's health in Bale zone, Ethiopia: a cross-sectional study. *BMC Public Health* **14**, 1076.

Cetorelli V, Wilson B, Batyra E and Coast E (2020) Female genital mutilation/cutting in Mali and Mauritania: understanding trends and evaluating policies. *Studies in Family Planning* **51**(1), 51–69.

Corrêa S and Jolly S (2008) Development with a body: making the connections between sexuality, human rights and development. In Cornwall A *et al.* (eds) *Development With a Body: Sexuality, Human Rights and Development*. Zed Books, London, pp. 1–21.

Corsi DJ, Neuman M, Finlay JE and Subramanian SV (2012) Demographic and health surveys: a profile. *International Journal of Epidemiology* **41**(6), 1602–1613.

Doyle AM, Mavedzenge SN, Plummer ML and Ross DA (2012) The sexual behaviour of adolescents in sub-Saharan Africa: patterns and trends from national surveys. *Tropical Medicine & International Health* **17**(7), 796–807.

Evans R (2020) Teaching about Female Genital Mutilation/Cutting in Africa: complex questions of culture, 'development' and human rights. *Journal of Geography in Higher Education* **44**(2), 230–247.

Exavery A, Kanté AM, Tani K, Hingora A and Phillips JF (2015) Sociodemographic drivers of multiple sexual partnerships among women in three rural districts of Tanzania. *HIV/AIDS (Auckland, NZ)* **7**, 105.

Fiaveh DY (2011) Male perspective(s) on condom use: context of STI/HIV prevention in the University of Ghana community. *Journal of Public Health and Epidemiology* **3**(1), 17–27.

Freymeyer RH and Johnson BE (2007) An exploration of attitudes toward female genital cutting in Nigeria. *Population Research and Policy Review* **26**(1), 69–83.

Gaffoor Z, Wand H, Street RA, Abbai N and Ramjee G (2016) Predictors of perceived male partner concurrency among women at risk for HIV and STI acquisition in Durban, South Africa. *AIDS Research and Therapy* **13**(1), 14.

Groeneveld AE (2013) Female genital mutilation: tradition versus human rights. *African Journal of Urology* **19**(3), 134–135.

Gruenbaum E (2001) *The Female Circumcision Controversy: An Anthropological Perspective*. University of Pennsylvania Press, Philadelphia, PA.

Guttmacher Institute (2012) Prevalence of female genital cutting varies greatly in Western Africa. *International Perspective on Sexual and Reproductive Health* **38**(2), 110–111.

Hernlund Y and Shell-Duncan B (2007) *Transcultural Bodies Female Genital Cutting in Global Context*. Rutgers University Press, New Brunswick, NJ.

Hicks EK (1993) *Infibulation: Female Mutilation in Islamic Northeastern Africa*. Transaction, New Brunswick, NJ.

Hussein M, Abdi A and Mohammed M (2013) Knowledge, attitude and practice of female genital mutilation among women in Jigjiga Town, Eastern Ethiopia. *Gaziantep Med Journal* **19**(3), 164–168.

Ibekwe Perpetus C, Onoh Robinson C, Onyebuchi Azubike K, Ezeonu Paul O and Ibekwe Rosemary O (2012) Female genital mutilation in Southeast Nigeria: a survey on the current knowledge and practice. *Journal of Public Health and Epidemiology* **4**(5), 117–122.

Jang SY (2015) *The Causes of the Sierra Leone Civil War*. E-International Relations Students. URL: https://www.e-ir.info/2012/10/25/the-causes-of-thesierra-leone-civil-war-underlying-grievances-and-the-role-of-the-revolutionaryunited-front (accessed 20th February 2021).

Jones SD, Ehiri J and Anyanwu E (2004) Female genital mutilation in developing countries: an agenda for public health response. *European Journal of Obstetrics and Gynecology and Reproductive Biology* **116**, 144–151.

Kim J (2015) School socioeconomic composition and adolescent sexual initiation in Malawi. *Studies in Family Planning* **46**(3), 263–279.

Makhlouf Obermeyer C (2005) The consequences of female circumcision for health and sexuality: an update on the evidence. *Culture, Health & Sexuality* **7**(5), 443–461.

Marks SR (1974) Durkheim's theory of anomie. *American Journal of Sociology* **80**(2), 329–363.

Mitike G and Deressa W (2009) Prevalence and associated factors of female genital mutilation among Somali refugees in eastern Ethiopia: a cross-sectional study. *BMC Public Health* **9**, 264.

Mlambo MG, Peltzer K and Chirinda W (2016) Predictors of multiple concurrent and multiple sexual partnerships among male and female youth aged 18–24 in South Africa. *Journal of Psychology in Africa* **26**(2), 156–163.

Mmbaga EJ, Leonard F and Leyna GH (2012) Incidence and predictors of adolescent's early sexual debut after three decades of HIV interventions in Tanzania: a time to debut analysis. *PLoS One* **7**(7), e41700.

Mpofu S, Odimegwu C, De Wet N, Adedini S and Akinyemi J (2017) The relation of female circumcision to sexual behavior in Kenya and Nigeria. *Women & Health* **57**(7), 757–774.

Mulongo P, McAndrew S and Hollins Martin C (2014) Crossing borders: discussing the evidence relating to the mental health needs of women exposed to female genital mutilation. *International Journal of Mental Health Nursing* **23**(4), 296–305.

Njue C, Karumbi J, Esho T, Varol N and Dawson A (2019) Preventing female genital mutilation in high income countries: a systematic review of the evidence. *Reproductive Health* **16**(1), 113.

Nnebue CC, Chimah UC, Duru CB, Ilika AL and Lawoyin TO (2016) Determinants of age at sexual initiation among Nigerian adolescents: a study of secondary schools' students in a military barracks in Nigeria. *American Journal of Medical Sciences and Medicine* **4**(1), 1–7.

Oyefara LJ (2014) Female genital mutilation (FGM) and theory of promiscuity: myths, realities and prospects for change in Oworonshoki Community, Lagos State, Nigeria. *Genus* **70**(2–3), 7–33.

Pashael T, Rahimi A, Ardaian A, Felah A and Majiessi F (2012) Related factors of Female Genital Mutilation (FGM) in Ravansar (Iran). *Journal of Women's Health Care* **1**(2), http://doi.org/10.4172/2167-0420.1000108

Rajadurai H and Igras S (2005) *CARE's Experiences Working with Communities Toward Abandonment of Female Genital Cutting (FGC)*. CARE, Atlanta, GA.

Setegn T, Lakew Y and Deribe K (2016) Geographic variation and factors associated with female genital mutilation among reproductive age women in Ethiopia: a national population-based survey. *PloS One* **11**(1), e0145329.

Shaaban LM and Harbison S (2005) Reaching the tipping point against female genital mutilation. *Lancet* **366**, 347–349.

Shell-Duncan B, Naik R and Feldman-Jacobs C (2016) *A State-Of-The-Art Synthesis on Female Genital Mutilation/Cutting: What Do We Know Now?* Population Council, New York.

Shell-Duncan B, Wander K, Hernlund Y and Moreau, A (2011) Dynamics of change in the practice of female genital cutting in Senegambia: testing predictions of social convention theory. *Social Science & Medicine* **73**(8), 1275–1283.

Sipsma HL, Chen GP, Ofori-Atta A, Ilozumba UO, Karfo K and Bradley EH (2012) Female genital multilation: current practices and beliefs in West Africa. *Bulletin of the World Health Organization* **80**, 120–127.

Solanke BL, Oyinlola FF, Oyeleye OJ and Ilesanmi BB (2019) Maternal and community factors associated with unmet contraceptive need among childbearing women in Northern Nigeria. *Contraception and Reproductive Medicine* **4**(1), 11.

Solanke BL and Rahman SA (2018) Multilevel analysis of factors associated with assistance during delivery in rural Nigeria: implications for reducing rural-urban inequity in skilled care at delivery. *BMC Pregnancy and Childbirth* **18**(1), 438.

Steffenson AE, Pettifor AE, Seage GR 3rd, Rees HV and Cleary PD (2011) Concurrent sexual partnerships and human immunodeficiency virus risk among South African youth. *Sexually Transmitted Diseases* **38**(6), 459–466.

UNICEF (2013) *Female Genital Mutilation/Cutting: A Statistical Overview and Exploration of the Dynamics of Change*. UNICEF, New York.

UNICEF (2016) *Female Genital Mutilation/Cutting: A Global Concern*. UNICEF, New York.

UNICEF (2018) *Female Genital Mutilation*. URL: https://data.unicef.org/topic/child-protection/female-genital-mutilation/ (accessed 9th August 2020).

Van Rossem R and Gage AJ (2009) The effects of female genital mutilation on the onset of sexual activity and marriage in Guinea. *Archives of Sexual Behavior* **38**(2), 178–185.

Van Rossem R, Meekers D and Gage AJ (2015) Women's position and attitudes towards female genital mutilation in Egypt: a secondary analysis of the Egypt demographic and health surveys, 1995–2014. *BMC Public Health* **15**, 874.

Wadesango N, Rembe S and Chabaya O (2011) Violation of women's rights by harmful traditional practices. *Anthropologist* **13**(2), 121–129.

WHO (2008) *Eliminating Female Genital Mutilation: An Interagency Statement*. Technical Report, Department of Women's Health, WHO, Geneva.

WHO (2013) *Female Genital Mutilation*. World Health Organization, Geneva. URL: http://who.int/mediacentre/factsheets/fs241/en (accessed 17th July 2020).

WHO (2020) *Female Genital Mutilation*. World Health Organization, Geneva. URL: http://www.who.int/news-room/fact-sheets/detail/female-genital-mutilation (accessed 29th March 2020).

Williams-Breault BD (2018) Eradicating female genital mutilation/cutting: human rights-based approaches of legislation, education, and community empowerment. *Health and Human Rights Journal* **20**(2), 223–233.

Yirga WS, Kassa NA, Gebremichael MW and Aro AR (2012) Female genital mutilation: prevalence, perceptions and effect on women's health in Kersa district of Ethiopia. *International Journal of Women's Health* **4**, 45–54.

Yoder PS, Camara PO and Soumaoro B (1999) *Female Genital Cutting and Coming of Age in Guinea*. Macro International Inc., Calverton, MD.

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