

Effects of antenatal care visits and health facility delivery on women's choice to circumcise their daughters in sub-Saharan Africa: evidence from demographic and health surveys

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Background: This study examines the association between maternal healthcare service utilisation and circumcision of daughters in sub-Saharan Africa (SSA).

Methods: This study is based on a cross-sectional study design that draws on analysis of pooled data from current demographic and health surveys conducted between 2010 and 2019 in 12 countries in SSA. Both bivariate and multivariable binary logistic regression models were employed.

Results: Mothers who had four or more antenatal care visits were less likely to circumcise their daughters compared with those who had zero to three visits. Mothers who delivered at a health facility were less likely to circumcise their daughters than those who delivered at home. With the covariates, circumcision of daughters increased with increasing maternal age but decreased with increasing wealth quintile and level of education. Girls born to married women and women who had been circumcised were more likely to be circumcised.

Conclusions: This study established an association between maternal healthcare service utilisation and circumcision of girls from birth to age 14 y in SSA. The findings highlight the need to strengthen policies that promote maternal healthcare service utilisation (antenatal care and health facility delivery) by integrating female genital mutilation (FGM) information and education in countries studied.

Keywords: antenatal care visits, health facility delivery, female genital mutilation, sub-Saharan Africa.

Introduction

Female genital mutilation (FGM) is a global public health issue, with high concentrations in Africa, the Middle East and some Asian countries.^{1,2} FGM involves the partial or total removal of external female genitalia or other injury to the female genital organs for non-medical reasons.³ Varied reasons are given for its practise in prevalent countries, including sociocultural, psychosexual, hygienic and religious beliefs.⁴ Globally, according to the United Nations Children's Fund,⁵ at least 200 million girls and women alive today have undergone some form of FGM in 30 countries across Africa and the Middle East and 30 million girls are at risk in the next decade. Statistics also show that one in three girls 15–19 y of age today have undergone FGM compared

with one in two girls 30 y ago in countries with nationally representative prevalence data.⁶ FGM is mainly performed on babies and girls from a few months to 14 y of age. In most cases, it is performed on girls before their 18th birthday.⁵

Studies have identified four types of FGM: type 1, partial or total removal of the clitoris and/or the prepuce; type 2, partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora; type 3, narrowing the vaginal opening through the creation of a covering seal; and type 4, all other harmful procedures to the female genitalia for non-medical purposes, such as piercing, pricking and scraping.^{7,8}

FGM is often associated with several complications, including severe pain (usually when anaesthetic agents are absent), acute urinary retention, vaginal lacerations at coitus and haemorrhage

inter alia.^{3,9,10} Thus FGM in the long term may result in poor quality of life, death or both.¹¹

Sustainable Development Goal (SDG) 5.3 focuses on eliminating all harmful practices, such as child, early and forced marriage and female genital mutilations by 2030.¹² To achieve this goal, attention must be focused on FGM among daughters of mothers of reproductive age, who are the next generation of women. In sub-Saharan Africa (SSA),¹³ the prevalence of FGM among daughters of women of reproductive age ranges from 3% in Kenya to 75% in Mali.¹⁴

The use of maternal healthcare services, including antenatal care (ANC) visits and health facility delivery, is considered a significant indicator to improve maternal and child health.^{15,16} For instance, adequate and timely ANC attendance gives women the opportunity to obtain useful pregnancy and childbirth-related information, health promotion, screening and diagnosis and disease prevention.^{17–20} Delivery in a health facility also protects women from risks such as desertion of colostrum provision and breastfeeding practices, neglect of immunisations and nutrition supplementation for mother and child.^{21–23} Health facility delivery also enhances postnatal care check-ups for children and mothers.^{21–23}

In the absence of country-specific ANC guidelines, ANC service provision across sub-Saharan African countries rely on the World Health Organization's (WHO) guidelines. Unfortunately the WHO guidelines on ANC do not mention FGM or make any provision for women to be educated on FGM as part of ANC services.¹⁸ This may reduce women's chances of receiving the right information about the practice and its consequences. Although some concerned healthcare providers may provide ad hoc FGM information, education and advice to expectant mothers, that approach to education may not be compelling enough compared with incorporating FGM education into focused ANC.

Studies have shown that educated women are more likely to support the discontinuation of FGM compared with non-educated women²⁴ and are less likely to intend to circumcise their daughters.²⁵ Other studies have found an association between higher levels of education and circumcision of daughters of women of reproductive age.^{26–28} Due to the health education given to women during ANC and health facility delivery,^{29,30} it can be argued that women who utilise ANC and health facility delivery services will be less likely to circumcise their daughters. However, no study has been conducted in SSA to understand if ANC attendance and health facility delivery protect against the circumcision of daughters of mothers of reproductive age. The aim of this study was to examine the association between maternal healthcare services utilisation and circumcision of daughters of mothers of reproductive age in SSA. The hypothesis that guided the study is that mothers who have four or more ANC visits and delivered at a health facility are less likely to circumcise their daughters.

Methods

Study design

This study was based on a cross-sectional study design derived from an analysis of pooled data from current Demographic and Health Surveys (DHSs) conducted between 1 January 2010 and 31 December 2019 in 12 countries in SSA. The countries included

in this study were Burkina Faso, Senegal, Togo, Nigeria, Niger, Mali, Guinea, Chad, Sierra Leone, Kenya, Ethiopia and Tanzania. These countries were included in this study because they featured a question asking mothers who had daughters the number of their daughters who had undergone FGM. Hence countries with datasets published between 2010 and 2019 that did not question circumcision practices for daughters were excluded. The DHS is a nationwide survey collected every 5 y across low- and middle-income countries (LMICs). This survey provides nationally representative data on core maternal and child health indicators such as the circumcision of daughters.³¹ To ensure the consistency in data collection across countries, the DHS uses a standard questionnaire for data collection, and the questionnaires are often translated into the major local languages of the countries involved.³¹ To ensure the validity of the translated questionnaires, the translated questionnaires together with the version in English are pretested in English and the local dialect. After that, the pretest field staff actively discusses the questionnaires and makes suggestions to modify all versions. Following field practice, debriefing sessions are held with the pretest field staff and modifications to the questionnaires are made based on lessons drawn from the exercise.^{19,31} In order to avoid data inaccuracies, the DHS Program has adopted a policy of editing results in a data file that accurately reflects the population studied and may be readily used for analysis.³¹ This policy, which includes applying sampling weights and handling missing cases, was adopted in this study.

Study population and sampling

The target population for this study was mothers of reproductive age (15–49 y) who had at least one daughter at the time of the survey. To sample participants, a stratified dual-stage sampling approach was employed and the same questions were posed to women in all 12 countries, which made it feasible as a multi-country study.³¹ The study involved a cluster sampling process (i.e. enumeration areas [EAs]), followed by systematic household sampling within the selected EAs. The sample frame usually excludes nomadic and institutional groups such as prisoners and hotel occupants. In this study, a sample of 68 775 mothers of reproductive age who had at least one daughter and completed information on FGM of daughters was considered in the analysis. Details of the weighted sample distribution and their proportions for each country are provided in Table 1.

Studied variables

Outcome variable

The outcome variable in this study was the circumcision of daughters. In the DHS, this variable was derived from a question asking mothers who had at least one daughter how many of their daughters¹³ had their genital area 'nicked with nothing removed', 'something removed' or 'sewn shut'. The response ranged from no daughters to 1–7 daughters. A binary outcome was created from these responses by grouping mothers who said none of their daughters went through FGM into the category 'No' and those who had at least one daughter circumcised into the 'Yes' category.

Table 1. Distribution of the study sample by country

Countries	Year	Weighted N	Weighted %
Burkina Faso	2010	10 419	15.15
Chad	2015	5763	8.38
Ethiopia	2016	3464	5.04
Guinea	2018	5431	7.90
Kenya	2014	6649	9.66
Mali	2018	3209	4.67
Niger	2012	2612	3.80
Nigeria	2018	7675	11.16
Senegal	2010–2011	7068	10.28
Sierra Leone	2019	7020	10.21
Tanzania	2016	6022	8.76
Togo	2013–2014	3448	5.01
All countries		68 775	100.00

Explanatory variables

Two main explanatory variables were considered in this study. These were the number of ANC visits and place of delivery. The number of ANC visits was defined as the number of times a woman 15–49 y of age with a live birth in a given time period attended ANC visits. This was categorised into zero to three visits and four or more visits based on the WHO's recommended number of ANC visits.¹⁸ The place of delivery was grouped into home and health facility delivery. Home delivery was described as any birth that took place in the woman's home or another's home. Health facility delivery referred to any birth that took place in a governmental health post, health centre, hospital, private clinic or maternity home.³²

Covariates

Nine variables were selected as covariates in this study. These were age (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49), wealth quintile (poorest, poorer, middle, richer, richest), education level (no education, primary, secondary/higher), marital status (never married, married, cohabitation, widowed/divorced/separated), place of residence (urban, rural), exposure to a newspaper (yes, no), exposure to radio (yes, no), exposure to television (yes, no) and mother's circumcision status (yes, no). The selection of these variables was based on their significant association with circumcision of daughters in previous studies.^{26–28}

Statistical analyses

The analyses began with computation of the prevalence of circumcision of daughters, four or more ANC visits and health facility delivery using forest plots. The χ^2 test of independence followed this to show the independent association between the explanatory variables, covariates and circumcision of daughters. Both bivariate and multivariable binary logistic regression models were consequently used to show the effect of four or more ANC visits and health facility delivery on the circumcision of daughters in

each country considered in this study. The results were presented as crude odds ratios (cORs) and adjusted odds ratios (aORs) with 95% confidence intervals (CIs). Sample weights were applied using the variable v005/1 000 000, and the survey command (svy) in Stata (version 14; StataCorp, College Station, TX, USA) was used to adjust for the complex sampling structure of the data in the regression analyses. The manuscript was prepared in line with the Strengthening Reporting of Observational Studies in Epidemiology guidelines.³³ All the statistical analysis was done in Stata.

Ethical approval

The DHSs have ethical clearance from the Ethics Committee of ORC Macro and the ethics boards of partner organisations of the various countries, such as the ministries of health. During each of the surveys, women provided either written or verbal consent. Since the authors did not collect the data, permission from the Monitoring and Evaluation to Assess and Use Results (MEASURE) DHS website and access to the data was requested and approved. The dataset is freely available at dhsprogram.com/data/available-datasets.cfm.

Results

Prevalence of four or more ANC visits in SSA

In the 12 sub-Saharan African countries, the overall prevalence of completion of four ANC visits was 49.8%. The prevalence was highest in Sierra Leone (90.7%) and lowest in Ethiopia (31.9%) (Figure 1).

Prevalence of health facility delivery in SSA

As shown in Figure 2, the prevalence of health facility delivery in the 12 countries considered in this study was 60.4%, with the highest prevalence in Sierra Leone (84.5%) and the lowest prevalence in Chad (25.6%).

Prevalence of circumcision of daughters in SSA

On average, 15.5% of mothers had at least one daughter circumcised in the 5 y prior to the survey. The highest prevalence was in Mali (60.7%) and the lowest prevalence was in Tanzania (0.3%) (Figure 3).

Association between independent variables and circumcision of daughters

Of the 68 775 mothers included in this study, most of them had four or more ANC visits (50.89%), delivered at a health facility (62.17%), were 25–29 y of age (26.21%), were in the poorest wealth quintile (20.58%), had no formal education (54.72%), were married (84.42%), lived in rural areas (68.31%), had no exposure to newspapers/magazines (86.81%), had exposure to radio (61.81%), had no exposure to television (60.98%) and were circumcised (52.70%) (Table 2).

Table 2. Association between independent variables and circumcision of daughters

Variables	Weighted N	Weighted %	At least one daughter circumcised	χ^2	p-Value
Number of ANC visits				179.54	<0.001
0–3	33 774	48.11	17.18		
≥4	35 001	50.89	11.60		
Place of delivery				348.91	<0.001
Home	26 020	37.83	20.30		
Health facility	42 755	62.17	10.71		
Age (years)				182.50	<0.001
15–19	4755	6.91	5.22		
20–24	14 594	21.22	7.99		
25–29	18 025	26.21	12.58		
30–34	14 020	20.39	17.95		
35–39	10 440	15.18	20.31		
40–44	5121	7.45	21.60		
45–49	1819	2.64	24.05		
Wealth quintile				68.83	<0.001
Poorest	14 157	20.58	19.27		
Poorer	13 791	20.05	16.08		
Middle	13 664	19.87	15.39		
Richer	13 857	20.15	12.49		
Richest	13 306	19.35	8.14		
Education level				569.37	<0.001
None	37 631	54.72	20.66		
Primary	17 387	25.28	6.46		
Secondary/higher	13 757	20.00	7.02		
Marital status				269.78	<0.001
Never married	3148	4.58	1.79		
Married	58 058	84.42	16.26		
Cohabiting	4097	5.96	2.64		
Widowed/divorced/separated	3472	5.05	7.41		
Place of residence				106.26	<0.001
Urban	21 795	31.69	9.53		
Rural	46 980	68.31	16.57		
Exposure to newspaper/magazine				576.31	<0.001
No	59 705	86.81	15.97		
Yes	9070	13.19	3.60		
Exposure to radio				66.63	<0.001
No	26 266	38.19	16.64		
Yes	42 509	61.81	12.92		
Exposure to television				52.22	<0.001
No	41 937	60.98	15.73		
Yes	26 838	39.02	12.16		
Mother circumcised				1441.75	<0.001
No	32 533	47.30	2.91		
Yes	36 242	52.70	24.61		

Effect of maternal healthcare utilisation on circumcision of daughters

As shown in model 1 of Table 3, mothers who had four or more ANC visits were less likely to circumcise their daughters compared with those who had zero to three ANC visits (cOR 0.63 [95% CI 0.59 to 0.68]). This persisted with increased odds after control-

ling for covariates (aOR 0.89 [95% CI 0.83 to 0.96]). In relation to place of delivery, mothers who delivered at a health facility were less likely to circumcise their daughters compared with those who delivered at home (cOR 0.47 [95% CI 0.43 to 0.51]), and this persisted with increased odds after controlling for covariates (aOR 0.58 [95% CI 0.48 to 0.57]). With the covariates, circumcision of daughters increased with increasing maternal age but decreased

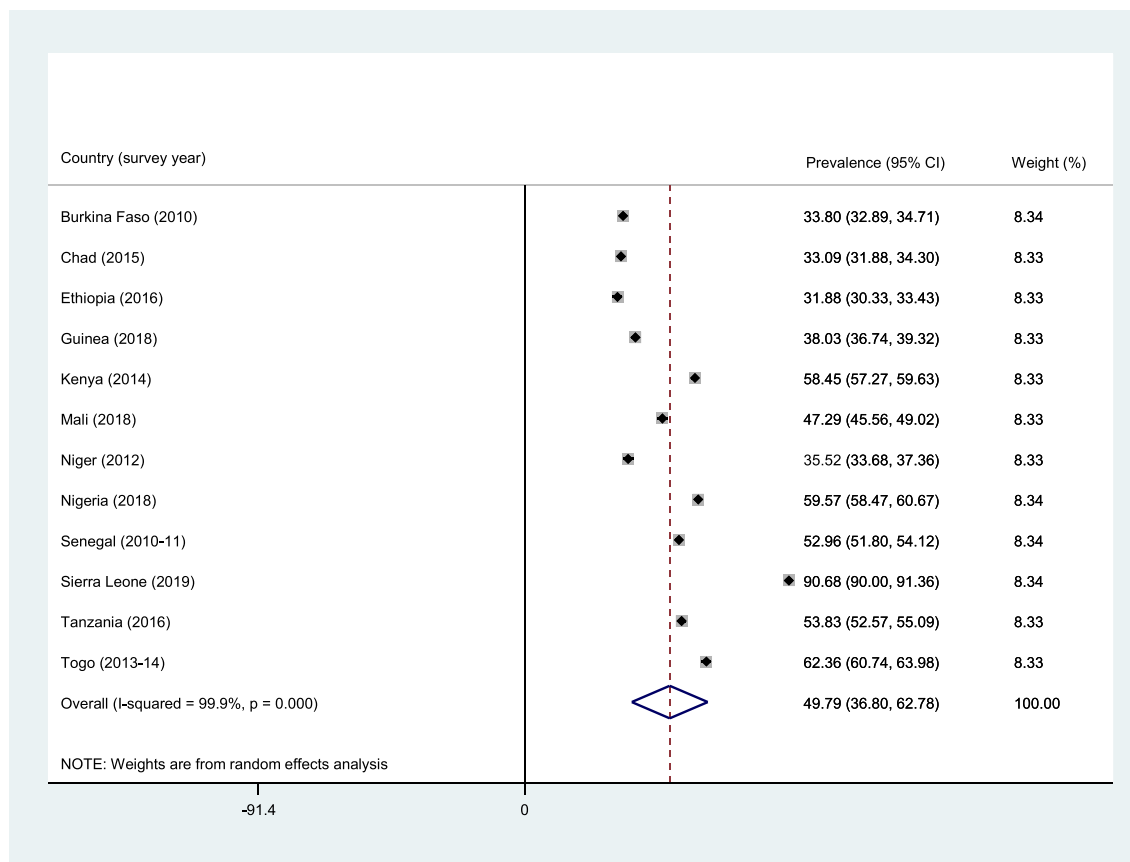


Figure 1. Proportion of women with four or more ANC visits.

with increasing wealth quintile and level of education. Girls born to married women and women who had been circumcised were more likely to be circumcised compared with those born to never-married women and women who were not circumcised. When the results were disaggregated by country, the odds of circumcision of daughters were lower among mothers who had four or more ANC visits in Burkina Faso, Kenya and Sierra Leone but were higher among women in Guinea (model 2 of Table 4). In terms of place of delivery, mothers who delivered at a health facility were less likely to circumcise their daughters in Burkina Faso, Chad, Ethiopia, Guinea, Niger, Nigeria and Senegal (model 4 of Table 4).

Discussion

The hypothesis that guided this study was that mothers who had four or more ANC visits and those who delivered at a health facility are less likely to circumcise their daughters. To test this hypothesis, this study looked at the prevalence of four or more ANC visits, health facility delivery and circumcision of daughters in all countries considered. Overall, the prevalence of four or more ANC visits in the 12 included countries was <50%, with the lowest prevalence in Ethiopia. Most mothers delivered at a health facility and the lowest prevalence of health facility delivery was observed in

Chad (12.3%). Approximately 15% of the mothers had circumcised their daughters, with the highest prevalence of circumcision of daughters occurring in Mali (60.73%).

In this study, the prevalence of four or more ANC visits was low. However, health facility delivery was high. The low prevalence of four or more ANC visits in SSA is consistent with the findings of previous studies³⁴ but contradicts the results of a recent study among women in SSA that had a pooled prevalence of >50% for four or more ANC visits.³⁵ The lowest prevalence of ANC was found in Ethiopia,³⁶⁻³⁹ and this supports the findings of previous studies in Ethiopia.³⁶⁻³⁹ This finding could possibly be attributed to inadequate access to healthcare services, especially in rural areas.^{40,41}

Consistent with the findings of previous studies,⁴²⁻⁴⁴ a high prevalence of health facility delivery was found in this study. A high prevalence of health facility delivery in SSA indicates the efforts of countries within the subregion to achieve SDG 3.8—an important target in attaining universal health coverage—by tracking financial protection and coverage of essential health services, including improved access to safe, effective and affordable essential medicines and vaccines for all individuals.⁴²

Chad recorded the lowest prevalence of health facility delivery, which is consistent with the findings of previous studies.^{43,45} The possible reason for the low prevalence of health facility delivery in Chad could relate to challenges emanating from limited infrastructure and health financing mechanisms in the country.⁴⁶

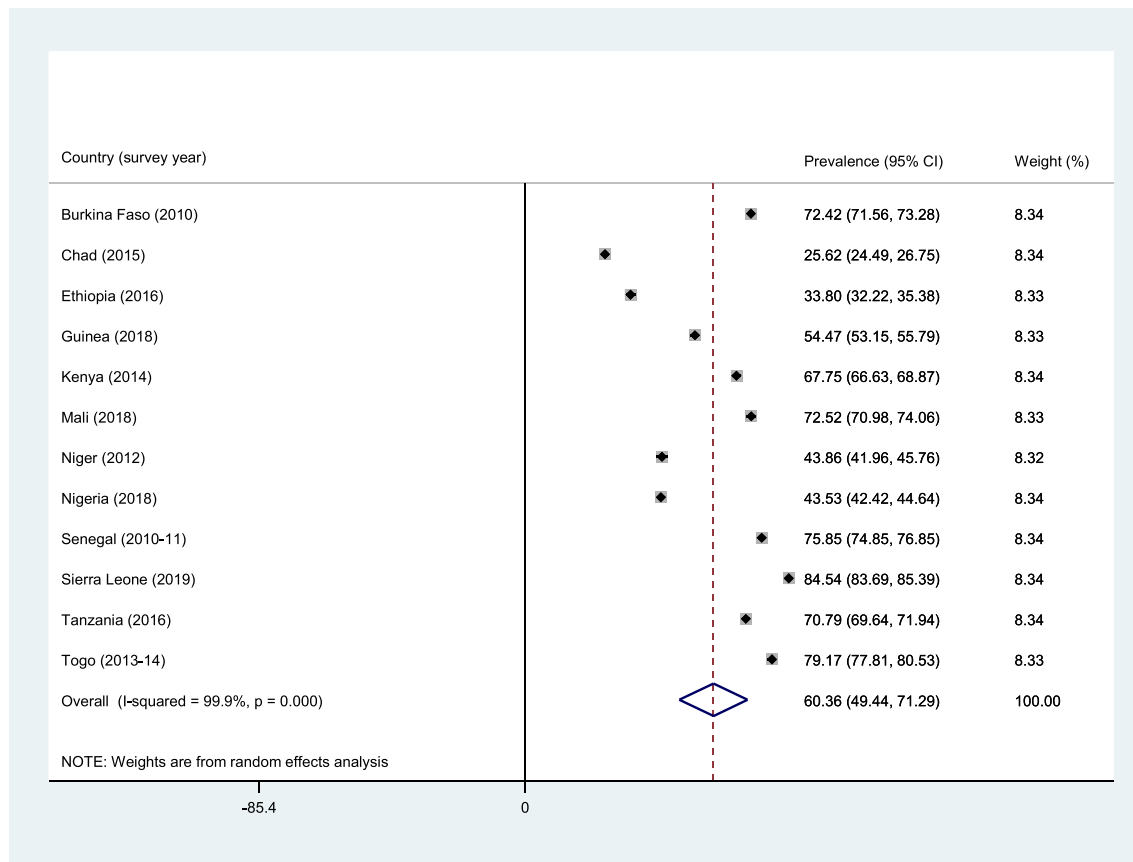


Figure 2. Proportion of women who delivery at a health facility.

Overall, this study found that >15% of daughters of women of reproductive age had been circumcised. Similar findings were obtained in previous studies.^{26,47,48} However, the prevalence of circumcision of daughters found in the current study is relatively higher than in previous studies. The possible reason could be the sample sizes and the study period.

The findings of the current study are consistent with previous research in identifying Mali as the country with the highest prevalence of circumcision of daughters.^{26,47-50} The high prevalence in Mali could be attributed to a number of factors. Legally, there is no law against FGM in Mali, even though the country has endorsed some international resolutions, such as the International Day of Zero Tolerance for FGM, to raise awareness of efforts to eradicate FGM.⁴⁹ In Mali, the practice of FGM is buried in social norms, meaning people who are willing to stop the practice continue to perpetuate it for fear of being ostracised by other community members. Thus many people who might want to abolish the practice are forced by societal norms to continue.⁵⁰

In terms of the effect of ANC and health facility delivery on circumcision of daughters, the study found that mothers who had four or more ANC visits and delivered at a health facility were less likely to circumcise their daughters across SSA. The same observation was made at the country-specific level. A possible reason could be the pregnancy and childbirth-related

information given to women during ANC and delivery.¹⁷⁻²⁰ The findings may suggest that medicalisation of FGM (FGM performed by a doctor, nurse, midwife or other health professional) is not prevalent in SSA, although reports indicate that some health professionals engage in the practice in Nigeria, Sudan, Mali and other sub-Saharan African countries.⁵¹⁻⁵³ In 2010, the WHO developed a strategy to stop healthcare professionals from performing FGM by engaging them to support abandonment of the practice.⁵⁴ The WHO, United Nations Population Fund and ministries of health of the included countries may have to persist in dissuading healthcare professionals from performing FGM. The findings also highlight the need for anti-FGM interventions to be merged with maternity healthcare (i.e. ANC and health facility delivery advocacy programs). Human rights-based institutions focusing on FGM abandonment across SSA may have to collaborate with various governments and ministries of health of the countries studied to ensure greater impact. This may be extremely useful within the subregion, as FGM appears to be culturally entrenched and widely acceptable in several countries, including Guinea, Sierra Leone and Mali.^{25,49,55,56} Surprisingly, women who had four or more ANC visits were more likely to circumcise their daughters compared with those with fewer than four ANC visits in Guinea. This finding calls for further research in Guinea to unearth factors that explain the positive association between four or more ANC visits and circumcision of girls 0-14 y of age.

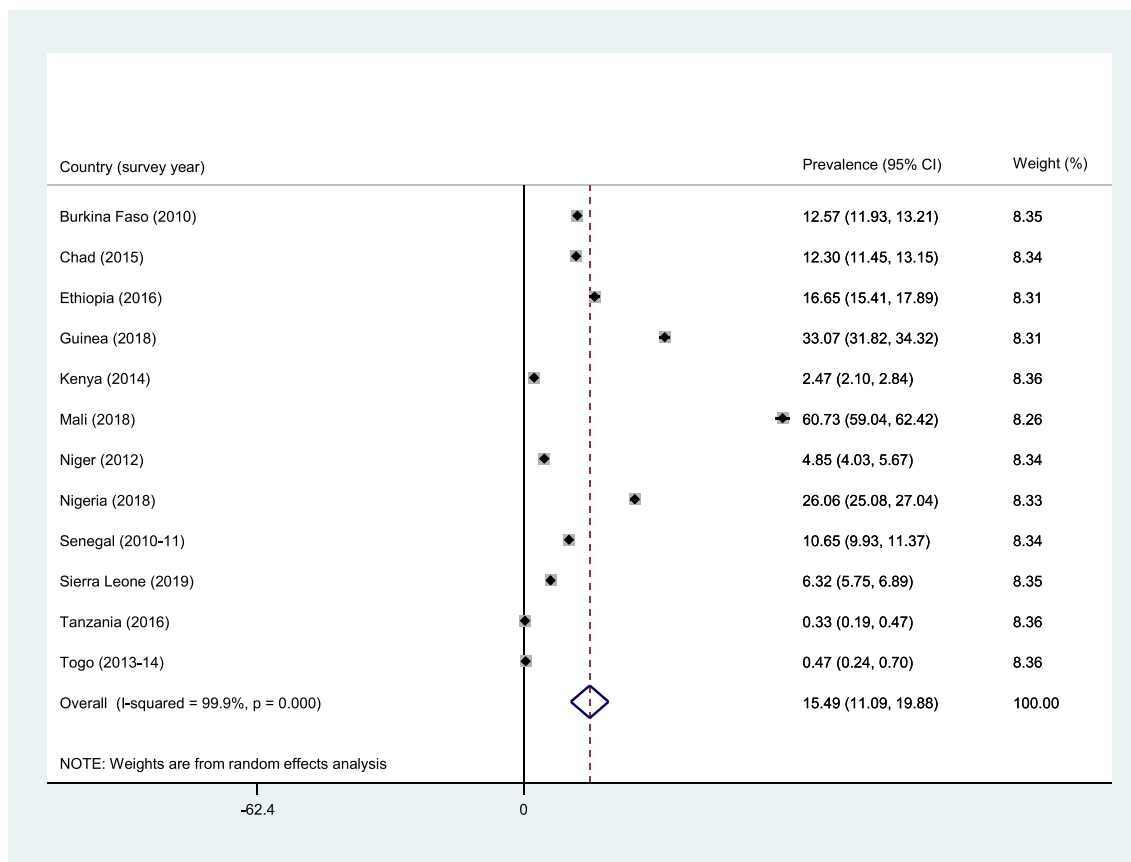


Figure 3. Proportion of women with at least one daughter circumcised.

With the covariates, circumcision of daughters increased with increasing maternal age but decreased with increasing wealth quintile and level of education. Girls born to married women and women who have been circumcised were more likely to be circumcised compared with those born to never-married women and women who were not circumcised. These findings are in line with the findings of previous studies that identified improved socio-economic status as protective against the circumcision of girls, while demographic factors such as increasing age, being married and a woman's experience of FGM increase the likelihood of circumcision of daughters.^{26,28,57} These findings imply that eliminating FGM in SSA goes beyond encouraging ANC attendance and health facility delivery to improving the socio-economic status of women and educating married, circumcised and older women about the negative effects of this cultural practice.

Strengths and limitations

A major strength of this study is the use of large, nationally representative datasets of 12 countries in SSA to examine the association between maternal healthcare services utilisation and circumcision of girls ages 0–14 y. The large sample size made it possible to use high-level statistical analyses that reinforce the accuracy of the findings. Despite these strengths, there are some

inherent limitations in this study. The design employed in the DHS is cross-sectional, therefore causal interpretations of the findings cannot be established. Second, circumcision of daughters of childbearing women were self-reported, creating the possibility of under- and/or overreporting of data.^{58–60} Finally, the wide differences in survey years can limit the comparability of the findings since modernization may have an impact on the choice to circumcise daughters in more current surveys compared with older ones.

Implications for policy and practice

The findings have significant policy and practical implications. The study points to the need for a strong integration between maternal healthcare and FGM interventions to maximise gains. As FGM generally occurs among women of reproductive age, a synergy between anti-FGM campaigns and maternal healthcare can help reach a wider audience and have a greater impact. Audio-visual aids can be developed and displayed/posted within maternity healthcare units of health facilities. These may concentrate on some short-, medium- and long-term consequences of FGM on victims. As women see these constantly within the health facility setting, they may be conscious of FGM and possibly reconsider their position on it, even if they are perpetrators or advocates. Political commitment is key in these initia-

Table 3. Results on the binary logistic regression analysis of the effect of maternal healthcare utilisation on circumcision of daughters

Variables	One or more daughters has had FGM	
	Model 1, cOR (95% CI)	Model 2, aOR (95% CI)
Number of ANC visits		
0–3	Reference	Reference
≥4	0.63*** (0.59 to 0.68)	0.89** (0.83 to 0.96)
Place of delivery		
Home	Reference	Reference
Health facility	0.47*** (0.43 to 0.51)	0.52*** (0.48 to 0.57)
Age (years)		
15–19	Reference	Reference
20–24	1.58*** (1.33 to 1.87)	1.71*** (1.43 to 2.03)
25–29	2.61*** (2.22 to 3.08)	2.75*** (2.32 to 3.26)
30–34	3.97*** (3.35 to 4.71)	4.13*** (3.46 to 4.94)
35–39	4.63*** (3.87 to 5.53)	4.65*** (3.87 to 5.59)
40–44	5.00*** (4.16 to 6.01)	4.81*** (3.99 to 5.79)
45–49	5.75*** (4.66 to 7.09)	4.94*** (3.97 to 6.14)
Wealth quintile		
Poorest	Reference	Reference
Poorer	0.80*** (0.73 to 0.88)	0.89* (0.81 to 0.99)
Middle	0.76*** (0.69 to 0.85)	0.93 (0.83 to 1.04)
Richer	0.60*** (0.53 to 0.67)	0.82** (0.72 to 0.93)
Richest	0.37*** (0.32 to 0.43)	0.62*** (0.52 to 0.74)
Education level		
None	Reference	Reference
Primary	0.27*** (0.24 to 0.29)	0.54*** (0.49 to 0.59)
Secondary	0.29*** (0.26 to 0.33)	0.79*** (0.70 to 0.89)
Marital status		
Never married	Reference	Reference
Married	10.65*** (7.98 to 14.24)	4.60*** (3.41 to 6.22)
Cohabiting	1.48* (1.02 to 2.16)	1.36 (0.93 to 2.00)
Widowed/divorced/separated	4.39*** (3.18 to 6.07)	2.27*** (1.64 to 3.14)
Residence		
Urban	Reference	Reference
Rural	1.89*** (1.67 to 2.13)	1.01 (0.86 to 1.18)
Exposure to newspaper/magazine		
No	Reference	Reference
Yes	0.20*** (0.17 to 0.23)	0.50*** (0.43 to 0.58)
Exposure to radio		
No	Reference	Reference
Yes	0.74*** (0.69 to 0.80)	0.99 (0.92 to 1.07)
Exposure to television		
No	Reference	Reference
Yes	0.74*** (0.68 to 0.80)	1.75*** (1.60 to 1.92)
Mother circumcised		
No	Reference	Reference
Yes	10.98*** (9.41 to 12.64)	9.75*** (8.40 to 11.32)

Exponentiated coefficients.
*p<0.05, **p<0.01, ***p<0.001.

Table 4. Results of the binary logistic regression on the effect of maternal healthcare utilisation and circumcision of daughters disaggregated by country

Countries	Four or more ANC visits		Health facility delivery	
	Model 1, cOR (95% CI)	Model 2, aOR (95% CI)	Model 3, cOR (95% CI)	Model 4, aOR (95% CI)
Burkina Faso	0.75*** (0.65 to 0.85)	0.85* (0.74 to 0.98)	0.55*** (0.48 to 0.62)	0.72*** (0.61 to 0.81)
Chad	0.57*** (0.48 to 0.69)	0.83 (0.66 to 1.04)	0.54*** (0.44 to 0.67)	0.74* (0.56 to 0.99)
Ethiopia	0.43*** (0.35 to 0.52)	0.85 (0.68 to 1.07)	0.26*** (0.21 to 0.33)	0.60*** (0.47 to 0.78)
Guinea	1.01 (0.90 to 1.14)	1.33*** (1.16 to 1.53)	0.59*** (0.53 to 0.66)	0.71*** (0.62 to 0.82)
Kenya	0.36*** (0.29 to 0.46)	0.62** (0.47 to 0.81)	0.29*** (0.23 to 0.36)	0.83 (0.59 to 1.16)
Mali	1.15 (0.99 to 1.33)	0.92 (0.75 to 1.10)	1.28** (1.09 to 1.51)	1.08 (0.87 to 1.34)
Niger	0.77 (0.50 to 1.20)	1.12 (0.68 to 1.83)	0.14*** (0.08 to 0.25)	0.26*** (0.13 to 0.53)
Nigeria	0.62*** (0.56 to 0.69)	0.92 (0.80 to 1.06)	0.38*** (0.34 to 0.43)	0.52*** (0.44 to 0.61)
Senegal	0.65*** (0.57 to 0.74)	0.96 (0.82 to 1.12)	0.37*** (0.32 to 0.42)	0.74** (0.62 to 0.88)
Sierra Leone	0.60* (0.52 to 0.91)	0.74* (0.55 to 0.99)	0.68** (0.54 to 0.85)	0.85 (0.67 to 1.08)
Tanzania	0.99 (0.42 to 2.34)	1.15 (0.46 to 2.89)	0.31*** (0.13 to 0.75)	1.00 (0.36 to 2.79)
Togo	0.67 (0.29 to 1.55)	0.83 (0.32 to 2.15)	0.29** (0.12 to 0.67)	0.44 (0.16 to 1.22)

Model 1: unadjusted model examining the independent association between the number of ANC visits and circumcision of daughters; model 2: adjusted for sociodemographic factors (age, education level, residence, wealth index, marital status, exposure to newspapers/magazines, exposure to radio, exposure to television and mother's circumcision status); model 3: unadjusted model examining the independent association between place of delivery and circumcision of daughters; model 4: adjusted for sociodemographic factors (age, education level, residence, wealth index, marital status, exposure to newspapers/magazines, exposure to radio, exposure to television and mother's circumcision status). Exponentiated coefficients.

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

tives and governments of the studied sub-Saharan African countries are urged to provide a conducive context for maternity health services to operate as mediums for anti-FGM within the subregion.

Conclusions

This study has established an association between maternal healthcare services utilisation and circumcision of girls aged 0–14 y in SSA. From a policy perspective, the findings call for the need to strengthen policies that promote maternal healthcare service utilisation (ANC and health facility delivery) as a strategy for eliminating FGM in the subregion. Again, there is the need for governments in the countries considered in this study to encourage midwives—especially those that provide maternal and child healthcare services—to enhance their education and sensitisation of parturient women on the public health consequences of FGM. Professional education and training of health professionals is also required, as is the provision of a working environment supported by guidelines and responsive policy, as well as community education for midwives in their advocacy against FGM. These interventions should take into consideration the socio-economic and demographic characteristics of mothers who circumcise their daughters. Hence there is the need to support women of low socio-economic status through providing them with financial support when accessing maternal healthcare services at health facilities and increasing health literacy. There is also the need to sensitize married, circum-

cised and older women on the negative effects of this cultural practice.

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