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Multilevel Analysis of Factors Determining Female Genital Mutilation Practice in Ethiopia: Evidence from the 2016 Ethiopian Demography and Health Survey

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Abstract

The main objective of this study is to identify factors that determine female genital mutilation practice in Ethiopia. The study was based on the 2016 Ethiopian demographic and health survey (EDHS) which was conducted by the Central Statistical Agency (CSA) of Ethiopia. The statistical methods of data analysis were multilevel logistic regression models and the parameters were estimated by using maximum likelihood estimation method. The study confirmed that the prevalence of female genital mutilation (cutting) was 65% in Ethiopia. From these, the most common type of circumcision involved cutting and removing flesh, with 73% of circumcised women reporting this type of circumcision. Three percent of circumcised women reported that, they had no flesh removed, and seven percent of circumcised women reported that their genital area had been sewn closed (infibulated). In Ethiopia, however, the challenge is that most uneducated women, women with low wealth, and those with no media exposure still seem to be affected by female genital mutilation. Moreover, religion, education status, place of residence, wealth index, and media exposure all contribute to improving the awareness of women about the risks of female circumcision and other female health services. From the methodological aspect, it was found out that the multilevel random intercept model is better compared to empty (null) model and random coefficient model in fitting the data and in explaining the variations of the practice of female genital mutilation status across regional levels of Ethiopia. Additionally, the overall variance of constant term found in the random intercept model was statistically significant, suggesting that female genital mutilation is practiced differently in different region of Ethiopia. Females of the same age and characteristics in two different regions have different circumcised status, which indicates that there is a clear regional difference.

Keywords: *Female Genital Mutilation, Multilevel, EDHS, Ethiopia*

1. INTRODUCTION

Female genital cutting (FGC), also known as female genital mutilation (FGM), female circumcision, refers to any procedure that involves the partial or total removal of the external female genital organ for cultural, religious, or other non-therapeutic reasons (WHO, 2017; Odukogbe ATA, et al., 2017). It persists today, primarily in Africa and among small communities in the Middle East and Asia. The spectrum of these genital procedures has been termed female circumcision, or more frequently, female genital mutilation (FGM), as a collective name describing several different traditional rituals that emphasize the physical disfigurement associated with the practice. It is estimated that at least 100 million women have undergone FGM and that between 4 and 5 million procedures are performed annually on under-five age females and girls, with the most severe types of FGM carried out on Somalian and Sudanese populations. Pediatricians, therefore, may encounter patients who have undergone these procedures, and pediatric surgeons and pediatric urologists may be requested by patients or by the parents of patients to perform surgery considered a ritual genital (Odukogbe ATA, et al., 2017).

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Yet, wherever it's practiced, FGM/C is performed in line with tradition and social norms to confirm that ladies are socially accepted and mature, and to uphold their standing and honour, as well as that of the entire family. UNICEF works with government and civil society partners towards the elimination of FGM/C in countries where it is still practiced (Bank, 2018). Four types of FGMs are practiced in different countries, ranging from simple clitoridectomy up to infibulations. Type I (clitoridectomy), is a partial or complete removal of the clitoris and/or prepuce; type II (excision), is a total or partial removal of the clitoris and the labia minoria with or without removal of the labia majora; type III (infibulation), involves the narrowing of the vaginal orifice with the creation of a covering seal by cutting and a positioning the labia minora and/or the labia majora, with or without excision of the clitoris; and type IV (all other), all other forms of harmful traditional practice on the female genitalia for a non-medical purpose (Atalay Goshu Muluneh, et al., 2019). Female genital mutilation is mostly practiced on young girls of infancy up to early adolescence period (WHO, 2018)

The World Health Organization (WHO) identified six key factors that determine the continuation of FGM in developing countries (WHO, 2018). These include cultural traditions, sexual morals,

marriageability, religion, health benefits, and male sexual enjoyment (Mohamud M, et al., 2017; Nabaneh S, and Muula AS, 2019; Breault, 2018; Koukoui S, et al., 2017, and Shiferaw D, et al., 2017). Different stakeholders were involved to decrease female genital mutilation globally (WHO, 2018; WHO, 2016, and UNICEF, 2016). The world has included FGM and other traditional practices as a target to be eliminated by 2030 in support of Sustainable Development Goals (20). Cognizant of this, the government of Ethiopia is struggling to eliminate FGM through prevention, provision, and protection until 2025 (CSA, 2016). Globally, the overall reduction of FGM was observed last three decades, but the progress is insufficient and uneven across countries because of the rapid population growth (WHO, 2018; UNICEF, 2016).

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There are many reasons for the practice of FGM, and it is often described as a means to safeguard against premarital sexual activity and, as such, prevent female promiscuity and preserve virginity. In Kenya, 30% of women supporting the continuation of the practice agreed that FGM helped to preserve virginity and avoid immorality. In Nigeria, similar rates (36%) were reported by women, while 45% of men supporting the continuation of the practice agreed with this statement. FGM was believed to be proof of a girl's virginity, thereby improving the marriage prospects of unmarried girls who had undergone the procedure. In Côte d'Ivoire, "improved marriage prospects" were cited by 36% of women favouring continuation of the practice once married. FGM is also believed by some communities to ensure that a woman is faithful and loyal to her husband. For example, 51% of women in Egypt believe that FGM prevents adultery (Mohamud M, et al., 2017; Nabaneh S, and Muula AS, 2019).

In Ethiopia, 65% of women have been circumcised. Among these women, the most common type of FGM/C involves the cutting and removal of flesh (73%). FGM/C is more common in rural women (68%) than in urban women (54%). Regionally, FGM/C is least common in Tigray

(24%) and Gambela (33%) and more common in Affar (91%) and Somali (99%). FGM/C has declined since 2000, from 80% of women in 2000 to 74% in 2005 to the current level of 65% in 2016. In Ethiopia, FGM/C is performed throughout childhood. Women are most likely to report circumcision occurring before age 5 (49%), while 22% are circumcised between age 5 and 9, 18% age 10-14, and 6% age 15 or older (CSA, 2016).

Objective of the study

The main objectives of this study are to assess factors associated with female genital mutilation practice in Ethiopia.

The specific objectives are:

- ✓ To identify factors associated with FGM practice in Ethiopia.
- ✓ To investigate regional differences in FGM practice in Ethiopia.
- ✓ To determine the prevalence of FGM practice in Ethiopia.

2. METHODOLOGY

2.1. Description of Study area

Ethiopia is located in East Africa at (3°-14° N and 33° - 48°E). It has ten regional states (Afar, Amhara, Benishangul-Gumuz, Gambella, Harari, Oromia, Somali, Southern Nations, Nationalities, and People's Region (SNNP), Tigray, and Sidama) and two administrative cities (Addis Ababa and Dire Dhawa). Ethiopia is the second-most populous country in Africa with a high fertility rate of 4.6 children per woman (Atalay Goshu Muluneh, et al., 2019).

2.2. Data source

This study used data collected in the Ethiopian Demographic and Health Survey (EDHS). The Ethiopia Demographic and Health Survey was conducted by the Central Statistical Agency (CSA) under the auspices of the support of the Ministry of Health. The sampling frame used for the EDHS was the Population and Housing Census conducted by the Central Statistical Authority (CSA) in 2007. During the 2007 Population and Housing Census, each of the kebele was subdivided into convenient areas called census enumeration areas (EAs). The EDHS sample was selected using a stratified, two-stage cluster design and EAs were the sampling units for the first stage. The interviewer-administered questionnaire was used to collect data on women of reproductive age (15-49) years. The questionnaire included socio-demographic, socioeconomic, pregnancy, and maternal health service-related variables related to women's health. A stratified

two-stage cluster sampling with a total of 645 Enumeration Areas (EAs) (202 in urban and 443 in rural areas) was selected with a probability proportional to EA size. A total of 15,683 women were interviewed for maternal health indicators assessment. Among the 15,683 interviewed, 7,163 households were selected for FGM.

2.3. Variables of the study

The dependent variable for this study is female circumcision. It's coded as 1, if the female experienced circumcision of genital mutilation, 0, otherwise. The predictor (independent) variables of the study are classified as demographic and socioeconomic variables which are expected to have an impact on female genital mutilation. The predictor variables included in the study were: wealth index, region, religion, age of mother, occupation, place of residence, Mother's education level, media exposure, ethnicity, and age of daughter.

2.4. Multilevel Logistic Regression Model

Multilevel statistical approach was used to model the relationship between Female genital mutilation status and the explanatory variables. In a multilevel logistic regression model, two levels of data hierarchy were stated (for instance, individual women and region). Units at one level are nested within units at the next higher level. In this study, the basic data structure of the two-level logistic regression is a collection of J groups (regions) and within-group j *(j= 1,2,…,J)*, a random sample n_j of level-one units (households). The response variable is denoted by;

$$Y_{ij} = \begin{cases} \mathbf{1} & \text{if the } i^{th} \text{ women in the } j^{th} \text{ region is circumcised} \\ \mathbf{0} & \text{if the } i^{th} \text{ women in the } j^{th} \text{ region is not circumcused} \end{cases}$$

With probabilities, $P_{ij} = P(Y_{ij} = 1 \mid X_{ij}, u_{ij})$ is the probability of being unemployed for the i^{th} youth in the j^{th} region and $1 - P_{ij} = P(Y_{ij} = 0 \mid X_{ij})$ is the probability of being employed for the i^{th} youth in the j^{th} region.

2.4.1. The Random Intercept Model

The Random intercept model is used to model unobserved heterogeneity in the overall response by introducing random effects. In the random intercept model, the intercept is the only random effect meaning that the groups differ with respect to the average value of the response variable, but the relationship between explanatory and response variables cannot differ between groups.

The random intercept model expresses the log-odds, i.e. the logit of P_{ij}, as a sum of a linear function of the explanatory variables. That is,

$$\log(P_{ij}) = \log\left(\frac{p_{ij}}{1-p_{ij}}\right) = \beta_{0j} + \beta_1 x_{1ij} + \beta_{2ij} x_{2ij} + \ldots + \beta_k x_{kij}, i = 1,2,\ldots n, j = 1,2,\ldots J$$ Where the intercept term β_{0j} is assumed to vary randomly and is given by the sum of an average intercept β_0 and group-dependent random errors U_{0j}, that is $\beta_{0j} = \beta_0 + U_{0j}$. As a result, we have

$$\log it(P_{ij}) = \beta_0 + \sum_{h=1}^{k} \beta_h x_{hij} + U_{0j}$$ where $\beta_0 + \sum_{h=1}^{k} \beta_h x_{hij}$ the fixed part of the model and the remaining U_{0j} is called the random part of the model. It is assumed that the residual U_{0j} is mutually independent and normally distributed with mean zero and variance δ_0^2

2.4.2. The Random Coefficient Model

The random coefficients build up on the random intercept model by allowing the effects of individual predictors to vary randomly across level 2, that is, level 1 slope coefficients are allowed to take on different values in different aggregate groupings. In the random coefficient model, both the intercepts and slopes are allowed to differ across the region. It is given by:

$$\log(P_{ij}) = \log\left(\frac{p_{ij}}{1-p_{ij}}\right) = \beta_0 + \sum_{h=1}^{k} \beta_h x_{hij} + U_{0j} + \sum_{h=1}^{k} U_{1j} X_{1ij}$$

Ethical Approval

Ethical approval was granted by the Institutional Review Board of ICF International. Consent was also sought from each woman during the fieldwork. The authors of this manuscript sought permission from the EDHS Program for use of the dataset for this study. Further information about the EDHS data usage and ethical standards is available at http://goo.gl/ny8T6X.

3. RESULTS AND DISCUSSIONS

3.1. Results of Multilevel Logistic Regression Analysis

In this study, multilevel analysis, a two-level structure is used with regions as the second level units and females as the first level units. This analysis is mainly aimed at a comparison among regions and within regions' variations of female genital mutilation practice in Ethiopia. The hierarchical

structure of the data is formed such that the females are nested in twelve geographical regions based on the 2016 EDHS survey.

3.1.1. Result of Null Multilevel Logistic Regression Model

The empty model contains no explanatory variables, and it can be considered as a parametric version of assessing heterogeneity among regions with respect to female genital mutilation practice. We first fitted a simple model with no predictors, i.e., a variance component model that predicts the probability of practice of female genital mutilation (circumcised) status. The variance components model results in Table 1 revealed that the information of the fixed effect; we can say that the estimated average log odds of practice of female genital mutilation (circumcised) status across regions of the country are β_0 = -0.4056. This shows the overall proportion of practice of female genital mutilation (circumcise) in Ethiopia without accounting for other sources of variation.

Table 1 Results of Null Multilevel Logistic Regression Model (2016 EDHS).

Fixed part	**Estimate**	**S. error**	**z-value**	**p-value**
β_0 = intercept	-0.4056	0.112	-3.621	0.0023
Random effect	**Estimate**	**S. error**	**z-value**	**p-value**
$\hat{\sigma}_u^2$	0.4023	0.135	2.98	0.035
ICC(ρ)	0.096	.0578	2.007	

The intercept for region j is -0.4056 + U_{0j}, where the variance of U_0 between regions in the average log odds of being female genital circumcised is estimated as $\hat{\sigma}_u^2$ = 0.4023.

We reject the null hypothesis which states that the variation across the region was zero. So, this finding implies that the variation in female genital mutilation practice due to regional differences was not nil. As a result, we conclude that regional differences in female genital mutilation practice in Ethiopia contributed to the variation. In the variance components model, it is possible to decompose variance into regional level (higher level) and individual levels. The goal of assessing individual (level 1) variance was to determine how many variations are caused by individuals (local norms) and how many variations are caused by regional level.

According to Gajaa M, et al., (2016) the individual (level 1) variance was fixed at ($\pi^2/3$) (3.29) for the logit model.

In order to get an idea of how many variations in the practice of female genital mutilation were attributable to the region's level factors, it is useful to see the intraregional correlation coefficient. The intraregional correlation coefficient (ICC) in the variance components model is ICC = 0.096, meaning that roughly 9.6% of the total variability in practice of female genital mutilation is significantly attributable to the regional level, whereas the remaining 90.4% is attributable to the local level (i.e., within-region differences).

3.1.2 Result of Random Intercept Model

The intercept estimation is random at the regional level, var (U_{0j}). Thus, the value of var (U_{0j}) = $\hat{\sigma}_u^2$ = 0.4023 is the estimated variance component of the intercept. The multilevel logistic regression analysis result displayed in Table 2 confirmed the significance of regional difference in the practice of female genital mutilation in Ethiopia. Note that there is a change (decrease) in the estimate of the between-region variance from the variance component model 0.4023 to the random intercept model 0.169, suggesting that the distribution of fixed explanatory variables is somewhat different across regions of the country, and that the random intercept model with the fixed explanatory variables is found to be a better fit as compared to the variance component model discussed above.

Table 2: Results of Random intercept Multilevel Logistic Regression Model (2016 EDHS)

Fixed effect	categories	Estimate	S.E	Z -value	P-value	Odds
intercept		-0.3086	0.1062	-2.906	0.0032	
Religion	Christian (ref)	----	----	----	----	---
	Muslim	0.872	0.230	3.79	0.00	1.06
	Other	0.574	0.228	2.51	0.012	1.23

Educational level of family	No Education (ref)	----	----	----	----	---
	primary	-0.299	0.075	-3.97	0.000	0.865
	Secondary and above	-0.212	0.109	-1.94	0.052	0.624
Women Age in 5-year groups	20-24 (ref)	----	----	----	----	-----
	25-29	0.099	0.116	0.85	0.052	1.071
	30-34	0.089	0.13	0.68	0.125	1.052
	35-39	0.158	0.089	1.77	0.067	1.130
	40-44	0.362	0.172	2.10	0.051	1.152
	45-49	0.52	0.289	1.79	0.082	1.31
Place of residence	Urban (ref)	----	----	----	----	----
	Rural	0.579	0.089	6.45	0.000	1.84
wealth index	Poor (ref)	----	----	----	---	----
	medium	-0.604	0.12	-5.33	0.004	0.724
	rich	-0.31	0.092	-3.37	0.008	0.652
Occupation	Not working (ref)	-----	----	----	-----	-----
	Professional /managerial	-0.125	0.031	-4.1	0.004	0.52
	Clerical	-0.82	0.25	-3.25	0.015	0.64
	Other	-0.93	0.314	-2.96	0.037	0.196
Media exposure	Yes (ref)	-----	----	----	-----	----
	no	0.924	0.27	3.42	0.032	1.53
Daughter's age	0-5 (ref)	----	----	-----	-----	----
	6-10	-0.85	0.32	-2.58	0.013	0.812
	11-15	-0.35	0.13	-2.97	0.026	0.685
	16-20	-0.61	0.197	-3.1	0.003	0.521
Random effect						
$\text{var}(u_{0j})$		0.169	.055			
ICC(ρ)		0.096				

The results from the random intercept model in Table 2 showed that the random intercept (β_0) is significant, implying that the average proportion of practiced female genital mutilation differs from region to region.

The results displayed in Table 2 showed that the intra-regional correlation coefficient (ICC) is estimated as $\hat{\rho} = 0.096$, meaning that roughly 9.6% of the total variability in the practice of female genital mutilation is attributable to the regional level, with the remaining unexplained 90.4% being due to individual (local norm) differences. From Table 2, the analysis of the multilevel intercept revealed that the practice of female genital mutilation varied among regions. In addition, religion, family educational level, place of residence, wealth index, occupation, median exposure and daughter's age were also found to be significant determinants of variation in the practice of female genital mutilation, whereas Women's age were insignificant predictors of variation in prevalence of female genital mutilation. The random part variance component of the random intercept model $\hat{\sigma}_u^2$ was found to be significant, which implies that region-specific difference contributes to the

variation of practice of female genital mutilation from the random intercept and fixed explanatory model.

The practice of female genital mutilation, among those from medium and rich families' wealth index decreased by 27% and 35%, respectively, as compared to those from poor families' wealth index (ref), controlling for other variables in the model. This finding is consistent with a previous study conducted by them (Alehegn, 2020; Dessie, 2020). The odds of practice of female genital mutilation whose families have primary and secondary/above levels of education were reduced by 13.5% and 37.6%, respectively, as compared to females of uneducated families (ref) controlling for other variables in the model. This implies that families' education is an important socioeconomic characteristic of circumcised status; that is, the practice of female genital mutilation in the country decreases as a family's education level increases, because educated families give attention to their status. This finding is consistent with the previous studies done in Ethiopia (Andualem, 2016; Setegn T, et al., 2016).

The current study found that the practice of female genital mutilation (circumcised) status is significantly associated with the age of a daughter. For a one-step increase in age category (to age group 6-10), the log odds of practice of female genital mutilation decreased by 18.8% when compared with the age group of 0-5 (ref). For a one-step increase in age category (to 11-15), the log odds of practice of female genital mutilation were decreased by 31.5% compared with the age group of 0-5 (ref) and For a one-step increase in age category (to 16-20), the log odds of practice of female genital mutilation decreased by 47.9% compared with the age group of 0-5 (ref). Therefore, daughters are more likely to be circumcised in age category of 0-5 as compared to other age categories. This indicates that the practice of female genital mutilation in Ethiopia is more likely in the early ages of 0-5 (ref). This result confirms what is stated with studies done by (Ashimi AO, et al., 2015; Bogale D, et al., 2015).

This study also revealed that the practice of female genital mutilation in Ethiopia is varies from urban to rural areas of residence. The likelihood of practicing female genital mutilation is approximately 1.84 times higher in rural areas than in urban areas. Likewise, the odds of practice of female genital mutilation of women who had median exposure were significantly different from women who had been exposed to median (ref). A woman who had not been exposed to median was 1.53 times more likely to have circumcised compared with women who had been median exposure. This result contradicts with the study conducted by (Andualem, 2016). Similarly, religion is another significant determinant of female circumcision. The result of this study demonstrated

that women whose religion was Islam and others were, 1.06 and 1.23 times more likely circumcised respectively than that of those following Christian religion (ref) in the in the country which is similar with study done by (Kandala N, et al., 2017).

3.1.3 Results of Random Coefficients Model.

It is possible to generalize the model so that the effect of level 1 covariates is different in each region. This can be done by adding random coefficients in front of some of the individual level covariates of the model. This model contains a random slope for the wealth index and family education level, which means that it allows the effect of the coefficient of the explanatory variable to vary from region to region. By adding level 1 predictors, the ICC increased and is estimated as $\hat{\rho}$ = 0.105, meaning that roughly 10.5% of the total variability in the practice of female genital mutilation is attributable to the random factor and region in the random coefficient multilevel binary logistic model. From Table 3, the random coefficient estimates for intercepts and the slopes vary significantly at the 5% significance level, which implies that there is a considerable variation in the effects of family education level and wealth index; these variables differ significantly across the regions.

The variance of the intercept in the random slope model is 0.269, which is still large, relative to its standard error of 0.0995. Thus, there remains some regional level variance unaccounted for in the model. The variance corresponding to the slope of the wealth index is 0.0356, which is relatively small with respect to its standard error. This suggests that the wealth index may be justified in constraining the effect to be fixed. Likewise, the variance corresponding to the slope of family education level is 0.0293, which is relatively large with respect to its standard error (SE = 0.0232); thus, this suggests that the effect of family education may be justified in constructing the effect to be random.

The significance of this difference further indicates that a model with a random coefficient is more appropriate to explain regional variation than a model with fixed coefficients. The correlation between the intercept and the random slope of the wealth index is -0.0451. This implies that the practice of female genital mutilation for females from rich families was less than among those who were from poor families by a larger factor at regions with higher intercepts compared to regions with lower intercepts.

Table 3 Results of Random coefficient Multilevel Logistic Regression Model (2016 EDHS)

Fixed effect	categories	Estimate	S.E	Z -value	P-value	Odds

Religion	Christian (ref)	----	----	----	----	---
	Muslim	0.852	0.220	3.79	0.00	1.06
	Other	0.544	0.218	2.51	0.012	1.23
Women Age in 5-year groups	20-24 (ref)	----	----	----	----	-----
	25-29	0.099	0.115	0.85	0.052	1.071
	30-34	0.099	0.132	0.68	0.125	1.052
	35-39	0.188	0.09	1.77	0.067	1.130
	40-44	0.362	0.173	2.10	0.051	1.152
	45-49	0.525	0.289	1.79	0.082	1.31
Place of residence	Urban (ref)	----	----	----	----	----
	Rural	0.589	0.087	6.45	0.000	1.24
Occupation	Not working (ref)	-----	----	----	-----	-----
	Professional /managerial	-0.145	0.032	-4.1	0.004	0.52
	Clerical	-0.84	0.251	-3.25	0.015	0.64
	Other	-0.935	0.314	-2.96	0.037	0.196
Media exposure	Yes (ref)	-----	----	----	-----	----
	no				0.032	
Daughter's age	0-5 (ref)	----	----	-----	-----	----
	6-10	-0.845	0.32	-2.58	0.013	0.312
	11-15	-0.345	0.13	-2.97	0.026	0.385
	16-20	-0.615	0.197	-3.1	0.003	0.421
Random effect						
$\hat{\sigma}_0^2 = \text{var}(u_{0j})$		0.269	0.0995			
$\hat{\sigma}_1^2 = \text{var}(u_{1j})$		0.0293	0.0232			
$\hat{\sigma}_2^2 = \text{var}(u_{2j})$		0.0356	0.0432			
$\hat{\sigma}_{01}^2 = \text{var}(u_{0j}, u_{1j})$		0.0875	0.0591			
$\hat{\sigma}_{02}^2 = \text{var}(u_{0j}, u_{2j})$		-0.0451	0.0523			
$\hat{\sigma}_{12}^2 = \text{var}(u_{1j}, u_{2j})$		-0.0967	0.0617			
ICC(ρ)		0.105				

3.2. Model Comparison.

The choice of a relevant multilevel model is an important step, and it should be based on the necessity of parsimony in the model. Parsimony means that models should be as simple as possible (Hox, 2000).

As shown in Table 4, the deviance-based chi-square value ($\chi 2$ = 7505.986, p value < 0.003) is significant for the variance component model. The deviance-based chi-square value ($\chi 2$ = 7657.182, p value < 0.000) is significant for the random intercept model, which implies that the random intercept model fits better as compared to the variance component model. Also, the deviance-based chi-square value for random effects ($\chi 2$ = 7638.457, p value < 0.001) for the multilevel random slope model (random coefficient model) is also statistically significant. Both models seem to be better for the data compared to the variance component model. However, based on deviance, AIC and BIC, the authors can see that model fit statistic values (AIC = 7668.182 and BIC = 7720.583) for the random intercept model were the smallest among models considered. Therefore, the random intercept model better fits the data to predict the Practice of female genital mutilation in Ethiopia.

Table 4 Model comparison

Fitted Model	Multilevel Empty Model	Multilevel Random Intercept Model	Multilevel Random Slope Model
-2*Log Likelihood	9505.353	7658.172	7734.752
Deviance	7505.986	7657.182	7638.457
P-value	0.003	0.000	0.001
AIC	9513.966	7668.182	7789.487
BIC	9528.202	7720.583	7861.654

4. CONCLUSION

The study also revealed that of women age 15-49 (65%) in Ethiopia are circumcised, the most common type of circumcision involved cutting and removal of flesh, with 73% of circumcised women reporting this type of circumcision. 3% of circumcised women reported having had no flesh removed and 7% of circumcised women reported that their genital area had been sewn closed (infibulated). Among circumcised women, those in urban areas are more likely to be circumcised before age 5 than rural women (59% versus 46%, respectively).

This study also concluded that FGM is associated with socio-economic factors (i.e., wealth index status and family education level), demographics, and religious practices. The challenges, however, are that most women without education, women with poor wealth categories, and women who have had no media exposure still seem to be affected by female genital mutilation in Ethiopia. In

addition, religion, education status, place of residence, wealth index, and media exposure provide a good opportunity to enhance the awareness of women about the risks of female circumcision and other female health services.

From the methodological aspect, it was found that the multilevel random intercept model is better compared to the empty (null) model and the random coefficient model in fitting the data and in explaining the variations in practice female genital mutilation status across regional levels of Ethiopia. In addition, from the random intercept model, the overall variance of constant term was found to be statistically significant, implying the existence of a difference in the practice of female genital mutilation status among regions of Ethiopia. This suggests that the female with the same characteristics and age in two different regions have different circumcised statuses, which indicates a clear regional effect.

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