



Review article

Prevalence of female genital mutilation among women in Ethiopia: A systematic review and meta-analysis

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ARTICLE INFO

Keywords:

Quality of life
Epidemiology
Gynecology
Obstetrics
Reproductive system
Female genital mutilation
Cutting
Clitoridectomy
Infibulation

ABSTRACT

Background: Female genital mutilation affects the social, psychological, spiritual and physical well-being of women. In Ethiopia, studies regarding the female genital mutilation were conducted in various settings and years.

Objective: This systematic review and meta-analysis was aimed to summarize the prevalence of female Genital Mutilation in Ethiopia.

Methods: A systematic search of articles was conducted in PubMed, African Journals Online (AJOL), Excerpta Medica database (EMBASE), SCOPUS, Web of Science, and JSTOR. Data were extracted using a standardized data extraction format prepared in Microsoft Excel. The data were analyzed using STATA version 11 software. Cochrane Q statistic was used to assess the presence of significant between-study heterogeneity. I^2 was used to quantify between-study heterogeneity. A leave-one-out sensitivity analysis and subgroup analysis based on a study period and setting were done. The funnel plot and Egger's regression tests were used to measure the presence of substantial publication bias. The pooled estimated prevalence of female genital mutilation was conducted using a DerSimonian and Laird random effects model.

Results: The pooled prevalence estimate of FGM was 77.28% (95% CI: 55.81, 98.76). The pooled prevalence was higher in studies conducted from 2013-2017 (78.39%, 95%CI: 48.24, 108.54) and studies conducted in Hospital (92.02: 95%CI: 55.81, 98.76).

Conclusion: The prevalence of Female Genital Mutilation is high. Therefore, interventions that are focused on health education, social support and advocacy are recommended.

1. Introduction

Female genital mutilation (FGM) involves the partial or total removal of the female external genitalia or injury to the female external genital organs. It has no therapeutic use [1].

Although the community's knowledge towards the effect of FGM has increased, FGM is still highly practiced. FGM is related to the cultural values and beliefs of the society. It is considered as an indicator of female transition to puberty [2, 3].

In some cultures, it is believed that women who undergo genital mutilation will behave appropriately. On the contrary, women will have reduced sexual desire and painful sexual intercourse [4, 5]. Undergoing FGM is also considered as a means to maintain hygiene and to increase women's acceptance in the community [6, 7, 8].

According to the World Health Organization (WHO), FGM is classified into different types. It involves clitoridectomy, excision, infibulation,

pricking, piercing, incising, scraping, and cauterizing the genital area [9, 10].

FGM affects the social, psychological, spiritual and physical well-being of women [11]. It causes bleeding, swelling, urine retention, pain, abscess, and infection. It also leads to adverse obstetric related complications, including fistula, urethral damage, inability to deliver by spontaneous vaginal delivery, severe bleeding during childbirth, infertility, and hemorrhagic shock [12, 13, 14, 15, 16]. Furthermore, sexual experience and function of married women are negatively affected. This causes a poor sexual quality of life and nephrolithiasis [17]. Post-traumatic stress disorder commonly occurs in those women. It also leads to anxiety, depression, and social isolation [18, 19].

At least 200 million women, who live in 30 countries, have undergone FGM, of which 44% are below the age of 15 [20]. FGM, which is a violation of right, is conducted across all age groups [21, 22]. The action is criminalized in Ethiopia [20, 23].

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A multifaceted approach is required to combat the problem. Preventive and provisional interventions are mandatory. Furthermore, health education to the community and reproductive age group women is required. Psychological support and surgical interventions might be required to support the women who had FGM [24, 25, 26].

A previous systematic review and meta-analysis identified the prevalence among women and children less than 15 years and assessed the regional variation [27]. Our study assessed the overall prevalence across all age groups comprehensively. We also identified the difference in prevalence by study period and setting. Moreover, our study incorporated studies that showed the prevalence of clitoridectomy, pricking, scraping, and cauterizing, which were not considered in the previous study. In Ethiopia, the study findings regarding the female Genital Mutilation were highly dispersed. The studies used various designs and sample sizes. Therefore, it is hard to generalize the findings to the general population in Ethiopia. This study therefore aimed to analyze and summarize, through a systematic review and meta-analysis, the pooled prevalence of FGM among women in Ethiopia. Our results may provide useful information for policymakers who are working against traditional practices in Ethiopia.

2. Methods

2.1. Searching strategy and information sources

PubMed, African Journals Online (AJOL), Excerpta Medica database (EMBASE), SCOPUS, Web of Science, and JSTOR were accessed. The terms and phrases used for searching were “Female Genital Mutilation”, “Female Genital Circumcision”, “Female Genital Cutting”, “Harmful Traditional Practice”, “Clitoridectomy”, “infibulation” “Pricking”, “Scraping”, “Cauterizing”, “Ethiopia”

The following terms with MeSH (Medical Subject Headings) and Boolean operators were used to search PubMed:

((((((((((prevalence) OR "Epidemiology"[Mesh]) AND mutilation) OR "Circumcision, Female"[Mesh]) OR female genital mutilation) OR female genital circumcision) OR female genital cutting) OR harmful traditional practice) OR clitoridectomy) OR infibulation) OR pricking) OR scraping) OR cauterizing) AND Ethiopia.

Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guideline was used to report the result [28].

2.2. Eligibility criteria

2.2.1. The inclusion criteria

Study period: Studies conducted or published until November 29, 2019.

Study type: All observational studies, which reported the prevalence of FGM.

Population: Studies conducted among women.

Publication status: Published and unpublished articles.

Place of Study: Studies conducted in Ethiopia.

Language: English.

FGM type: Studies conducted on clitoridectomy or/and excision or/and infibulation or/and pricking or/and piercing or/and incising or/and scraping or/and cauterizing the genital area.

Age: No age Restriction.

2.2.2. Exclusion criteria

1. Duplicate studies whereby similar study published in more than one journal.
2. Studies that did not report the outcome of interest.

2.3. Study selection and extraction

Three independent authors identified the eligibility of candidate studies. They screened the title and abstract of the retrieved articles. Any disagreement was resolved through a discussion with a third author.

Two authors extracted the data independently to avoid data extraction error. A standardized data extraction format was prepared using Microsoft Excel 2016 spreadsheet. The data extraction format is carefully designed and piloted. The data extracted were name of the first author, publication year, study region, study period, study setting, study design, sample size, response rate, sampling method, and prevalence of FGM. Inconsistencies between the data recorded were corrected through discussion.

2.4. Quality assessment

Two independent authors appraised the quality of studies. Any disagreement was resolved through discussion. The Newcastle-Ottawa Scale adapted for cross-sectional studies was used for critical appraisal [29]. The checklist includes appraisal of the selection, comparability and outcome. The Newcastle-Ottawa Scale score for the studies, which are included in this systematic review and meta-analysis, ranged from five to eight.

2.5. Statistical analysis

The data were analyzed by using STATA 11 software and Review Manager 5.3. The Cochran Q statistic was calculated to assess between-study heterogeneity. I^2 was used to quantify between-study heterogeneity. The degree of heterogeneity between the included studies was evaluated by the index of heterogeneity I^2 values of 0%, 25%, 50%, and 75%, which represented no, low, medium, and high heterogeneity, respectively.

Pooled prevalence of Female Genital Mutilation was conducted using a DerSimonian and Laird random effects model. We also conducted a leave one-out sensitivity analysis to appraise the main studies that exert a most important impact on between-study heterogeneity. The analysis was done to evaluate the effect of each study on the pooled estimated prevalence of FGM by excluding each study step-by step. Moreover, we conducted a subgroup analysis based on the study period and setting to identify the possible source of heterogeneity among the studies. Funnel plot and Egger's regression test were used to measure the presence of substantial publication bias [30]. The significant value considered for the Egger's regression test was 0.05. Duval and Tweedie have proposed a trim and fill analysis that adds studies to make the distribution symmetrical. It omits small studies until the funnel plot is symmetrical, estimates the true center of the funnel, and replaces the omitted studies and their missing counterparts around the center. It provides an estimate of the number of missing studies and an adjusted treatment effect is derived by performing a meta-analysis including the filled studies [31].

3. Results

3.1. Characteristics of included studies

Initially, 3215 articles were retrieved. Nineteen articles met the eligibility criteria and were included in the final meta-analysis (Figure 1).

All the included studies had shown a low risk. Seven of the studies were conducted in Oromia region [32, 34, 36, 39, 44, 47, 49], two in Southern Nations and Nationalities People (SNNP) [33, 40], one in Addis Ababa [35], four in Somali [37, 38, 45, 46], one in Afar [43], two in Amahra [41, 42], one in Tigray [48], and one at national level [50]. Most of the studies were community-based studies. The earliest study was conducted in 2001 and the latest was conducted in 2017. All

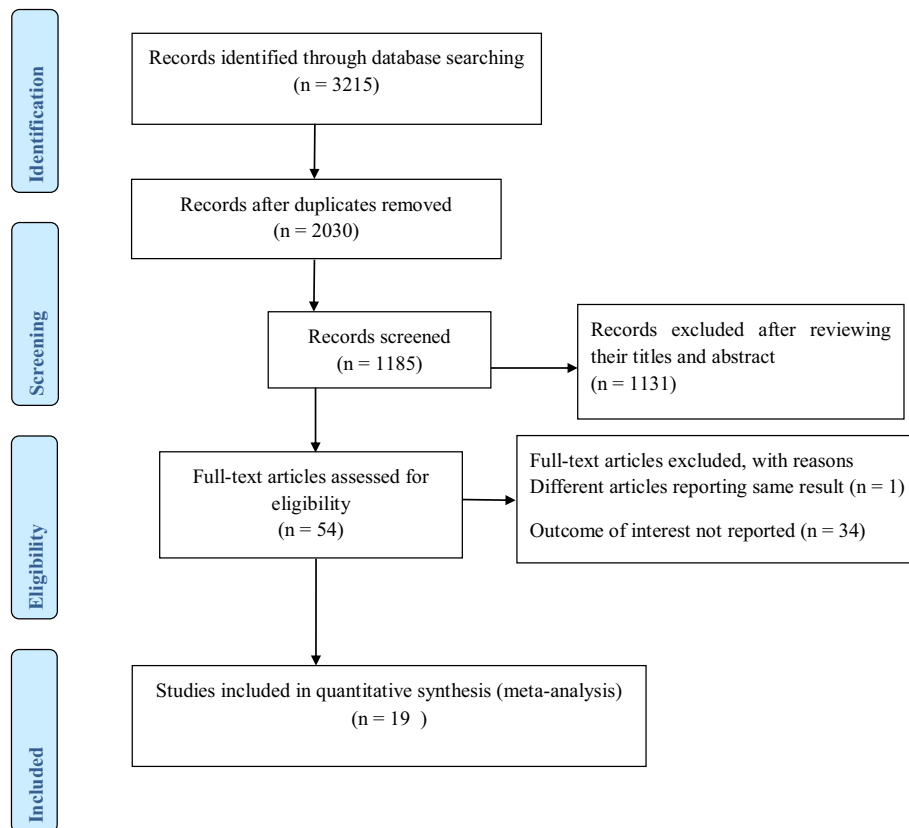


Figure 1. Flow chart of study selection for systematic review and met-analysis of the prevalence of Female Genital Mutilation in Ethiopia.

the studies employed a cross-sectional study design with a response rate ranging from 92.1% to 100%.The prevalence of FGM ranged from 0.7% to 98.2%. The sample size ranged from 138 to 7822. Ten studies used systematic random sampling, five used simple random sampling, three used multistage sampling, and one used purposive sampling (Table 1).

3.2. Publication bias

The results of the Begg's test ($z = 4.27, p < 0.001$) and Egger's test ($t = 3.54, p\text{-value} = 0.003$) showed the presence of publication bias. In addition, asymmetric distribution was observed in the funnel plot (Figure 2).Therefore, trim and fill analysis was conducted. It indicated the presence of ten unpublished studies (Figure 3).

Table 1. Descriptive summary of 19 studies included in the systematic review and meta-analysis of the prevalence of Female Genital Mutilation in Ethiopia.

First Author/Publication Year	Study Region	Study period	Setting	Study Design	Sample Size	Response Rate (%)	Sampling Method	Prevalence (%)	Study Quality
Olijira T et al./2016 [32]	Oromia	2013	Community	Cross-sectional	842	100	Multistage sampling	79.5	Low Risk
Tamire M et al./2013 [33]	SNNP	2011	School	Cross-sectional	797	97.87	Systematic random sampling	82.2	Low Risk
Bogale D et al./2014 [33]	Oromia	2014	Community	Cross-sectional	634	97.6	Simple random sampling	78.5	Low Risk
Shay TZ et al./2010 [35]	Addis Ababa	2008	School	Cross-sectional	442	92.1	Simple random sampling	26	Low Risk
Yirga WS et al./2012 [36]	Oromia	2008	Community	Cross-sectional	858	100	Systematic random sampling	92.3	Low Risk
Abdisa B et al./2017 [37]	Somali	2017	Community	Cross-sectional	337	94.9	Systematic random sampling	87.1	Low Risk
Gebremariam K et al./2016 [38]	Somali	2014	School	Cross-sectional	679	97.5	Simple random sampling	82.6	Low Risk
Shiferaw D et al./2017 [39]	Oromia	2012	School	Cross-sectional	798	96.4	Simple random sampling	77.8	Low Risk
Degefa H et al./2017 [40]	SNNP	2015	Hospital	Cross-sectional	395	100	Systematic random sampling	92.2	Low Risk
Andualem M/2013 [41]	Amhara	2012	Community	Cross-sectional	730	100	Simple random sampling	77.7	Low Risk
Andualem M/2016 [42]	Amhara	2014	Community	Cross-sectional	730	98	Systematic random sampling	96	Low Risk
Chuluko BG et al./2018 [43]	Afar	2016	Community	Cross-sectional	792	93.5	Systematic random sampling	90.8	Low Risk
Belda SS et al./2017 [44]	Oromia	2009	Community	Cross-sectional	771	100	Systematic random sampling	63.7	Low Risk
Gudu W et al./2017 [45]	Somali	2015	Hospital	Cross-sectional	228	100	Purposive sampling	91.7	Low Risk
Hussein MA et al./2013 [46]	Somali	2012	Community	Cross-sectional	323	100	Systematic random sampling	90	Low Risk
Gajaa M et al./2016 [47]	Oromia	2014	Community	Cross-sectional	622	98	Systematic random sampling	98.2	Low Risk
Gebrekiros K et al./2014 [48]	Tigray	2013	Community	Cross-sectional	752	100	Multistage sampling	0.7	Low Risk
Argaw A et al./2002 [49]	Oromia	2001	Community	Cross-sectional	138	100	Systematic random sampling	96.4	Low Risk
EDHS/2016 [50]	National	2016	Community	Cross-sectional	7822	100	Multistage sampling	65	Low Risk

3.3. Prevalence of female genital mutilation

The I^2 test result showed high heterogeneity ($I^2 = 100\%$, $P < 0.001$), which indicated the need to use a random effects model. Therefore, we used a DerSimonian and Laird random effects model to estimate the pooled prevalence. Accordingly, the estimated pooled prevalence of FGM was 77.28% (95% CI: 55.81, 98.76) (Figure 4).

3.4. Leave-out-one sensitivity analysis

Leave-out-one analysis was done to evaluate the effect of each study on the pooled estimated prevalence of FGM by excluding each study step-by-step. The result showed that the excluded studies did not show significant effect on the estimated prevalence of FGM among women (Table 2).

3.5. Subgroup analysis

The pooled prevalence of FGM was higher in studies conducted from 2013-2017 (78.39 %, 95%CI: 48.24, 108.54). Significant heterogeneity was identified in studies conducted from 2001-2012 (I^2 , 100%; $p < 0.001$) and 2013-2017 (I^2 , 100%; $p < 0.001$) (Figure 5).

The pooled prevalence of FGM was higher in studies conducted in hospital (92.02%, 95%CI; 89.90, 94.15). Significant heterogeneity was identified in community based studies (I^2 , 100%; $p < 0.001$) and school based studies (I^2 , 99.5%; $p < 0.001$) (Figure 6).

4. Discussion

This meta-analysis estimated the pooled prevalence of FGM. The prevalence of FGM increases through time, while it is expected to decline

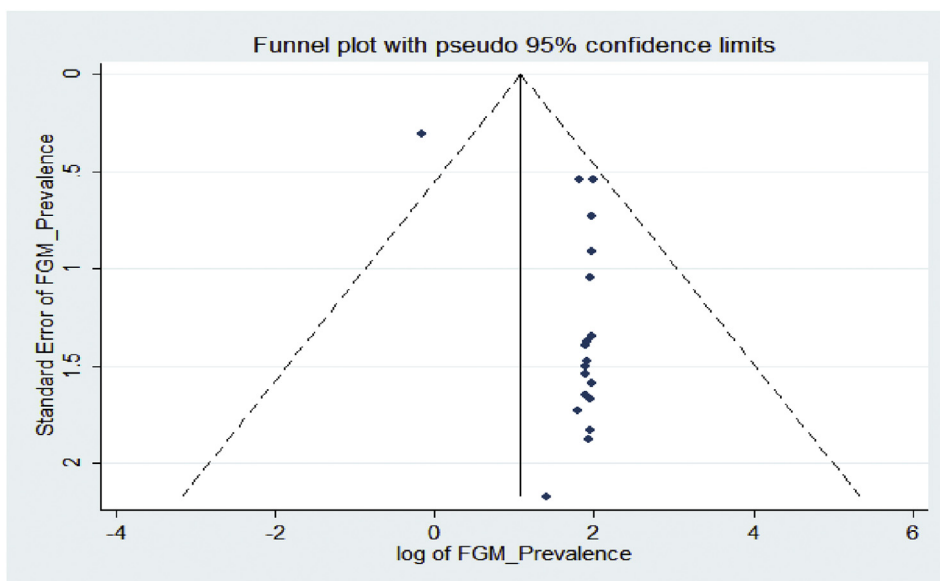


Figure 2. Funnel plot of publication bias.

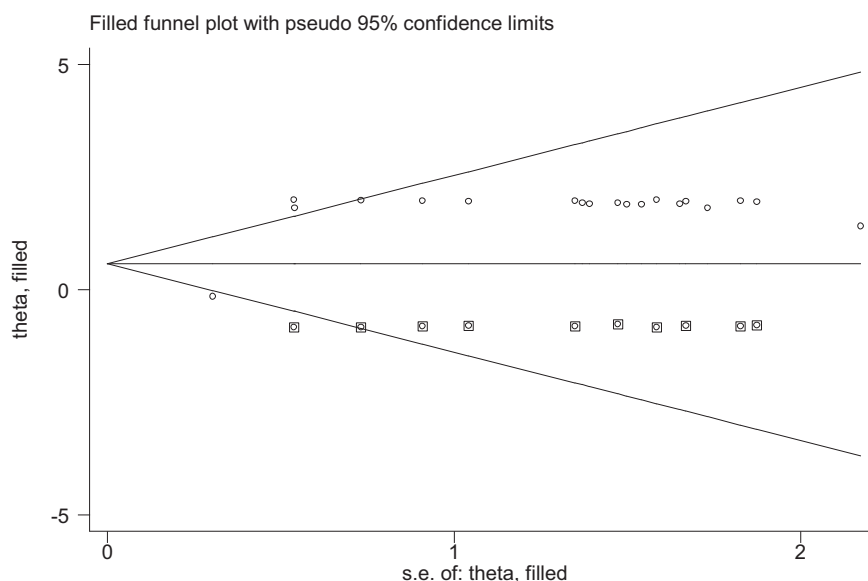


Figure 3. Funnel plot of trim and fill analysis.

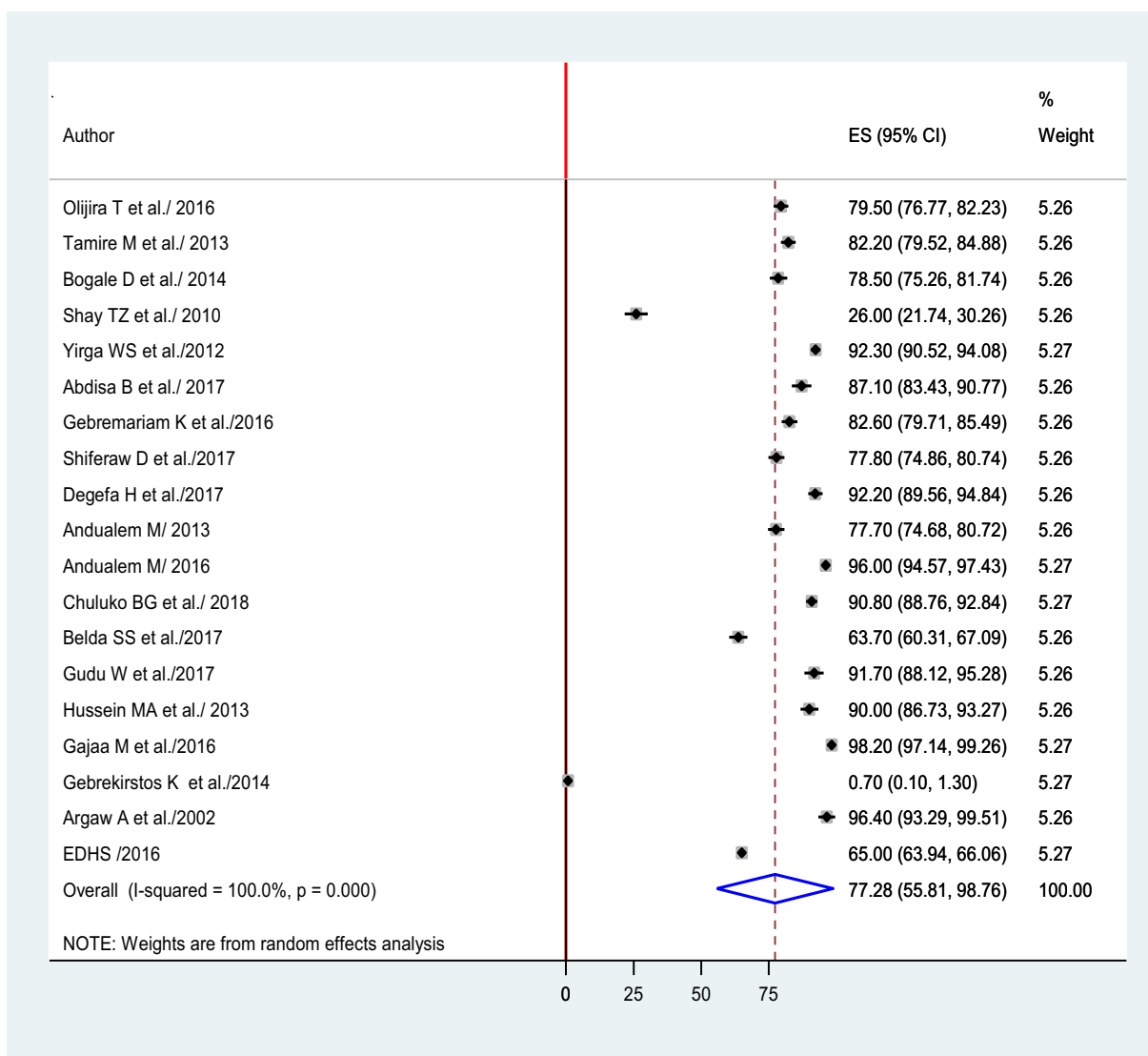


Figure 4. Forest Plot of the prevalence of Female Genital Mutilation with its 95% Confidence Interval.

[51]. Therefore, estimating FGM prevalence will be helpful for health policymakers and organizations working against harmful traditional practices in Ethiopia. It would help them to allocate all the required resources in developing preventive strategies.

In this systematic review and meta-analysis, the proportion of FGM was varying from 0.7% to 98.2%. The highest prevalence of FGM was reported in Oromia region and the smallest prevalence was reported in Tigray.

This study tried to estimate the overall prevalence of FGM in Ethiopia by reviewing the findings of available studies conducted in Ethiopia. The overall estimated pooled prevalence of FGM was 77.28%, which implies that FGM practice is increasing through time. The prevalence was reported to be 64% in 2016 [50]. It might imply that the available interventions, which were developed to combat the problem, are not effective enough in decreasing the incidence.

The sub-group analysis showed a higher prevalence in hospital-based studies than community-based and school-based studies. The possible justifications for this variation might be the fact that the hospital-based studies were conducted in Somalia and SNNP regions. In those regions, FGM is commonly practiced, which is accepted as a means to make the women clean [52, 53].

The prevalence of FGM was considerably higher in the recent studies conducted between 2013 and 2017 than studies conducted before 2013. In line with our finding, another study conducted in Ethiopia showed that the community still supports the continuation of FGM [7]. On the contrary, this finding is different from the finding of other studies conducted in Ethiopia that showed a growing resistance and decline of FGM [54, 55]. Therefore, community based health education should be delivered thoroughly.

In the current study, the variation between the studies resulted in a significant between-study heterogeneity. To manage it we used a random effect model. A leave-out-one sensitivity analysis was also performed. The result showed that the estimated pooled prevalence was robust and not dependent on a single study. In addition, subgroup analysis by study period and settings was done. The heterogeneity in estimated prevalence could be related to a difference in the study period and setting. The study sample differences might also contribute to the heterogeneity.

According to this review, FGM is a major public health problem in Ethiopia. The prevalence of FGM is related to residence area, age, educational status, occupation and knowledge about the effect of FGM [5, 7, 12, 14]. Therefore, multifaceted interventions should be

Table 2. Sensitivity analysis of pooled prevalence of FGM for each study being removed one at a time.

Study Omitted	FGM Pooled prevalence (95% CI)
Olijira T et al./2016	77.16(54.87,99.45)
Tamire M et al./2013	77.01(54.74,99.29)
Bogale D et al./2014	77.22(54.99,99.45)
Shay TZ et al./2010	80.13(57.96,102.30)
Yirga WS et al./2012	76.45(54.14,98.76)
Abdisa B et al./2017	76.74(54.58,98.90)
Gebremariam K et al./2016	76.99(54.74,99.23)
Shiferaw D et al./2017	77.26(54.99,99.52)
Degefa H et al./2017	76.46(54.27,98.64)
Andualem M/2013	77.26(55.00,99.52)
Andualem M/2016	76.24(53.99,98.50)
Chuluko BG et al./2018	76.53(54.24,98.82)
Belda SS et al./2017	78.04(55.78,100.30)
Gudu W et al./2017	76.48(54.35,98.62)
Hussein MA et al./2013	76.58(54.42,98.74)
Gajaa M et al./2016	76.12(54.15,98.09)
Gebre Kirstos K et al./2014	81.58(74.43,88.74)
Argaw A et al./2002	76.22(54.10,98.34)
EDHS/2016	77.97(53.87,66.06)

implemented at various stages. Firstly, health education about the negative consequences of FGM should be communicated at the community level. Social support focusing on women advocacy is essential [56]. Secondly, laws against FGM should offer an appropriate direction. The laws should be written clearly using the various local languages. The community should be aware of the specific punishments. In addition, monitoring the compliance is essential. Thirdly, the government should work with other sectors working against FGM in developing a tailored approach to understand the situation better. Stringent anti-FGM programs should be launched and strengthened.

We used a comprehensive search strategy. We also acknowledged some limitations. The first limitation was the lack of researches conducted in most part of Ethiopia, in which only one study was conducted in Addis Ababa, Afar and Tigrai. Therefore, those studies have not addressed the prevalence of FGM in other areas that are located within the regions. Secondly, all the studies incorporated in this systematic review and meta-analysis used cross-sectional design.

Future studies should sought information on the contributing factors. There is a need for implementation researches, which could offer a direction for an effective mitigating strategy. Systematic review and meta-analysis addressing the associated factors is also recommended.

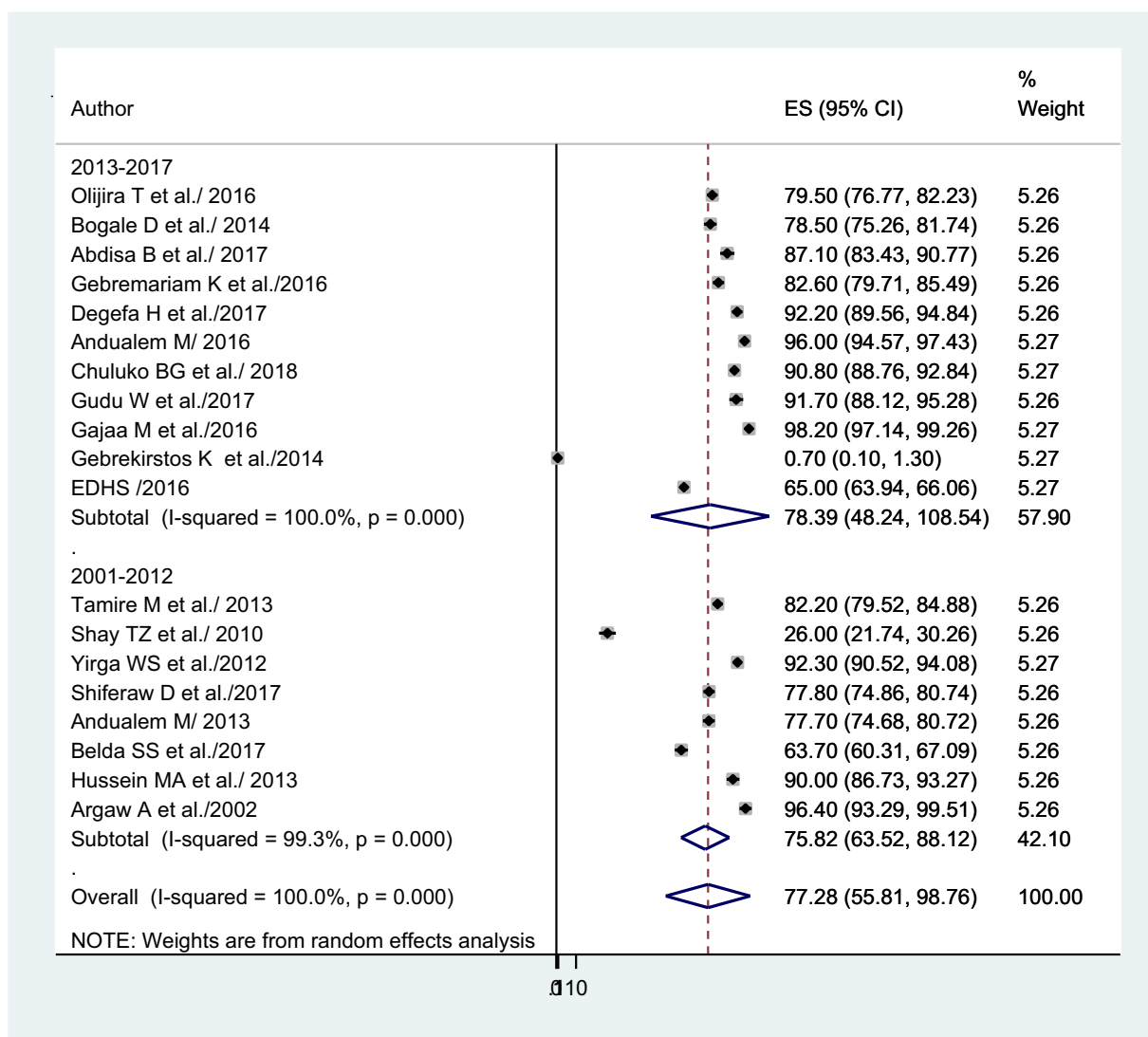


Figure 5. Subgroup analysis by the study period.

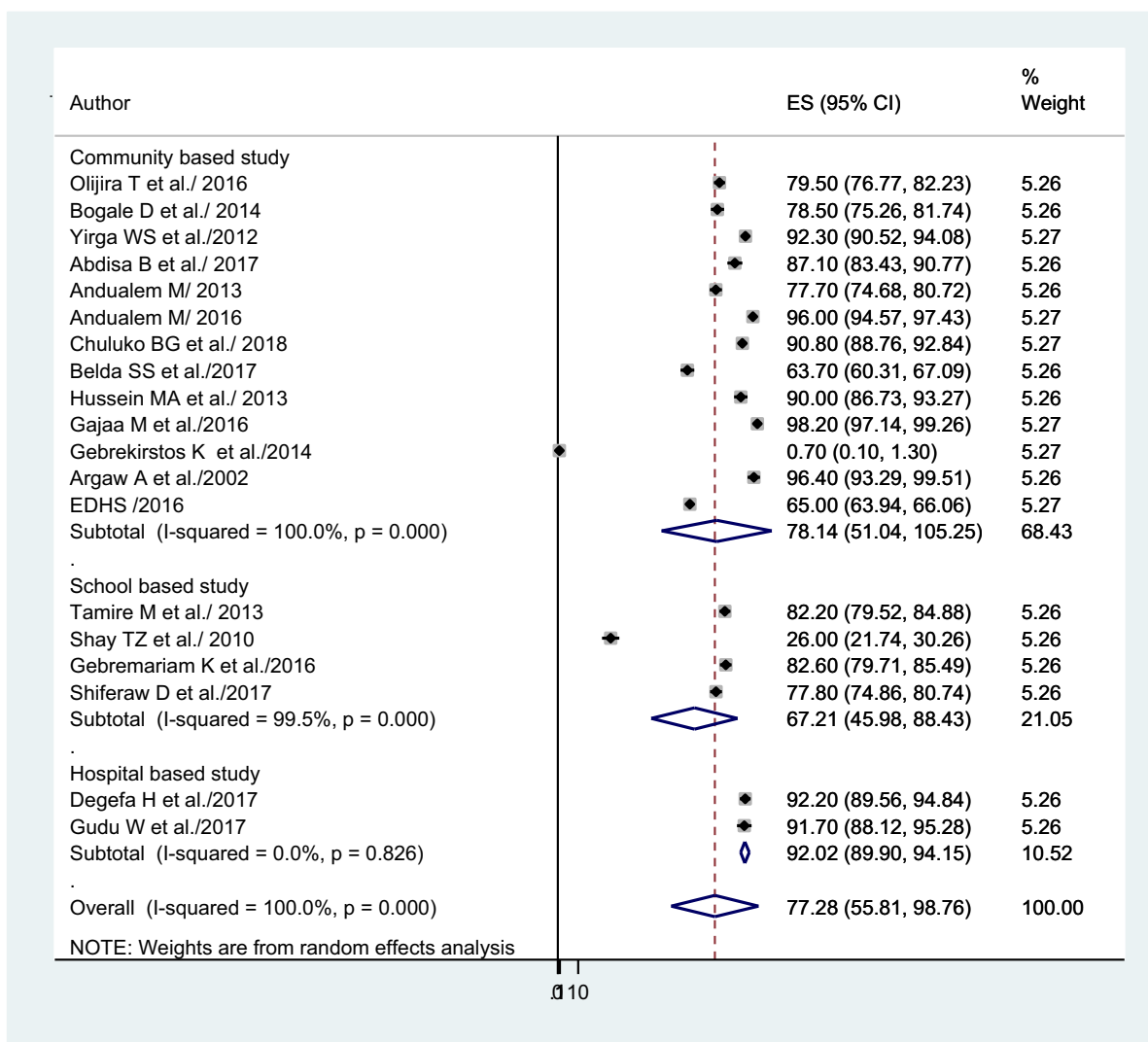


Figure 6. Subgroup analysis by the study setting.

5. Conclusion

This systematic review and meta-analysis revealed a high prevalence of FGM in Ethiopia. Thus, policymakers and community leaders should design adequate interventions to alleviate this public health problem. In addition, governmental and non-governmental organizations should provide health education to the community and launch an appropriate regulatory mechanism. Further studies should be done to determine the factors contributing to this high level of FGM.

Declarations

Author contribution statement

All authors listed have significantly contributed to the development and the writing of this article.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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