





# BMJ Open Prevalence and determinants of pregnancy termination in Ethiopia: a systematic review and meta-analysis

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**To cite:** Kumsa H, Mislu EK, Arage MW, *et al.* Prevalence and determinants of pregnancy termination in Ethiopia: a systematic review and meta-analysis. *BMJ Open* 2024;**14**:e073799. doi:10.1136/bmjopen-2023-073799

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<https://doi.org/10.1136/bmjopen-2023-073799>).

Received 20 March 2023  
Accepted 28 February 2024



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## ABSTRACT

**Objective** This review aims to determine the prevalence of pregnancy termination and its determinant factors in Ethiopia.

**Design** Systematic review and meta-analysis.

**Data sources** Relevant articles were retrieved from databases such as PubMed, EMBASE, Medline and other search engines.

**Eligibility criteria for selecting studies** The research design for this study had no restrictions, allowing for the inclusion of cross-sectional and case-control studies that examined the prevalence or determinants of pregnancy termination. However, case reports, case series, reviews, editorials and studies published as abstracts only were excluded from the analysis.

**Data extraction and synthesis** The review was precisely in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses criteria, and the quality of the review was assessed using the Joanna Briggs Institute critical appraisal checklist. Heterogeneity was indicated by the *p* value for *I*<sup>2</sup> statistics less than 0.05. Data were entered into Microsoft Excel, and the analysis was conducted by using Stata V.16.

**Results** The pooled prevalence of pregnancy termination in Ethiopia was 21.52% (95% CI 15.01% to 28.03%). Women who had their first sexual initiation before the age of 18 (OR 1.78; 95% CI 1.13 to 2.82, *p*=0.14), had irregular menstrual bleeding (OR 1.86; 95% CI 1.25 to 2.77, *p*=0.76), being a student (OR 4.85; 95% CI 1.98 to 11.91, *p*=0.20) and had multiple sexual partners (OR 4.88; 95% CI 3.43 to 6.93, *p*=0.33) were significantly associated with pregnancy termination.

**Conclusions** One in five women terminated their pregnancies, which is higher than in other sub-Saharan countries. Being a student, irregular menstrual bleeding, early initiation of sexual intercourse and multiple sexual partners were determinants of pregnancy termination. Special attention is needed in avoiding early sexual initiation and in reducing sexual risk behaviours.

## INTRODUCTION

Pregnancy termination is a sensitive and contentious issue with religious, moral, cultural and political dimensions. Also, it presents a significant public health concern in developing countries.<sup>1</sup> Above 60% of unintended pregnancies result in pregnancy

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Comprehensive inclusion of studies from various regions provides a broader perspective.
- ⇒ Variations in study population, setting and design may impact the results.
- ⇒ Exclusion of qualitative studies on pregnancy termination explanations limits the overall understanding.

termination, with the majority of those being unsafe.<sup>2</sup> Developing countries bear the burden of 97% of all unsafe abortions which contributes to 220 deaths per 100 000 live births.<sup>3</sup>

Pregnancy termination imposes an additional burden on health institutions and individuals; in developing countries alone, each year an estimated 7 million women seek treatment in health facilities for the complication of pregnancy termination.<sup>4</sup> It is estimated that healthcare systems will spend US\$553 million per year on postabortion complications and will lose US\$922 million in income due to long-term disability caused by unsafe termination.<sup>5</sup> Additionally, a woman who undergo pregnancy termination, particularly through methods such as mechanical dilation and curettage, faces an increased a risk of experiencing preterm birth and repeated pregnancy loss.<sup>6</sup>

Though the burden of pregnancy termination in Ethiopia is a significant contributor to maternal mortality and morbidity.<sup>7</sup> Previous studies conducted in Ethiopia have shown that the prevalence of pregnancy termination and its negative consequences are increasing over time,<sup>8,9</sup> and repeated pregnancy termination also accounts significant amount.<sup>10–12</sup> Several variables, including early age marriage, low level of education, early sexual intercourse initiation, violence/rape, emotional well-being, educational status, employment status, and resources, and sexual intercourse relationship, have been implicated as factors

of pregnancy termination in studies conducted across Ethiopia.<sup>13–16</sup>

However, at the national level, illustrative evidence is lacking in Ethiopia regarding the level and underlying factors of pregnancy termination. Thus, this systematic review and meta-analysis aimed to assess the prevalence of pregnancy termination and its determinant factors in Ethiopia. The findings of this study provide evidence for intervention to reduce the burden of pregnancy termination, its complications and its economic impact on the country. Additionally, this study will help to design strategies and monitor the progress of programmes aimed at achieving the maternal mortality reduction targets of the Sustainable Development Goals.

## METHODS

### Study design and setting

This systematic review and meta-analysis included cross-sectional and case-control studies, which has been conducted in Ethiopia. Systematic review and meta-analysis using computerised databases; searches were performed to estimate the prevalence and identify the determinants of pregnancy termination in Ethiopia.

### Search strategy

For this review, a comprehensive search was conducted using various searching strategies to identify relevant articles. Published articles were searched in well-known online databases including EMBASE, Medline, Google, PubMed, Google Scholar, African Journal Online and Science Direct databases. Additionally, the search was expanded by examining the reference lists of eligible articles to retrieve and extract potential articles. This systematic review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Similarly, the quality of our systematic review and meta-analysis was assessed using the Joanna Briggs Institute (JBI) critical appraisal checklist.<sup>17</sup>

Searching was done by using Medical Subject Heading (MeSH) terms related with determinants of pregnancy termination. MeSH terms enables us to select related research articles. We conducted the search for terms using Boolean operators “AND” and “OR,” both separately and in combinations. We used the search terms “(((((((Abortion) OR (termination of pregnancy)) OR (miscarriage)) AND (determinant factors)) OR (determinants)) OR (associated factors)) OR (influencing factors)) AND (Amhara) OR (Oromia) OR (Tigray) OR (Southern nation, nationalities and people’s) OR (Afar) OR (Benshagul gumuz) OR (Gamabella) OR (Somali) OR (Dire dawa) OR (Addis Ababa) OR (Hareri) OR (Ethiopia)”.

### Eligibility criteria

#### Inclusion criteria

There were no restrictions on research design. We included cross-sectional and case-control studies that

showed the prevalence of or determinants of pregnancy termination. Additionally, Only articles reported in the English language and conducted studies until February 2023 were included.

### Exclusion criteria

Case reports, case series, reviews, editorials and studies published as abstracts only were excluded. Agreements on the inclusion and exclusion of the articles were held through the participation of all authors.

### Quality assessment and data extraction

Articles were screened using their titles, abstracts and full paper reviews before being included in the meta-analysis. The quality of the included studies was evaluated using the JBI critical appraisal checklist.<sup>17</sup> The quality scores of included studies were assessed and presented using the mean scores to designate them as high or low quality. The JBI tool for prevalence and determinant studies was used as a guideline for data extraction from the final selected articles. Moreover, all authors independently reviewed the titles and abstracts of studies to be included in this systematic review and meta-analysis. Agreements on the inclusion and exclusion of the articles were reached with the participation of all authors. The extraction sheet contains name of authors, study year, publication year, region of study, study design, sample size, prevalence in percentage or proportion, OR of factors, CIs both the upper and lower bound of each corresponding OR. The OR of each factors is transformed as log (OR). The lower and upper CIs are log-transformed as log (upper CI), and log (lower CI). The SE for the proportion was also

created as:  $SE = \sqrt{\frac{p(1-p)}{n}}$ . Then the SE of the CIs was also estimated using the log-transformed upper and lower limits which is calculated as  $SE = (\log UCL - \log LCL) / 3.92$ . Finally, for pooled prevalence estimation, the proportion and its corresponding SEs were used. For factors, the log-transformed ORs and the SE of their corresponding CIs were used to estimate the effect sizes.

### Measurement of the outcome variable

In this study, termination of pregnancy is the removal of pregnancy tissue, conception products, or fetus, and placenta from the uterus. The term ‘fetus’ and ‘placenta’ is commonly used after 8 weeks of pregnancy. Pregnancy tissue and products of conception are the tissues that are produced by the union of an egg and sperm before 8 weeks. Terminating a pregnancy is a deliberate action taken by a health professional or the woman herself.<sup>18</sup>

### Registration and protocol

This review has not previously registered or prepared a protocol. As a result, no adjustments have been made.

### Patient and public involvement

Not applicable.

### Statistical methods and analysis

The meta-analysis was conducted by using Stata V.16 software after entering data into Microsoft Excel. Forest plots

were used to demonstrate the prevalence of pregnancy termination in Ethiopia. The random effect model of analysis was used as a method of meta-analysis to minimise the heterogeneity of included studies.<sup>19</sup> The study setting, population and study period were used to conduct subgroup analysis. The presentation of pregnancy termination determinants was based on ORs with a 95% CI.

The heterogeneity of the studies included was assessed using the  $I^2$  statistics. The presence of heterogeneity was determined by using  $p$  value for  $I^2$  statistics that was less than 0.05. Based on the  $I^2$  test statistics results, the heterogeneity is categorised as low (25%), moderate (50%) and high (75%).<sup>19</sup> Furthermore, the Egger regression asymmetry test was used to evaluate the publication bias.<sup>20 21</sup> When the Egger test result's  $p < 0.05$ , there is a declaration of publication bias. Also, the Duval and Tweedie non-parametric trim-and-fill analysis using the random effect analysis was conducted to detect the presence of publication bias.<sup>22</sup>

## RESULT

### Study selection

This systematic review and meta-analysis included published studies on the termination of pregnancy in Ethiopia. A total of 12 242 records were retrieved through electronic database searching, and only 33 articles were included in the final analysis (online supplemental figure 1).

### Characteristics of included studies

This review included 33 studies conducted in various regions of Ethiopia. Of all the studies, 8 (24.24%) were from the Amhara Region,<sup>11 12 15 16 23–26</sup> South Nations and Nationalities Peoples accounted for 9 (27.27%) of the total,<sup>13 27–34</sup> 1 was from Oromia,<sup>35</sup> 5 (15.15%) from Addis Ababa city administration,<sup>10 14 36–38</sup> 3 (9.09%) were from Harari region,<sup>39–41</sup> 3 (9.09%) were from Tigray region,<sup>42–44</sup> 1 (3.03%) was from Afar region and<sup>45</sup> 3 (9.09%) were from National data.<sup>46–48</sup> 28 (84.85%) of the included articles were cross-sectional studies,<sup>10–13 15 23–31 33–35 37–42 44–48</sup> and remains 5 (15.15%) were case-control studies.<sup>14 16 32 36 43</sup>

As well, 27 of the studies were institution based,<sup>10–16 24 27–33 35–46</sup> while 6 were community-based studies.<sup>23 25 26 34 47 48</sup> The sample size of the included studies ranged from a minimum of 124 in a study conducted in southwest Ethiopia<sup>34</sup> and to a maximum of 12 378 in a study conducted using Demographic Health Survey (DHS) data.<sup>48</sup> Overall, a total of 40 116 study participants were included in this review and the details are available in online supplemental table 1.

### Prevalence of pregnancy termination in Ethiopia

Based on the random effect model, the overall pooled prevalence of termination of pregnancy among women in Ethiopia was 21.52% (95% CI 15.01% to 28.03%) (online supplemental figure 2). The meta-analysis included studies with significant heterogeneity:  $I^2$  value of 99.8%,

$p < 0.000$ . Publication biases among the included studies were examined using funnel plots and Egger's regression test. The results of funnel plots showed an asymmetric shape, which indicates the presence of publication bias among included studies. Additionally, the Duval and Tweedie non-parametric trim-and-fill analysis was applied to correct publication bias among the studies, but no trimming was performed since the data are unchanged (online supplemental figures 3 and 4).

Objective assessments of publication bias by Egger's regression test also showed the presence of publication bias across studies ( $p < 0.001$ ). After conducting the trim-and-fill analysis to address publication bias, the final pooled prevalence of pregnancy termination in Ethiopia was adjusted to 21.52% (95% CI 15.01% to 28.03%).

### Subgroup analysis

We performed subgroup analysis based on the region, study population and study setting of the included studies. Table 1 shows the pooled prevalence was highest, 35.60% (95% CI 28.86% to 42.34%) in the Oromia region, followed by 34.17% (95% CI 17.67% to 86.01%) in the Tigray region, 24.63% (95% CI 10.52% to 37.75%) in the South Nation and Nationalities People Region, and the lowest was seen in three studies conducted using demographic health data, 12.10% (95% CI 5.66% to 18.50%) (online supplemental figure 5).

Furthermore, subgroup analysis reveals that the highest pooled prevalence of abortion was seen among gynaecological admitted patients, at 60.60% (95% CI 59.47% to 61.73%), followed by 25.38% (95% CI 9.39% to 41.32%) among university/college students and 27.90% (95% CI 20.01% to 35.79%) among insecurely housed women, with the lowest pooled prevalence being seen among pregnant and youth women (online supplemental figure 6). Additionally, subgroup analysis was conducted based on the year before and after the Millennium Development Goals (MDGs) implementation. The pooled prevalence of pregnancy termination before and after MDGs was 20.55% (95% CI 16.10% to 24.99%) and 21.61% (95% CI 15.01% to 28.03%), respectively (online supplemental figure 7).

### Determinants of pregnancy termination

#### Sociodemographic characteristics

The sociodemographic factors included in this analysis were the place of residence, age, marital, occupational and educational status of the women. A separate analysis was conducted for each variable. Finally, a meta-analysis of<sup>16 39</sup> two studies showed that being a student was significantly associated with pregnancy termination (OR 4.85; 95% CI 1.98 to 11.91). There was moderate heterogeneity ( $I^2 = 39%$ ) (online supplemental figures 8 and 9).

#### Reproductive characteristics

A total of five articles<sup>15 24 28 43 47</sup> were included to assess the association between first sexual initiation before the age of 18 and pregnancy termination. The pooled

**Table 1** Subgroup analysis for the prevalence of pregnancy termination in Ethiopia, 2004–2022

Subgroup	No of studies	Total sample	Prevalence (95%CI)	Heterogeneity	
				I <sup>2</sup>	P value
By region					
Addis Ababa	2	855	25.49 (10.39 to 40.09)	92.4	<0.001
Amhara	6	2371	18.06 (6.27 to 29.85)	99.0	<0.001
SNNP	8	3678	24.63 (10.52 to 37.75)	99.4	<0.001
National data	3	19854	12.10 (5.70 to 18.50)	99.7	<0.001
Tigray	2	7463	34.17 (17.6 to 86.01)	99.9	<0.001
Harari	2	1835	16.13 (12.21 to 20.05)	81.2	<0.001
Oromia	1	194	35.60 (28.86 to 42.34)	.	.
Afar	1	509	8.80 (6.34 to 11.26)	.	.
By publication year					
2016–2022 (post MDG)	15	24234	20.55 (16.10 to 24.99)	99.3	<0.001
Before MDG	10	12525	22.61 (4.55 to 40.66)	99.9	<0.001
Study population					
Reproductive age	8	4426	17.03 (8.55 to 25.52)	99.0	<0.001
Pregnant women	1	12378	8.90 (8.40 to 9.40)	.	.
Abortion care seeker	7	2990	21.19 (14.65 to 27.72)	95.3	<0.001
University or college student	6	3237	25.36 (9.39 to 41.32)	99.5	<0.001
Gynaecological patient	1	7203	60.60 (59.47 to 61.73)	.	.
Youth women	1	6401	2.50 (2.12 to 2.88)	.	.
Insecurely housed women	1	124	27.90 (20.01 to 35.79)	.	.
Total	25	36759	21.52 (15.01 to 28.03)	99.8	<0.001

Insecurely household women: it means women who live or spend their time on the street.  
MDGs, Millennium Development Goals.

meta-analysis found that women who had their first sexual experience before the age of 18 were twice as likely as those who had their first sexual experience after the age of 18 to have their pregnancy terminated (OR 1.78; 95% CI 1.13 to 2.82). There was moderate heterogeneity ( $I^2=41.6\%$ ). Moreover, two articles<sup>11 43</sup> were also included to determine the association between irregular menstrual bleeding and pregnancy termination. The final pooled meta-analysis using data from the two articles found that pregnancy termination was nearly two times more likely to occur in women with irregular menstrual bleeding than in those who had regular menstrual bleeding (OR 1.86; 95% CI 1.25 to 2.77). Similarly, a meta-analysis of six studies<sup>14 15 24 32 34 43</sup> showed that women who had multiple sexual partners were significantly associated with pregnancy termination (OR 4.88; 95% CI 3.43 to 6.93). There was low heterogeneity ( $I^2=13.4\%$ ) (online supplemental figure 10).

## DISCUSSION

Pregnancy termination is a major public health concern in Ethiopia.<sup>49</sup> In this systematic review and meta-analysis, the overall magnitude of pregnancy termination was

pooled from 25 published articles in Ethiopia, and significant determinants of pregnancy termination were identified using different articles. Being a student increased the rate of termination of pregnancy nearly five times. In addition, first sexual initiation before the age of 18, women with irregular menstrual bleeding, and multiple sexual partners were determinants of pregnancy termination in Ethiopia. The findings of this review revealed evidence to help reduce the impact of pregnancy termination in Ethiopia by aiming at the main determinants.

In Ethiopia, various studies have been conducted on the issue of pregnancy termination, involving different settings such as the community, healthcare institutions and higher education institutions. These studies have yielded varying figures regarding the prevalence of pregnancy termination. However, this particular study revealed Ethiopia has a higher prevalence of pregnancy termination compared with other low-income and middle-income countries.

The study found that the pooled prevalence of termination of pregnancy in Ethiopia was 21.52%. This finding is lower compared with a study done in Ghana at 25%,<sup>50</sup> higher than in Mozambique at 9% ( $\times 2.33$ ),<sup>50</sup> and in India

at 1.7% ( $\times 12$ ).<sup>51</sup> The difference could be attributed to various factors like; study population, study design, study area, sociodemographic characteristics and the differences in health policies of the countries. Additionally, the current study used a meta-analysis approach at the national level, incorporating community or institutional studies, while the study in Ghana and Mozambique was conducted using demographic health data with a small sample size compared with the current study.<sup>50</sup> Moreover, in our study, huge variations were seen across the regions. A spatial analysis study conducted in Ethiopia using national data also showed variation within the regions.<sup>48</sup> Thus, acting according to the needs of the region and age-specific policy is important during national policy or guideline development.

Our study observed that being a student was significantly associated with the termination of pregnancy. One of the possible explanations could be that students are likely to be adolescents, belonging to the younger age category. In addition, adolescent girls are remaining in school longer, which may factor into their decisions to postpone childbearing and terminate unintended pregnancies.<sup>52</sup> Likewise, a study conducted in India shows the tendency for pregnancy termination is high in this age category since the rate of unintended pregnancies and unmet needs for family planning are high in this age group.<sup>53</sup> The higher rate of pregnancy termination could also be attributed to a failure to provide education on prevention for unintended pregnancy and complications of pregnancy termination.<sup>54</sup>

Additionally, the idea supported by Van Rensburg is that societal poverty, unemployment and other sociodemographic factors affect youth pregnancies and it might be prone to pregnancy termination.<sup>55</sup> In addition, a review from the late 1990s found that young women often cited a desire to stay in school as a major reason for pregnancy termination.<sup>56</sup> Moreover, many adolescents continue to have difficulty accessing contraception, often as a result of stigma and/or a lack of resources.<sup>57</sup>

The study from Nigeria indicated that women aged 15–24 years are still being left behind on reproductive health matters despite increasing global attention to prioritising their health.<sup>58</sup> Studies found that educational programmes aimed at reducing sexual risk behaviours and preventing pregnancy among young people can effectively reduce pregnancy rate among teenagers.<sup>59</sup> Also, programmes aimed at abstinence-centred education are effective in preventing adolescent pregnancy.<sup>60</sup> Thus, this implies a future focus on reproductive health issues specific to students to address their needs. Additionally, future researchers should better focus on possible interventions to reduce the risk of pregnancy and pregnancy termination among students.

Women under the age of 18 at first sexual initiation were significantly more likely to terminate their pregnancy. This finding is consistent with studies conducted in Nigeria and Peru that reported a higher rate of pregnancy termination among women who had their age at

first sex before 18 years.<sup>58 61 62</sup> Studies also revealed that early sexual debuts are significantly associated with adolescent pregnancies, which are usually unwanted.<sup>63 64</sup> As well, a study conducted in Ethiopia shown initiation of sexual intercourse before the age of 18 years was found significant association with repeated pregnancy termination.<sup>65</sup>

In many low-income countries, rising ages at first marriage combined with increasing levels of premarital sex continue to result in unintended pregnancies among adolescents.<sup>66</sup> Therefore, improving the knowledge of adolescents about sexual and reproductive health issues, and increasing contraceptive access and use among young people, are important to prevent unsafe abortion or pregnancy termination.<sup>67</sup> This necessitates the development of reproductive health education specifically for adolescent girls. Future researchers should also address the gap in studies on the needs of adolescent girls and possible interventions needed to reduce sexual initiation before the age of 18 years.

Furthermore, at the individual level, we found that pregnancy termination was significantly associated with women who had multiple sexual partners. Likewise, a study conducted in Peru indicated that as the number of sexual partners increased, the odds of getting a pregnancy termination increased.<sup>68</sup> Studies conducted in Cambodia, China and the UK also have found that having multiple sexual partners is associated with a higher rate of repeated pregnancy termination.<sup>54 69 70</sup> The government shall be emphasised reproductive health education, particularly for women regarding the risks of multiple sexual partners, the access where and how to get counselling on how to prevent pregnancy.

This study also found that pregnancy termination was two times higher among women who had menstrual irregularities compared with their counterparts. Lastly, this systematic review and meta-analysis indicated that there was no statistical association between the termination of pregnancy and rural residents, marital status, women's age, educational status, primiparous, history of abortion and wanted pregnancy.

Our study has several strengths. The comprehensive inclusion of studies from various regions in Ethiopia provides a broader perspective. The rigorous methodology employed in the selection and analysis of studies further strengthens the credibility of the results. As a limitation, this finding might be prone to the risk of bias due to the significant heterogeneity of articles included from a different region of Ethiopia. In addition, differences in the study population, setting and design within the included studies might influence the results of this review. Studies conducted in health institutions, higher education might affect the pooled estimates. Furthermore, it is important to note that the review exclusively included published articles and did not incorporate qualitative studies that explore the explanations for pregnancy termination.

Future research must explain the relationship between pregnancy termination and other determinants such as

social, economic, substance use, peer pressure, alcohol use, sexual or physical violence, and knowledge of sexual and reproductive health issues such as family planning and fertility.

## CONCLUSIONS

One in every five women had their pregnancies terminated, which is a high rate when compared with sub-Saharan countries. Being a student was significantly associated with the termination of a pregnancy. In addition, irregular menstrual bleeding, early initiation of sexual intercourse and multiple sexual partners were important determinants of pregnancy termination.

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**Contributors** HK, MWA, ABK, EKM, TH and LAT conducted the data curation and extraction. HK, LAT, EKM and MWA wrote the original and final draft of the research. LAT, EKM, MWA and HK conducted formal analyses and data interpretation. All authors read and approved the final manuscript.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial, or not-for-profit sectors.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available on reasonable request.

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