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Research article

Early discontinuation of the IMPLANON® and associated factors in Ethiopia, systematic review and meta-analysis

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ABSTRACT

Background: Implanon® is a commonly used effective long-acting reversible contraceptive method. It provides contraception for up to three years. Its early discontinuation was associated with an unwanted pregnancy, abortion, and socioeconomic burden. Thus, the main aim of this systematic review and meta-analysis is to determine the rate of early discontinuation of Implanon® and associated factors in Ethiopia.

Method: This Systematic review and meta-analysis was performed by using online databases including PubMed, Google Scholar, Cochrane, HINARI, Web of Science, and other gray and online repositories of Ethiopian Universities. The JOANNA Briggs Institute standard data extraction and appraising sheet format was used for the extraction of all included studies. To test the heterogeneity of the studies the Cochran Q test and I^2 statistics test were used. The Funnel plot and Egger's tests were used to detect possible publication biases of the included studies. The forest plots were used to present the finding of the overall prevalence of the early Implanon® discontinuation and the odds ratio (OR) along with a 95% CI.

Result: In this systematic review and meta-analysis seven studies with a total population of 3161 women using Implanon® were included. The overall pooled early Implanon® discontinuation rate was 31.34% (95%CI: 19.20, 43.47). Early discontinuation of Implanon® was associated with lack of counseling during service delivery 2.55times (OR: 2.55, 95%CI: 1.99, 3.25), the experienced side effect 3.25 times (OR: 3.25, 95%CI: 2.48, 4.24), absence of appointment after insertion 6.06 times (OR: 6.06, 95%CI: 2.15, 17.05), others decision on the women's choice 3.30 times (OR = 3.30, 95%CI: 2.52, 4.32), and lack the satisfaction of provided service 2.68 times (OR: 2.68, 96%CI: 1.61, 4.45).

Conclusion: About one-third of the women in Ethiopia discontinue the use of Implanon® within one year of the insertion. This is high compared to findings from other countries. Lack of counseling about the service, women's experience of the side effect, absence of the appointment following the service provision, other decisions on the method chosen, and lack of satisfaction were factors associated with the discontinuation of Implanon®. Hence, efforts should be made to reduce the rate of early discontinuation of Implanon® through drafting national guidelines and strategies accompanied by appropriate implementation, follow-up to foster adequate counseling, arrangement of appointments, helping women to decide on the choice, and increase the quality of care provision to enhance the satisfaction of the service.

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1. Introduction

Implanon® is a commonly used and progesterone-only long-acting reversible contraceptive method. It is a single 4 mm rod and 2 mm in diameter which is inserted subdermally in the upper arm of a nondominant hand and contains 68 mg of the progestin etonogestrel which provides contraception for three years duration [1–4]. It releases 25–30 mg/day of etonogestrel hormone to provide contraception for up to three years to avoid pregnancy with its mechanisms of action including suppressing ovulation, and thickening of the cervical mucous so that it becomes impenetrable to sperm [5–8]. Once the Implanon® is inserted it does not require daily or monthly taking, minimal maintenance, and requires no compliance efforts by the user like other short-term contraceptive methods [9, 10]. In 2012, the United Nations Commission on Life-Saving Commodities for Women and Children endorsed it as one of its 13 life-saving commodities [11,12].

Long-acting reversible contraceptive implants including Implanon® have high efficacy and ease of maintenance making implants an ideal contraceptive for many women [13,14]. They are suitable for breastfeeding women who have contraindications to estrogens like women with diabetes, hypertension, sickle cell anemia, and HIV infection. Moreover, it has a nearly immediate onset of action with insertion, the rapid termination of all effects with removal, and once implanted it does not require daily or monthly dosing [15, 16].

However, it was associated with different side effects including heavy and irregular bleeding, fibroadenoma, genital condyloma, teratoma, cervical dysplasia, headache, asthma, gastrointestinal problems, decreased libido, acne, insertion site pain, and mood changes [17,18]. Those side effects along with individual and service provision-related problems were reasons for non-use and discontinuation before the completion of its intended duration [19]. This marks hindering the target of the expanding family planning service and other reproductive and socio-economic problems like unwanted pregnancy and abortion with its complication [20,21].

Currently, contraceptive use in developing countries is improving, it has changed from 51.8% in 1990 to 62% in 2010[22]. In South Africa, the yearly contraceptive prevalence rate raise is 0.68% which would reduce the number of pregnancies from 1.3 million in 2014 to 1 million in 2030[23]. According to the mini 2019 Ethiopian demographic survey (EDHS) data, 41% of the women utilize injectables, and 9% use implants [24]. In another study in Tigray Ethiopia, 10.1% of the women utilize Implanon® [25]. But still, there are many women in Africa who live with the unmet need for family planning methods, discontinuation of the service, and non-use of service [26–28]. This is because the family planning service provided doesn't have quality in keeping privacy, provision of adequate information, and communication, to satisfy the need and expectations of the women [29].

Ethiopia is a populous African country with a higher birth rate [30]. The Ethiopian government commenced a strategic plan to increase the uptake of the long-term contraceptive method, unlike other long-term contraceptives including Jadele, Sinoplant, and IUD, Implanon® is the most accepted in the country [31]. To prevent the rate of early discontinuation, service providers and educators should give adequate information, follow-up, and counseling about the benefits, risks, and common side effects [22]. There are five single studies conducted in Ethiopia on the early discontinuation rate of Implanon® and associated factors, but no study shows the overall early discontinuation of Implanon®. Therefore, the main aim of this systematic review and meta-analysis is to determine the rate of early discontinuation of the Implanon® and associated factors in Ethiopia.

2. Method

2.1. Search strategy

This systematic review and meta-analysis were performed by searching the potential articles on the rate of early Implanon® discontinuation and associated factors by international databases including Google Scholar, PubMed, Cochran, HINARI, and Web of Science, and literature from electronics repositories of Ethiopian Universities were used. The people intervention comparison and outcome (PICO) formatting question was used to search relevant articles from the database mentioned above. These are '' Implanon'', ''etonogestrel'' naxoplanon ''long term contraceptives'', ''hormonal contraceptives'', ''family planning methods'', ''contraceptive methods'', ''early discontinuation of implanon'', ''early'', ''irregular bleeding'', ''heavy vaginal bleeding'', '' nausea'', ''leukorrhea'', ''abdominal pain'', ''decreased libido'', ''headache'', ''lack of satisfaction'', ''absence of follow up'', ''lack of chance to choose the method'', ''lack of information'', ''misinformation'', ''rumors''. The MeSH engine term used include: ''Implanon'', OR ''Etonogestrel'' OR ''Long term contraceptives'' OR ''Hormonal contraceptives'' OR ''Family planning methods'' OR ''Early'' OR ''Discontinuation of implanon'', OR ''Irregular bleeding'', OR ''Heavy vaginal bleeding'', OR '' Nausea'', OR ''Leukorrhea'', OR ''Abdominal pain'', OR ''Decreased libido'', OR ''Genital condyloma'', OR ''Lack of satisfaction'', OR ''Absence of follow up'', OR ''Lack of chance to choose the method'', OR ''Lack of information'', OR ''Misinformation'' and Ethiopia and related terms.

2.2. Inclusion criteria

Those articles described the rate of early discontinuation of Implanon® and associated factors in Ethiopia were combined.

2.3. Exclusion criteria

The exclusion was done for the articles that don't have complete abstracts, texts, and reported out of the area of the outcome interest.

2.4. Quality assessment

To assess the quality of the articles, Joan Briggs Institute (JBI) model [32], a cross-sectional study quality appraisal checklist was used and the article's and literature's quality evaluation process was carried out independently by three authors (ZF, AM, and TT). Disagreements and conflicts during the evaluation process were handled by two authors DT and EB). The JBI quality appraisal checklist for the cross-sectional study consists of eight items including criteria for inclusion of study participants, appropriateness of description of study subject and setting, validity and reliability of the measurement of exposure, an appropriate description of objective and standard criteria used, an appropriate representation of confounder identification, use of strategy to handle confounders, reliability, the validity of outcome measurement, and the appropriateness of statistical analysis method used. After assessments of the quality of the articles using the above indicators, the articles with a score of 50% and more were included in the analysis.

2.5. Data extraction

After the data set was exported to Endnote version ×8 software, it was then transferred to the Microsoft Excel spreadsheet to remove duplicate data in the review. Three authors (ZF, TT, and AM) independently extracted all the important data using a standardized JBI data extraction checklist. The disagreements that occurred between reviewers were resolved by the fourth and fifth authors (DT and EB).

2.6. Measurement of outcome

This systematic review and meta-analysis study had two measurements of the outcome variables. The first one was the rate of early discontinuation of Implanon® and the second measurement outcome was factors associated with early discontinuation of Implanon®. To compute the odds ratio of the studies, the factors contributed for the early discontinuation of Implanon® was summed up. The outcome of this study was to focus on single studies estimating the rate of early Implanon® discontinuation and associated factors in Ethiopia.

2.7. Early Implanon® discontinuation

Was defined as the removal of Implanon® within 12 months of insertion because of different reasons.

2.8. Factors associated with Implanon® discontinuation

Were defined as the reasons for the early discontinuation of Implanon® like side effects (heavy and irregular bleeding, genital condyloma, cervical dysplasia, and headache), educational level, parity, history of Implanon® use, counseling of the service, follow-up after service provision, the satisfaction of provided service, and other [33–35].

2.9. Data synthesis and reporting

This systematic review and meta-analysis estimated pooled rate of early discontinuation of the Implanon® in Ethiopia using the standard PRISMA flowchart diagram and PRISMA checklist guideline [36].

2.10. Data analysis

A Funnel plot and Egger's regression tests [44] were used to check any publication biases of the articles that meet the inclusion criteria. The heterogeneity of the studies was tested by using Cochran Q-test and I squared statistical testes [45]. Random-effect inverse-variance model was computed to determine pooled analysis due to the presence of heterogeneity in the studies. The existence of a significant level of heterogeneity in the included studies dragged us to do a subgroup analysis using the sample size and regions in Ethiopia to assess the pooled prevalence of the early discontinuation of the Implanon®. To compute the analysis of the data STATA version 14 statistical software. A Forest plot was used to present the pooled point prevalence of early discontinuation of the Implanon® with a 95% of confidence interval (CI).

3. Result

3.1. Literature search result

3.1.1. The feature of the included studies

The search was carried out using international online databases including PubMed, Google Scholar, Cochrane, Science Direct, web of science, HINARI, and other gray and online repositories of Ethiopian Universities, and finally, 145 were retrieved depicting the rate of early Implanon® discontinuation and associated factors. 93 duplicated articles were removed using Microsoft Excel, then 52 studies were left for further review of their title and abstracts. Following a review of the title and abstracts, 32 articles that don't relate to Implanon® were excluded. Therefore, 20 full-text articles were accessed and assessed for inclusion criteria, which resulted in the

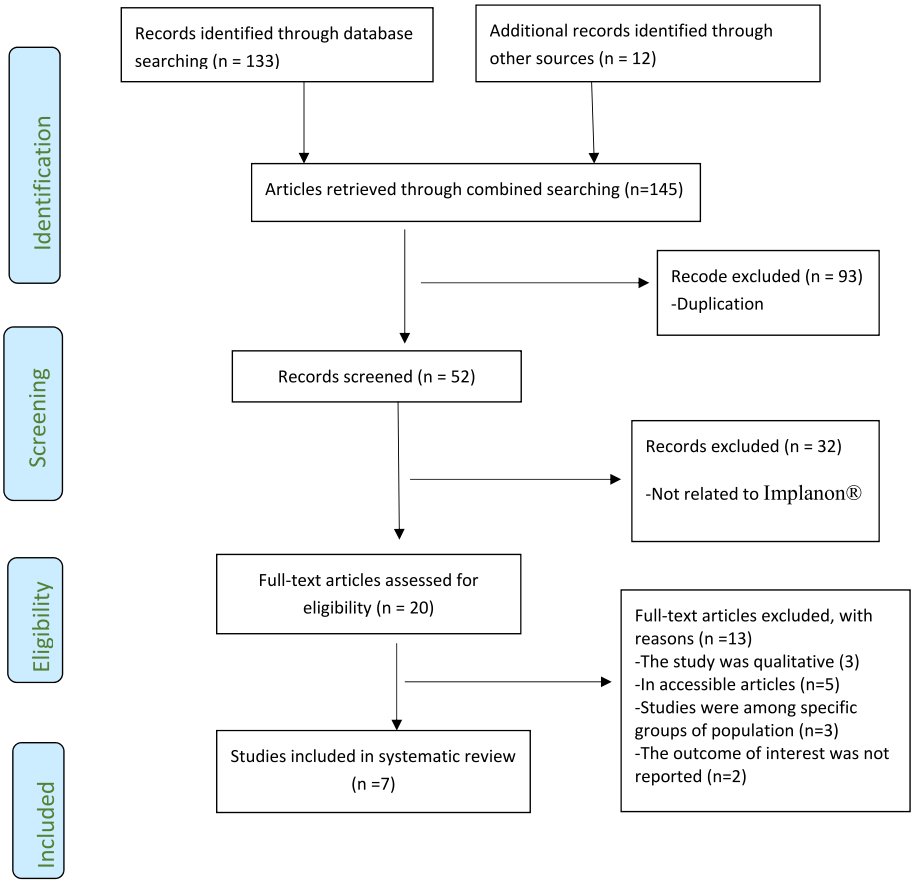

Fig. 1. PRISMA flow chart of study selection for systematic review and meta-analysis of the rate of early discontinuation of Implanon® and associated factors in Ethiopia.

Table 1
Characteristics of included studies in systematic review and meta-analysis of the rate of early discontinuation of implanon® and associated factors in Ethiopia.

No	Author	Study year	Region	Study area	Study design	Sampling technique	Sample size	Response rate	Prevalence	Quality
1	Kalayu Birhan et al. [37]	2015	Tigray	Ofla district	Cross sectional	Consecutively	244	92.4%	16%	Low risk
2	Mengistu Asaye et al. [38]	2018	Amahara	Debre tabor	Cross sectional	Systematic	449	100%	65%	Low risk
3	Negaso& Geberetsadik [39]	2018	SNNPR	Dale	Cross sectional	Multi-stage	683	96.1%	23.4%	Low risk
4	Tesfaye Hana et al. [40]	2020	Oromia	Mettu	Cross sectional	Systematic	430	94.9%	19.3%	Low risk
5	Melese Seyoum et al. [41]	2017	Amahara	Debre markos	Cross sectional	SRS	348	90.23%	23.9%	Low risk
6	Mamecha Mesha et al. [42]	2020	SNNPR	Kucha	Cross-sectional	Systematic	430	100%	34%	Low risk
7	Tsirity G/Medhin et al. [43]	2019	Tigray	Mekele	Cross sectional	SRS	229	100%	38%	Low risk

further exclusion of 13 articles. As a result, 7 studies met the inclusion criteria to undergo the final systematic review and meta-analysis (Fig. 1) (Table 1).

3.1.2. Prevalence of the early Implanon® discontinuation rate in Ethiopia

The result of this systematic review and meta-analysis showed the overall pooled rate of early Implanon® discontinuation is presented with a forest plot. Therefore, the pooled estimated prevalence of early Implanon® discontinuation in Ethiopia was 31.34%

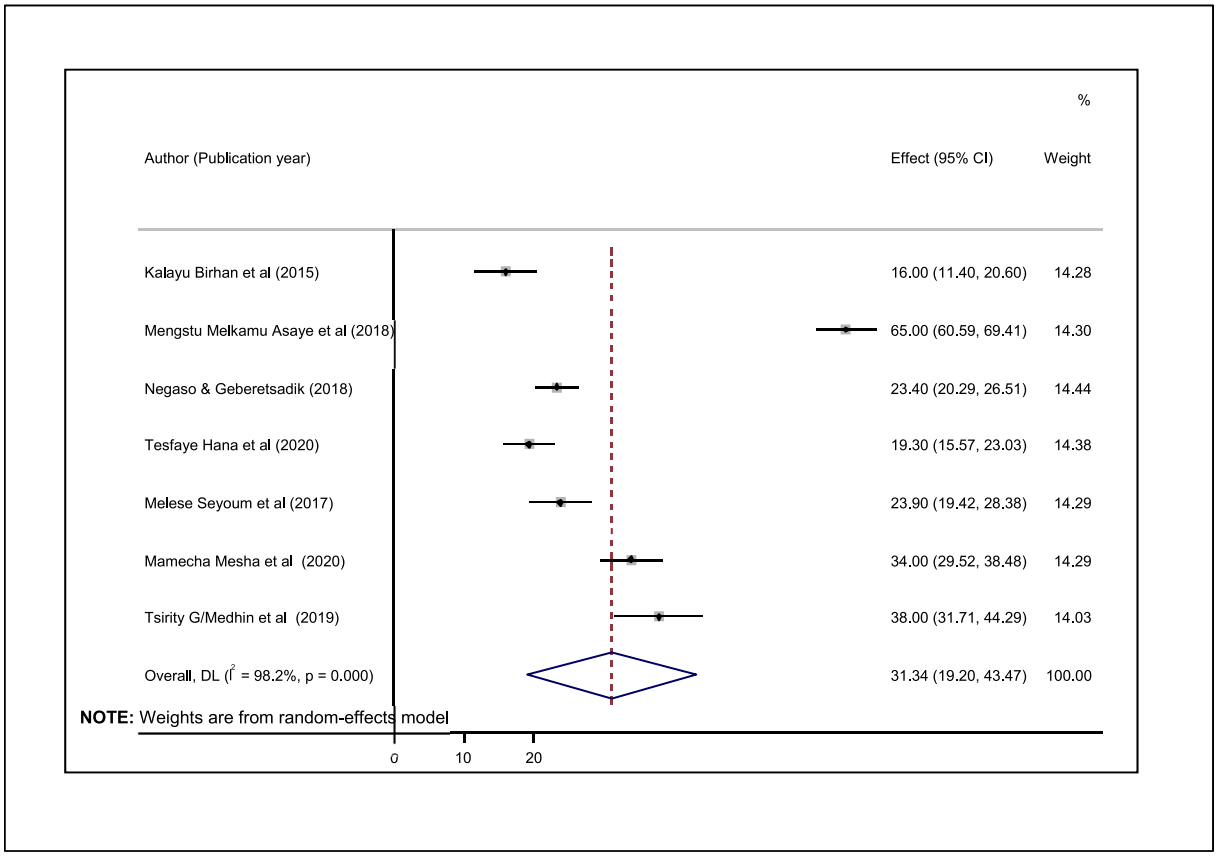

Fig. 2. Forest plot of rate of early discontinuation of Implanon® with a corresponding 95%CIs of seven studies. NOTE: Weights are from random-effects model.

(95%CI: 19.20, 43.47); I2 = 98.2%, p < 0.01) (Fig. 2).

3.1.3. Publication bias

For the asymmetric distribution of the early Implanon® discontinuation, a Funnel plot was assessed to check publication bias by visual inspection of a Funnel plot (Fig. 3). The absence of the publication bias was determined by Egger's regression test showing a p-value of 0.250.

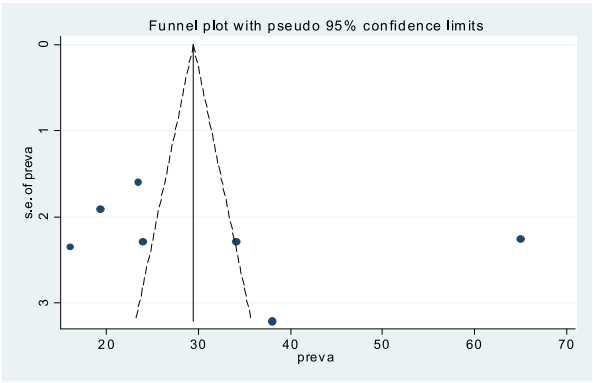

Fig. 3. Funnel plot to test publication bias for early discontinuation of Implanon® in Ethiopia.

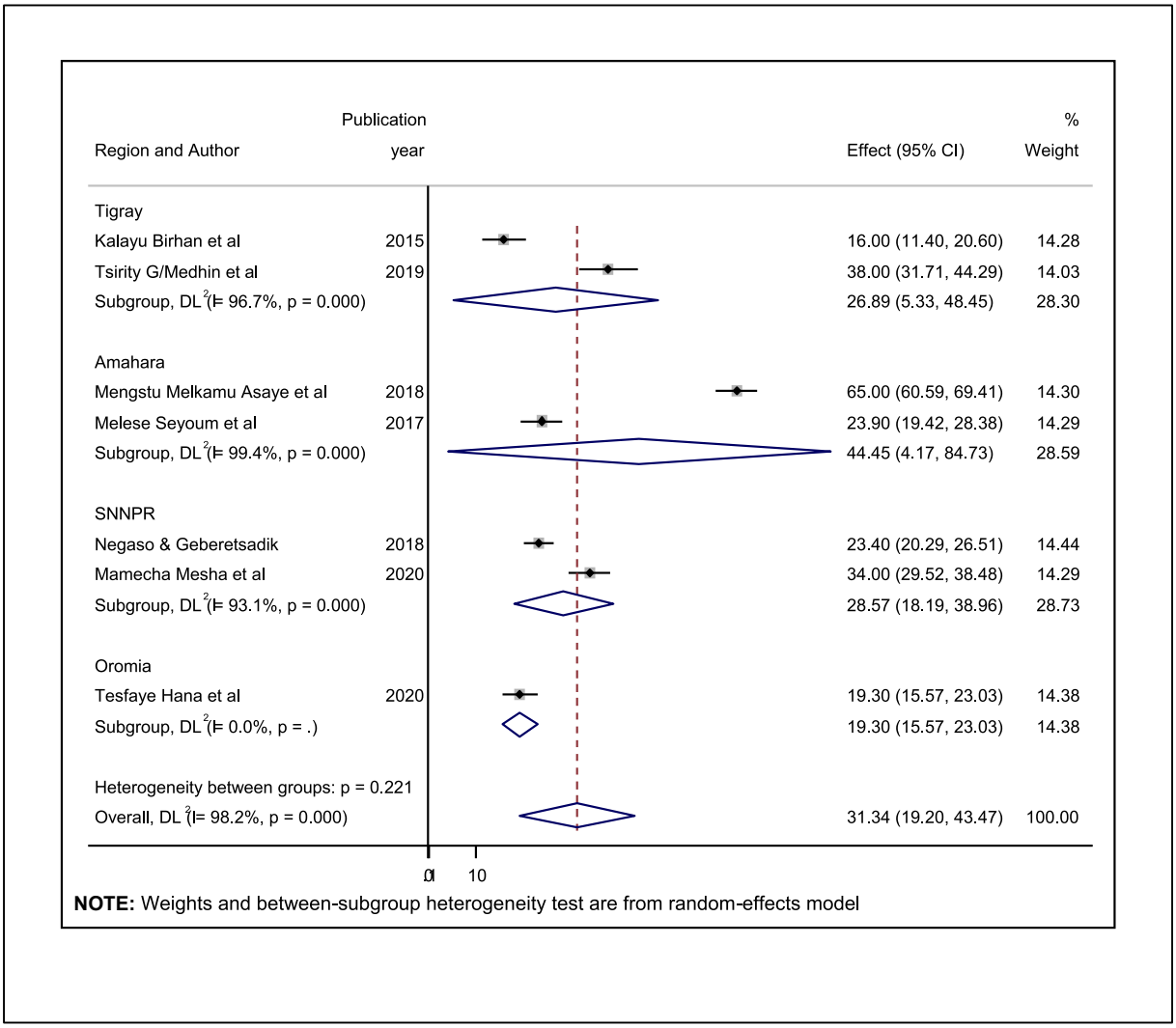

Fig. 4. Forest plot of the subgroup analysis of early Implanon® discontinuation based on regions of Ethiopia. NOTE: Weights and between-subgroup heterogeneity test are from random-effects model.

3.1.4. Subgroup analysis

The subgroup analysis was done using random effect size analysis based on regions of Ethiopia and the sample size of the articles. It was computed because of the evidence in heterogeneity of the studies. The presence of the marked heterogeneity was shown by the Cochrane $I^2 = 98.2\%$, $p < 0.01$. The subgroup analysis for regions of the Ethiopia showed the rate of early discontinuation of Implanon® discontinuation was highest in the Amahara region accounting for 44.45% (95%CI: 4.17, 84.73) followed by SNNPR for 28.57% (95%CI: 18.19, 38.96). Similarly, the rate of early discontinuation was higher among studies having a sample size of more than 300, 33.09% (17.72, 48.46) (Fig. 4) (Fig. 5).

3.1.5. Factors for early discontinuation of Implanon®

3.1.5.1. Association between early discontinuation of Implanon® and lack of counseling during service provision. Under this category five studies were included [37,39–41,43]. The possibility of women's discontinuation of Implanon® for those women lacking counseling during service delivery was 2.55 times (OR: 2.55, 95%CI: 1.99, 3.25) more likely compared with getting adequate counseling for those women. In this meta-analysis, included studies were characterized by the absence of heterogeneity ((I2 = 0.0%, p = 0.783). Besides, because of the absence of heterogeneity we used the analysis of a fixed-effect model (Fig. 6).

3.1.5.2. Association between early discontinuation of Implanon® and experience of the side effect. Four studies were included under this category [37,39,41,43]. The tendency of early Implanon® discontinuation with the women experiencing side effects is 3.25 times (OR:

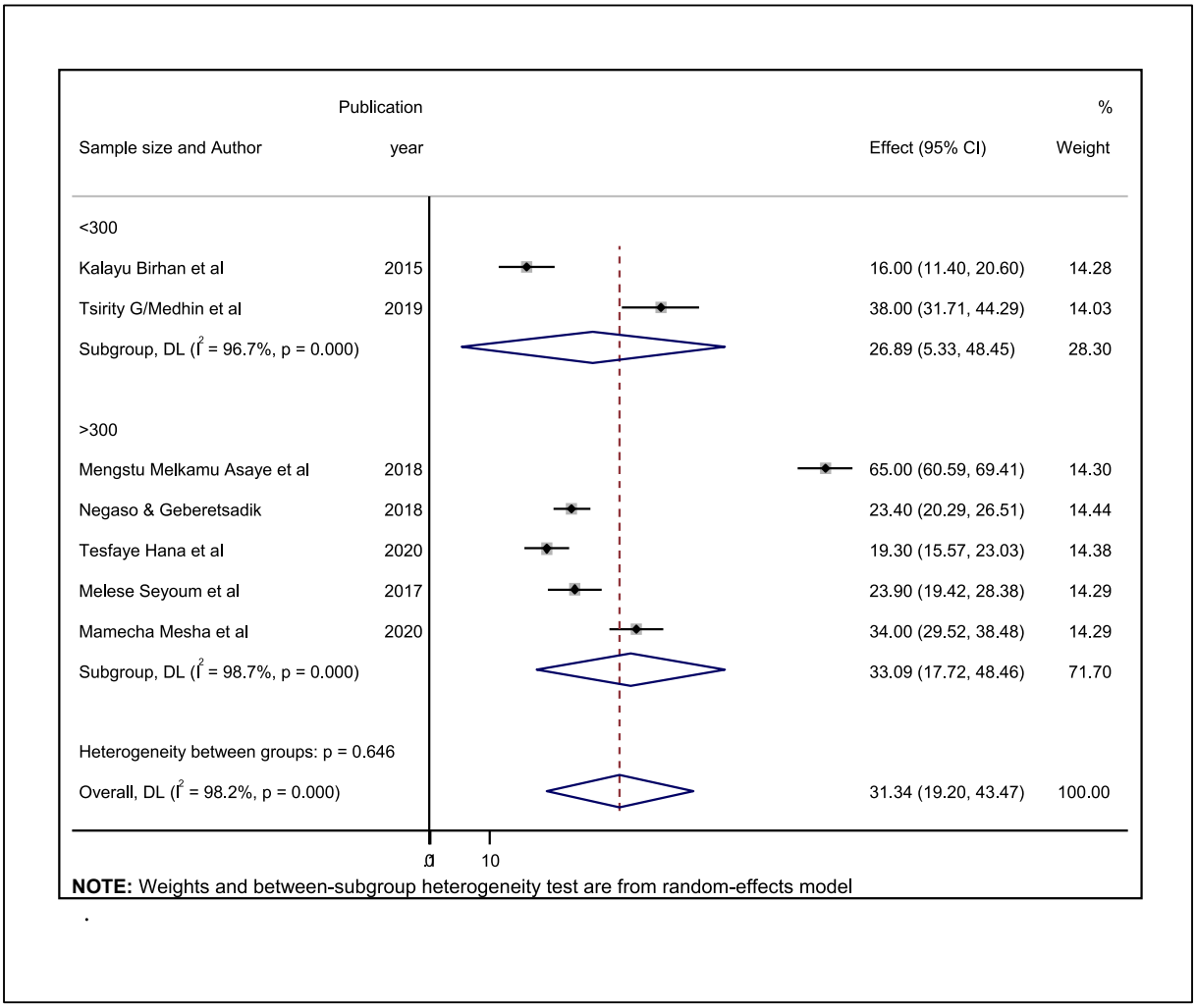

Fig. 5. Forest plot shows subgroup analysis of early discontinuation rate of Implanon® based on sample size of studies. NOTE: Weights and between-subgroup heterogeneity test are from random-effects model.

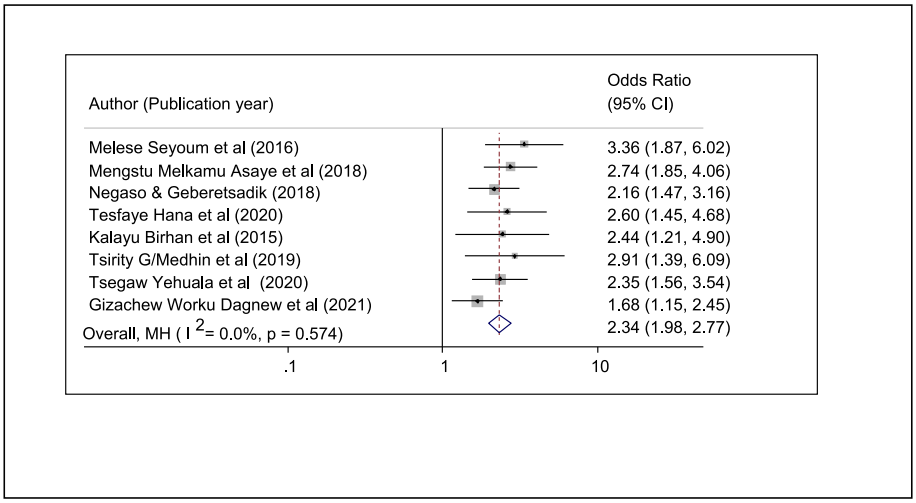

Fig. 6. Forest plot showing association between early discontinuation of Implanon® and lack of counseling during service delivery.

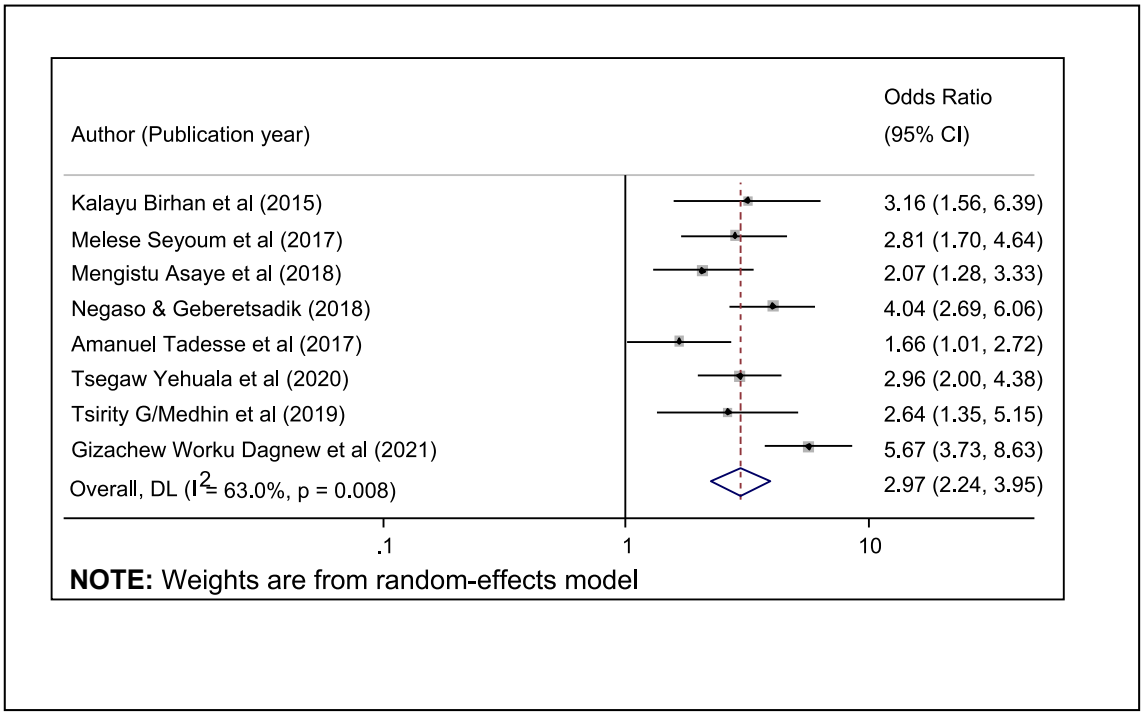

Fig. 7. Forest plot displaying association between early discontinuation of Implanon® and experience of side effect. NOTE: Weights are from random-effects model.

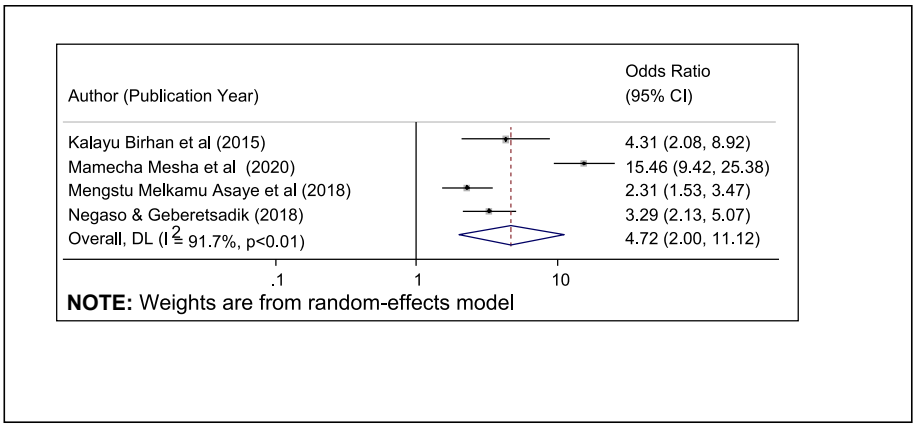

Fig. 8. Forest plot displaying association between early Implanon® discontinuation and lack of appointment after service. NOTE: Weights are from random-effects model.

3.25, 95%CI: 2.48, 4.24) more likely compared to those women who had not developed a fear of side effects. Included studies in this meta-analysis were characterized by the presence of heterogeneity $I^2 = 00.0\%$, $p = 0.616$). Therefore, we used fixed effect model analysis due to heterogeneity (Fig. 7).

3.1.5.3. Association between early discontinuation of Implanon® and lack of appointment. Under this three studies were summed up [37, 39,42]. The odds of early Implanon® discontinuation among women who do not have an appointment after insertion is 6.06 times (OR: 6.06, 95%CI: 2.15, 17.05) more likely than women who did arrange an appointment. This meta-analysis has marked heterogeneity ($I^2 = 91.0\%$, $p \leq 0.01$). Therefore, we used a random-effect model (Fig. 8).

3.1.5.4. Association between early discontinuation of Implanon® and others' decision on the women's choice. Under this category, three studies were included [39,41,42]. The decision made by others on the women's choice has 3.03 times (OR = 3.02, 95%CI: 2.52, 4.32)

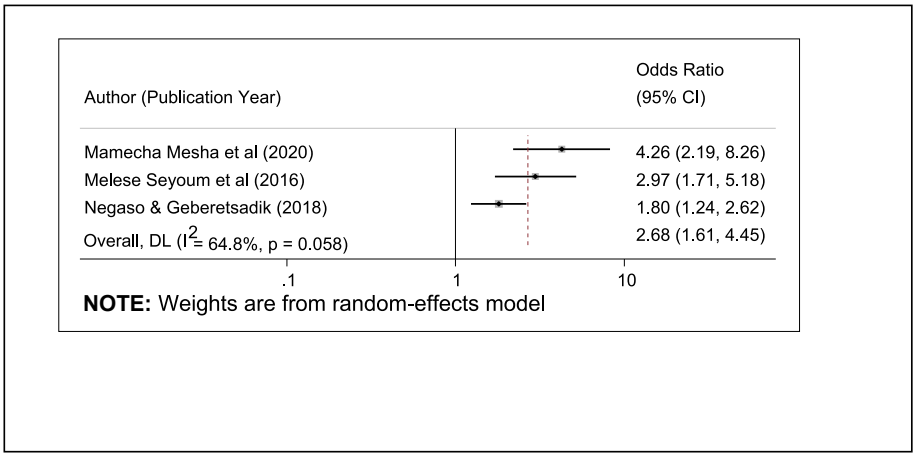

Fig. 9. Forest plot displaying the association between early Implanon® discontinuation and other decision on women's choice. NOTE: Weights are from random-effects model.

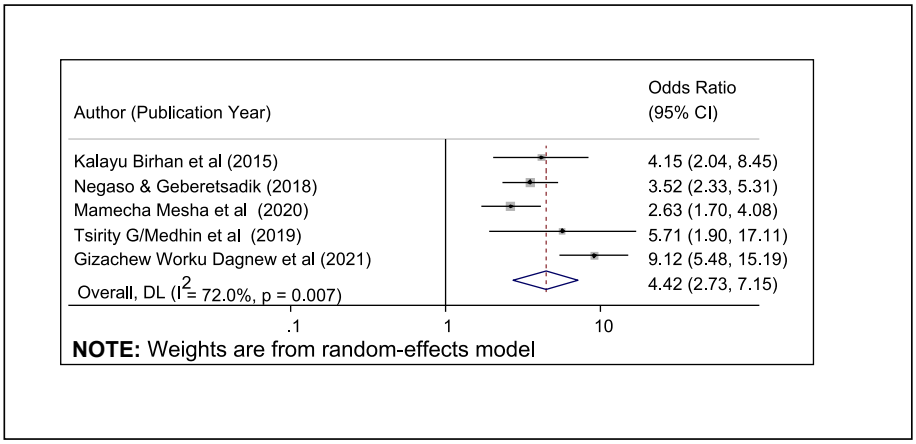

Fig. 10. Forest plot displaying association between early Implanon® discontinuation and lack of satisfaction of provided service. NOTE: Weights are from random-effects model.

risk of early discontinuation of Implanon® than women who decided on their own. Regarding the heterogeneity status of this meta-analysis, it has no heterogeneity ($I^2 = 0.0\%$, $p = 0.481$) for this matter we used fixed effect model analysis (Fig. 9).

3.1.5.5. Association between early discontinuation of Implanon® and lack of satisfaction. This category five studies were included [37, 39,42,43]. The possibility of early discontinuation of Implanon® among women lacking the satisfaction of provided service is 2.68 times (OR: 2.68, 96%CI: 1.61, 4.45) more likely than women satisfied with the service given. This meta-analysis has no heterogeneity ($I^2 = 64.8\%$, $p = 0.058$). Thus, the analysis was made by a fixed effect model (Fig. 10).

4. Discussion

The pooled rate of early discontinuation of Implanon® according to this systematic review and meta-analysis was estimated to be 31.34% (95%CI: 19.20, 43.47). Our data showed one-third of the women who used Implanon® as a contraceptive method removed within one year of the insertion and this infers the bottleneck on consistent use of Implanon® family planning in Ethiopia.

This finding was similar to a study in Australia 26% [49], the UK 25% [50], and Uganda 31% [51], this similarity might be because women in Uganda have a similar service delivery setup and living conditions to women in Ethiopia. Contrariwise, the finding of this systematic review and meta-analysis is two to four times higher than the studies conducted in the USA 16% [52], Congo 9.06% [53], and Egypt 13.5% [54]. The justification for this discrepancy may be the women using v contraceptives have a good understanding of the method, and they get adequate counseling and follow-up. Besides these, socio-demographic characteristics differences may be the reason. The odds of Implanon® discontinuation among women lacking counseling during service provision was 2.55 times (OR: 2.34, 95%CI: 1.98, 2.77) more likely compared to women who get adequate counseling of the service. Some studies support this finding in

Congo [53]. This might be because when women don't get adequate information and counseling regarding the service they lose confidence and decide to remove the Implanon® before the required service.

The possibility of discontinuation of Implanon® among women who experienced side effects of the method was 3.25 times (OR: 3.25, 95%CI: 2.48, 4.24) more likely compared to those women who didn't develop side effects. There are some studies from different countries supporting this finding: USA [55], Switzerland [56], Australia [49], South Africa [17], Buffalo South Africa [57], Congo [53], Uganda [58], and Egypt [54]. This can be justified as during the experience of the side effect particularly vaginal bleeding the women think the only reason for irregular bleeding is Implanon® other than ruling out the cause.

The possibility of Implanon® discontinuation among women with a lack of appointment after the provision of the service was 6.06 times (OR: 6.06, 95%CI: 2.15, 17.05) more likely than women with an appointment. This result is unique and not supported by studies from other countries. This might be justified by the fact when the appointment was not arranged for the women following the service provision the women were exposed to different physical and social challenges which can be managed through the arrangement of follow-up.

The likelihood of Implanon® discontinuation among women whose decision was made by others was 3.03 times (OR = 3.02, 95% CI: 2.52, 4.32) than women who decided by themselves. This finding also doesn't have similarity with studies from other countries. Whenever the decision was made by the husband, health care providers, and other relatives the women may not feel confident in the service so the tendency of discontinuation was high.

The odds of Implanon® discontinuation among women lacking satisfaction with the provided service was 2.68 times (OR: 2.68, 96%CI: 1.61, 4.45) more likely than women satisfied with the service. Whenever women aren't satisfied with the provided service they might think differently and lack confidence in providing service so they remove Implanon®. This presence of heterogeneity might be due to the sample size of each study, the nature of the study design, and the study setting.

Although maternal mortality was steadily declining in Ethiopia, it is still the highest compared to other countries [46]. The leading causes of death in Sub-Saharan Africa were obstetric haemorrhage 28.8%, hypertensive disorders in pregnancy 22.1%, non-obstetric complications 18.8%, and pregnancy-related infections 11.5%. By providing quality, accessible, and affordable maternal care services, currently, there is an emphasis made by governmental and non-governmental organizations under the realm of sustainable development goals [47,48].

5. Limitations of the study

This systematic review and meta-analysis have some weaknesses. There may be a chance to do this type of study in Ethiopia with a higher rate of early discontinuation of Implanon®. In terms of the clinical risk factor, it is difficult to know how the study population from included studies compared to that of the larger Ethiopian population. It may lack national representativeness because the data were only from four regions of Ethiopia.

6. Conclusion

According to this systematic review and meta-analysis, the overall rate of the early discontinuation of Implanon® was high in Ethiopia. Lack of counseling, the experience of side effects, lack of appointment, other decisions on the method used, and lack of satisfaction with the service provided. Hence, to reduce the rate of the early discontinuation of Implanon® national tactics should be drafted to provide adequate counseling, arrangement of appointments, help women to decide on the choice of the family planning method, and increase the quality of care provision to enhance the satisfaction of the service.

Author contribution statement

Zerihun Figa, Abbas Mahamed: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Tesfaye Temesgen, Etaferahu Bekele: Contributed reagents, materials, analysis tools or data.

Dessalegn Tarekegn: Performed the experiments; Analyzed and interpreted the data.

Data availability statement

Data will be made available on request.

Additional information

Supplementary content related to this article has been published online at [URL].

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

Abbreviations

CI	Confidence Interval
OR	Odds Ratio
JBI	Joan Briggs Institute
SNNPR	Southern nation national peoples region

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