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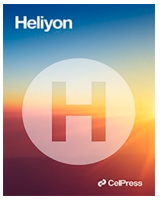

Research article

Level of skin-to-skin care practices among postnatal mothers in Ethiopia. A systematic review and meta-analysis

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ABSTRACT

Introduction: Even though skin-to-skin contact offers several advantages for the survival of the newborn, it is not often practiced in Ethiopia. For instance, hypothermia which increases the risk of neonatal mortality by five times is prevented by this practice. Despite this, there are inconsistent findings that can affect policymaking. Consequently, this metanalysis aimed to produce trustworthy national data regarding skin-to-skin care practice and its determinants among postpartum mothers in Ethiopia.

Methods: A search of the publications was conducted using MEDLINE, PubMed, Embase, Scopus, Web of Sciences, and Google Scholar. The program used for cleaning and analysis was STATA version 18.2. The random-effects model was utilized to estimate the pooled prevalence, which was then presented using a forest plot with a 95 % confidence interval. We evaluated heterogeneity using I2 and Cochrane Q statistics. Moreover, a visual examination of a funnel plot and Egger's regression test were used to evaluate publication bias.

Results: This study included eight studies with a total of 10410 postpartum mothers. The overall level of skin-to-skin care practices was 48 % (95%CI: 31, 65. $I^{2=}$99.38 %, P = 0.001). Based on subgroup analysis by year of publication, studies published between 2017 and 2019 years showed that the level of skin-to-skin care practice among postnatal mothers was 52 % (95 % CI: 14–89, I^2 = 99.19). The knowledge of mothers about skin-to-skin care was significantly associated with practicing a level of skin-to-skin care.

Conclusions: The findings showed that in Ethiopia, comparatively less than half of the newborns received skin-to-skin care. Moreover, there was a substantial correlation between the mother's knowledge and practice of skin-to-skin care. Therefore, both the government and all stakeholders should take coordinated action to improve and expand skin-to-skin care practices through health education, so that all postnatal mothers can practice this vital newborn care.

1. Introduction

In 2021, 2.3 million children around the world died in the first month of life, which is approximately 6400 newborn deaths every day. Newborns in developed countries have a ten-fold lower chance of dying than those born in developing countries [1]. Countries with the highest rates of newborn death have also been found to have higher rates of neonatal hypothermia, which can be avoided by

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practicing of skin-to-skin care (SSC) within the first hour of life [2]. A study done in Ethiopia indicated that the newborn death from hypothermia was 37 per 1000 live births [3].

Skin-to-skin care is defined as the process of laying a nude newborn on a mother's bare chest or abdomen immediately possible after birth and it should be practiced for at least 1 h after birth [4]. After delivery, skin-to-skin contact between a mother and her newborn helps with breastfeeding, reduces crying, and strengthens the bond between the two. Maintaining SSC throughout the postpartum phase is essential because it will lessen the need for formula to be added to breast milk and assist new mothers in becoming more adjusted to their new roles as mothers [5–8].

Research demonstrated the significant benefits of skin-to-skin care for new mothers, including a reduction in the time of placental delivery and a decrease in postpartum hemorrhage by increasing oxytocin levels in the mother during the first hour after delivery [9, 10]. Despite the fact that skin-to-skin contact has several benefits for both mothers and newborns, Ethiopians do not frequently practice it [11]. In spite of efforts to raise newborn survival rates, newborn mortality has not decreased [12,13]. Maternal SSC practice is discouraged by existing societal ideas and behaviors [14]. This is due to the fact that mothers do not believe that SSC is essential for their newborns. After all, newborns are usually taken from their mothers at birth [15–17].

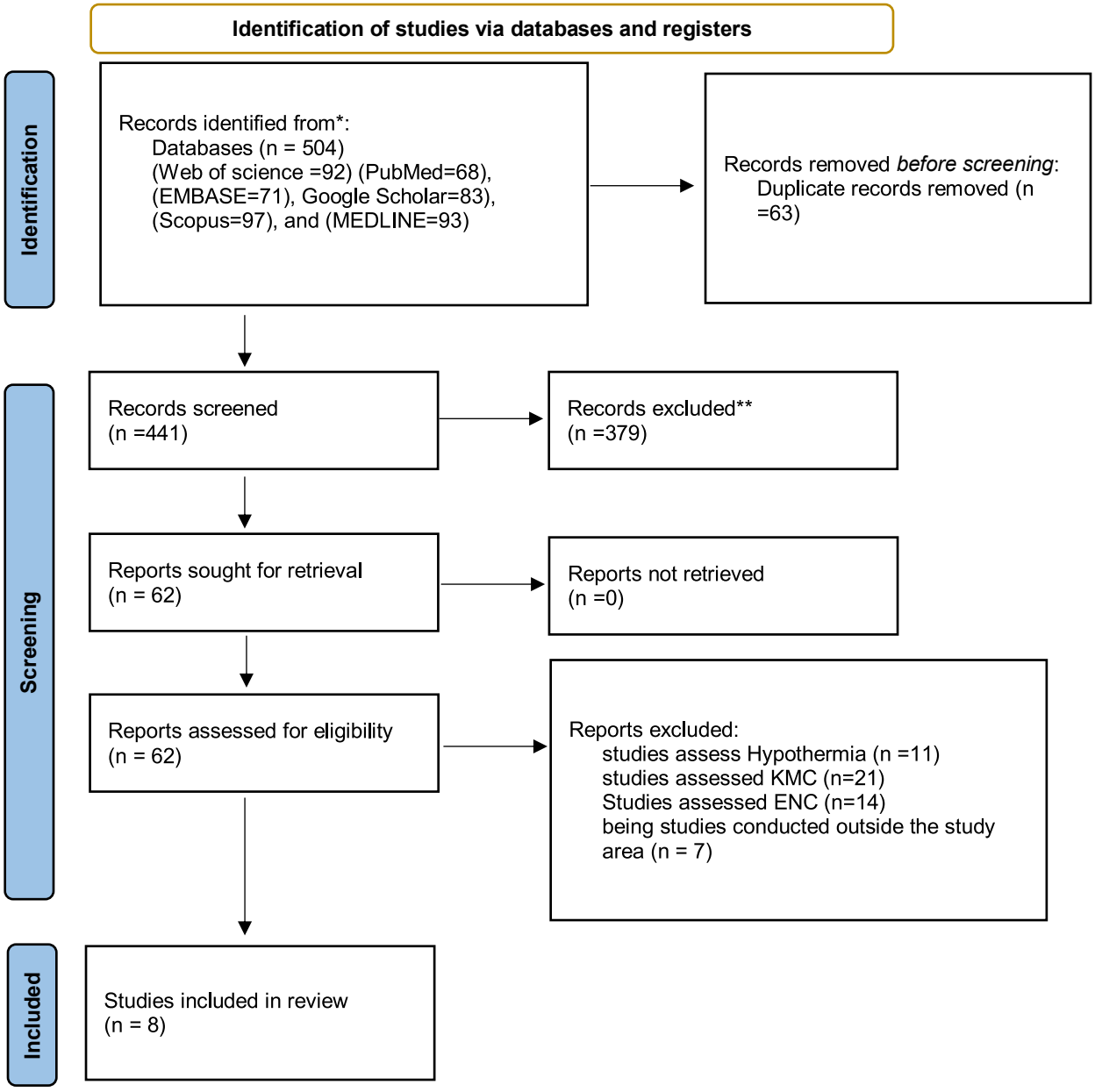

Fig. 1. PRISMA 2020 flow diagram for systematic reviews and meta-analysis for skin-to-skin care in Ethiopia, 2023.

Various studies have demonstrated a correlation between low levels of SSC practice and the quality of prenatal and postpartum care given to women and their children. Regular surveys like the Ethiopian Demographic and Health Survey (EDHS) have not identified several critical factors [18].

Despite the paucity of research on skin-to-skin care and determinants among Ethiopian postpartum women, no meta-analysis exists that may provide more robust data. Moreover, sporadic and small-scale research has been conducted on the practice of skin-to-skin care in Ethiopia. Therefore, it is essential to carry out a thorough investigation that can compile the results of earlier studies and provide policy and decision-makers with access to the information. Thus, this study aimed to evaluate postpartum mothers' level of skin-to-skin care and determinants in Ethiopia.

2. Methods

2.1. Protocol and eligibility criteria

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed in reporting this study [19] ***[Additional file 1].*** Studies assessed skin-to-skin care practice, studies conducted among postnatal mothers, research done in Ethiopia, and studies using cross-sectional, case-control, and cohort study designs met the inclusion criteria. Additionally, from the study's inception until September 5, 2023, publications written in English were included. Reviews, editorials, commentary, and case series/reports were not taken into account in this study.

2.2. Data sources and search strategy

Boolean logic operators (AND, OR, NOT), Medical Subject Headings (MeSH), and keywords were used in conjunction to find papers for this study in electronic databases like PubMed, EMBASE, Google Scholar, MEDLINE, SCOPUS, Web of Sciences, and Google search. The advanced PubMed search method comprises ((("skin"[MeSH Terms] OR "skin" [All Fields]) AND ("skin care" [MeSH Terms] OR ("skin"[All Fields] AND "care" [All Fields]) OR "skin care" [All Fields]) OR (("thermal"[All Fields] OR "thermalization"[All Fields] OR "thermalize"[All Fields] OR "thermalizes"[All Fields] OR "thermalizes"[All Fields] OR "thermalizing"[All Fields] OR "thermals"[All Fields]) AND "care"[All Fields])) AND "Ethiopia"[MeSH Terms]. Furthermore, papers on websites and institutional repositories were found by using the previously indicated keywords.

2.3. Study selection

The reference management program (Endnote version X8) was used to manually eliminate duplicate articles and validate the database search results. After that, the paper titles and abstracts were carefully assessed. Based on preset inclusion and exclusion criteria, two authors (AD and AE) independently examined the full texts of the remaining publications to assess their eligibility. The full-text studies produced in English were then further analyzed concerning their objectives, methods, population, and noteworthy findings (level/prevalence, skin-to-skin care, and its determinants in Ethiopia). With the help of the author (IM), the two authors arrived at a logical agreement over how to address any issues that arose throughout the extraction process. The full study selection procedure is represented by the PRISMA statement flow diagram (Fig. 1).

2.4. Data extraction

Once the authors (AE and AD) located pertinent papers, they separately extracted the data. Microsoft Excel 2016 was used to collect data from studies under the following categories: author and year; study design; setting; sample size; studied variables; data collection techniques; study subject; major outcome of interest; and significant factors. By contrasting the outcomes generated by the two writers, the precision of the data extraction process was verified. From the included publications, quantitative data was taken out, such as the effect size, frequency of occurrence (n), and overall sample size (N).

2.5. Data item

The practice level of skin-to-skin contact was the outcome variable of interest. Studies assessing postnatal mothers' thermal or skin-to-skin care practices were included in this analysis.

2.6. The methodological quality of studies

Using the Joanna Briggs Institute (JBI) criteria, the methodological quality of observational research (cross-sectional, case-control, and cohort studies) was evaluated. The eight criteria on the instrument were used to evaluate each study. The authors (TG and AE) assessed each study's quality independently. The final decision was made using the mean ratings of the two authors. The included studies were divided into three quality categories: high (score of 80 % or more), moderate (score of 60 %–80 %), and low (score of less than 60 %) based on points earned using eight criteria.

Table 1
General characteristics of included studies, 2023.

Author	Year	Region	Design	Sample Size	prevalence	Event	Data collection method	Investigated variable	Significant factors
Eyeberu, A et al.	2022	Harari	CS	820	53. 2	436	Interview	SSC and cord care and their determinants	Mothers aged 20–29, 30–39, above 40 [(AOR = 11.17, 95 % CI: 4.71, 26.5; AOR = 4.1, 95 % CI: 1.77, 9.55, AOR = 14.3, 95 % CI: 7.2, 28.6), respectively], Being married [AOR = 3.70, 95 % CI (1.58, 8.70)], being a merchant and self-employed ([AOR = 0.55, 95 % CI: 0.34,0.87] and [AOR = 0.49, 95 % CI: 0.27, 0.86], respectively), having good knowledge about SSC [AOR = 2.11, 95 % CI: (1.53, 2.92)], giving birth at gestational age of 37–42 weeks [AOR = 1.82, 95 % CI (1.31, 2.5)], and multigravidas (AOR = 2.83, 95 % CI (1.90,4.21
Dirirsa, D. E et al.	2022	Oromia	CS	286	44.8	128	Observation and interview	SSC practice, knowledge level, and its determinants	Health professional's knowledge (AOR = 4, 95 % CI = 1.7, 10), training (AOR = 7, 95 % CI = 2.2, 21), complicated delivery (AOR = 0.12, 95 % CI = 0.04, 0.4), and maternal chronic illness (AOR = 0.13, 95 % CI = 0.03, 0.6).
Bedaso, A. et al.	2019	Oromia, Amara, Benshangul	CS	384	28.1	108	Interview	SSC practice and its determinants	Mothers' education (AOR = 18.23 [95 % CI 5.26, 63.52]), and number of ANC visits (AOR = 8.55 [95 % CI 1.05, 69.54])
Mose A et al.	2021	SNNP	CS	382	35.3	135	Interview	SSC practice and its determinants	Being urban residence [AOR = 2.23, (95 % CI; 1.17–4.23)], normal newborn birth weight (≥2500 gm) [AOR = 3.1, (95 % CI; 2.15–3.89)], early initiation of breastfeeding [AOR = 2.93, (95 % CI; 1.29–6.64)], colostrum feeding [AOR = 4.19, (95 % CI; 2.01–8.73)], and having mothers' good knowledge on skin-to-skin care practice [AOR = 8.51, (95 % CI; 4.32–16.75)]
Abebe E et al.	2018	Harari	CS	308	34.4	106	Interview	SSC practice and associated factors	Health professional guidance on thermal care (AOR = 5.687; CI: 2.39, 13.51), mother's previous information SSC (AOR = 4.479; CI: 2.42, 8.29), vaginal delivery (AOR = 2.578; CI: 1.10, 6.02), breastfeeding initiation (AOR = 2.108; CI: 1.11, 4.06), and presence of conducive environment in hospital
Nigatu E et al.	2020	EDHS	CS	7488	24.3	1819	Secondary data	SSC practice and associated factors	Attending 1–4 antenatal care (AOR = 1:51, 95%CI = ½1:08, 2:12, giving birth at a health facility (AOR = 4:51, 95%CI = ½2:16, 9:44, and having female births (AOR = 1:24, 95%CI = ½1:01, 1:54) were associated with more odds of practicing SSC. However, giving birth by the cesarean section had resulted in lower odds of practicing SSC (AOR = 0:37, 95%CI = ½0:22, 0:63). Regions

(*continued on next page*)

Table 1 (*continued*)

Author	Year	Region	Design	Sample Size	prevalence	Event	Data collection method	Investigated variable	Significant factors
									with reduced odds of SSC practice include Amhara (AOR = 0:57, 95%CI = ½0:40, 0:82), Somali (AOR = 0:51, 95%CI = ½0:31, 0:83), and Southern Nations, Nationalities, and People (AOR = 0:64, 95%CI = ½0:43, 0:94
Brhane, M. et al.	2017	Tigray	CS	354	89	315	Interview	Thermal care and associated factors including SSC	There is significance (status of the attending health provider, gestational age (in weeks)
Wako G. et al.	2022	Oromia	CS	388	69.1	268	Interview	Thermal care including SSC	Not applicable

CS: Cross-sectional study design.

2.7. Statistical analysis

Data synthesis and statistical analysis were performed using STATA 18.2. The degree to which postnatal mothers in Ethiopia use skin-to-skin care was illustrated using forest plots based on the meta-analysis results. Galbraith plot, I2 statistics (following Higgins et al.'s advice), and Cochrane Q statistics were used to evaluate heterogeneity. Subgroup analysis, sensitivity analysis, and the random effect model—three meta-analysis techniques—were used to control the heterogeneity of the included studies. On the basis of the publishing year and region, subgroup analyses were also conducted. To find out what led to the heterogeneity in the research, a multivariate meta-regression analysis was also done.

The researchers employed a visual evaluation of a funnel plot and Egger's regression test to measure publication bias. There was a slight study effect on the pooled prevalence, according to Egger's test, with a p-value less than 0.05. Upon visual inspection, publication bias was evident due to the asymmetric presentation of the funnel plot.

3. Results

3.1. Search finding and risk of bias assessment

The authentic databases yielded a total of 504 articles. Due to redundancy, 63 publications were excluded from all identified studies using ENDNOTE and visual inspection. The remaining 441 studies were then kept and screened according to their title and abstracts. Around 379 were removed after being evaluated based on titles and abstracts. About 62 publications were deemed admissible, and 54 papers were disqualified for failing to evaluate the study's conclusion. Studies that evaluated newborn care and hypothermia that were conducted outside the research region are excluded for this reason. Ultimately, the study contained eight observational studies that met the inclusion criteria (Fig. 1). A thorough examination of all the included studies in eight domains of the JBI tool gave high-quality scores. Therefore, all studies were included.

3.2. Characteristics of the included studies

The level of skin-to-skin care practice and its determinants among postnatal mothers in Ethiopia were examined in eight cross-sectional studies that made up this study. The studies were released in the years 2017 [6] through 2022 [7,20,21]. Of all studies, two studies were conducted at the national level [22,23], two studies were from the Oromia region [20,21], two studies were from Harari regional state [7,24], one study was from Tigray [6] and one study was from Southern Nation Nationalities and people of Ethiopia [8]. The sample size of the included studies ranged from 286 in a study done in Oromia [20] to a maximum of 7488 in a study conducted at the national level [22]. This comprehensive study included 10410 postnatal mothers and newborns in total. The primary features of the papers that are part of this study are compiled in Table 1.

3.3. Meta-analysis of the primary outcome

All included studies report the primary outcome of the study. The level of skin-to-skin care practices among postpartum mothers ranges from 24 % of EDHS [22] to 89 % in a study done in Tigray [6]. The pooled result indicated that the overall level of skin-to-skin care practices among postnatal mothers was 48 % (95%CI: 31, 65, $I^{2=}$99.38 %, P = 0.00) and heterogeneity; $tau^2 = 0.24$, $i^2 = 99.41$ %; overall effect z = 8.48 (p = 0.00) (Fig. 2).

3.4. Subgroup analysis of the primary outcome

By region and publication year, subgroup analysis was done for the eight studies that reported the main result. Subgroup analysis by publication year revealed that among studies published between 2017 and 2019, half of postnatal mothers who gave their newborns skin-to-skin care (52 % (95 % CI: 14–89)) were noted (Fig. 3).

Based on subgroup analysis by study region, studies conducted in the Tigray region had the highest level of skin-to-skin care done among postnatal mothers (89 % (95 % CI 85–92)) (Fig. 4).

3.5. Publication bias

A funnel plot's visual examination revealed a symmetrical distribution and an Egger's test value of 0.388. Consequently, the research does not exhibit publication bias (Fig. 5). Furthermore, the Der Simonian Liard random-effects model's predicted effect sizes for the observed and combined observed and imputed effects did not differ, as shown by Trim fill analysis.

3.5. Heterogeneity assessment

To enable accurate interpretation of the results, sources of heterogeneity were examined using multivariate meta-regression analyses in addition to Cochrane statistics and I2 statistics. There was no significant correlation found between publication year, sample size, region, and study heterogeneity, according to multivariate meta-regression analyses (Table 2). To determine the reason for heterogeneity, the Galbraith plot was also computed and estimated; however, no study was discovered to be beyond the confidence limit (Fig. 6).

3.6. Sensitivity analysis

To evaluate the impact of a single study on the meta-analysis results and, if present, to detect outliers, sensitivity analysis was conducted. No outlier was discovered, as seen in Figure below (Fig. 7).

3.7. Determinants of the level of skin-to-skin care practices

Seven of the eight included studies discussed the relationship between independent factors and postnatal mothers' skin-to-skin care practices. Prenatal care, breastfeeding initiations, mother knowledge, and mother occupations were among the frequently mentioned factors. To evaluate the relationship between prenatal care and skin-to-skin care practice, three studies were considered [7,8,22]. The pooled estimate, however, shows no correlation between skin-to-skin care practices and ANC follow-up [AOR = 1.24, 95 % CI, 0.78, 1.70]. Three studies evaluated the relationship between skin-to-skin care practices and knowledge regarding SSC [7,8,24]. However, it has been discovered that SSC knowledge is related to the three previously described research, therefore combining them may not be very significant.

In addition, three studies were combined to assess the relationship between skin-to-skin care practices and employment status [7,

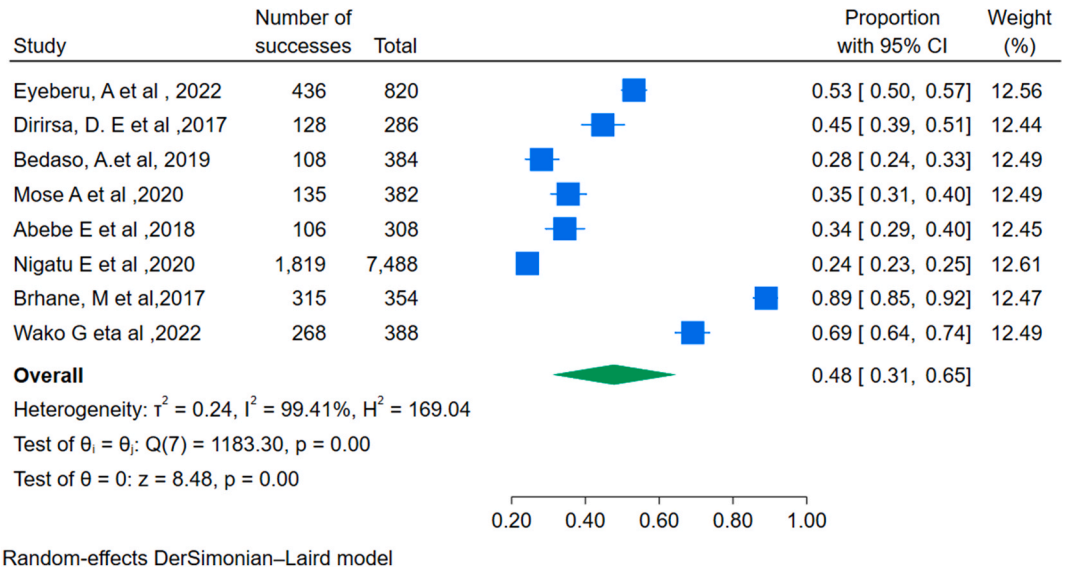

Fig. 2. Level of skin-to-skin care practices among postnatal mothers in Ethiopia, 2023.

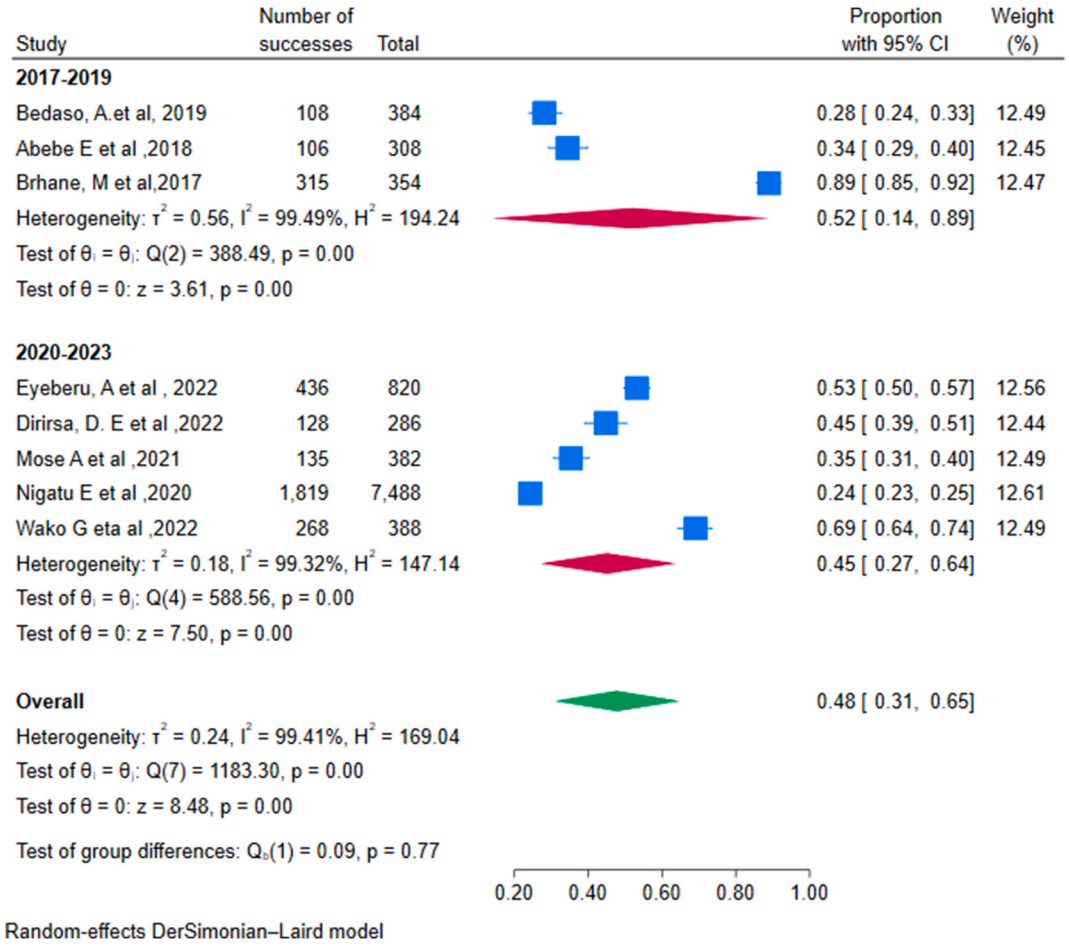

Fig. 3. Sub group analysis of level skin to skin care practices among postnatal mothers in Ethiopia, 2023 by year of publication.

22,23]. The pooled estimate does not demonstrate statistically significant relationships, even though these factors were significantly related in some studies.

4. Discussion

Providing skin-to-skin care to neonates can effectively raise their body temperature, especially in situations where resources are scarce and the climate is cold [25]. The World Health Organization advised that skin-to-skin contact between a mother and her newborn should occur continuously, without interruption, from the moment of birth until the kid takes their first feeding [1]. SSC is not widely used in Ethiopia despite these suggestions, and conflicting research results may have an impact on policy decisions. This study was carried out to produce trustworthy national data on Ethiopian postpartum mothers' practices related to skin-to-skin care and determinants.

The study found that 48 % of postpartum women practiced skin-to-skin care (95%CI: 31, 65, I2 = 99.38 %, P = 0.00). This result is higher than a study conducted in Africa that indicated a 1–9% prevalence of SSC [26]. The finding is also higher than the study done in Bangladeshi 28 % [27] and Arabian countries 25 % [28]. The disparity of the results is from the variation in the number of articles incorporated into the analysis. Eight publications were included in this analysis, which may have improved its capacity to identify the problem's actual impact. A study done in Africa included only two studies that can affect the prevalence. The other reason for the discrepancy is socio-cultural differences among participants. The study's findings made it clear that, in Ethiopia, less than half of newborns received skin-to-skin care. This finding so clearly acts as a warning to all parties involved to take action and place a strong priority on initiating and executing care to reduce and alleviate health, physiological, and social difficulties caused by the non-practice of this standardized care [14,29,30].

The results of the subgroup analysis conducted by publication year indicated that there is a significant variation in the level of skin-to-skin care practices among mothers across years of publication, which suggests patterns in the practices of skin-to-skin care within the specified publication years. Thus, according to research released between 2017 and 2019, 52 % of postpartum mothers (95 % CI: 14–89) gave their newborns skin-to-skin care. There could be several reasons for this, including the possibility that postpartum

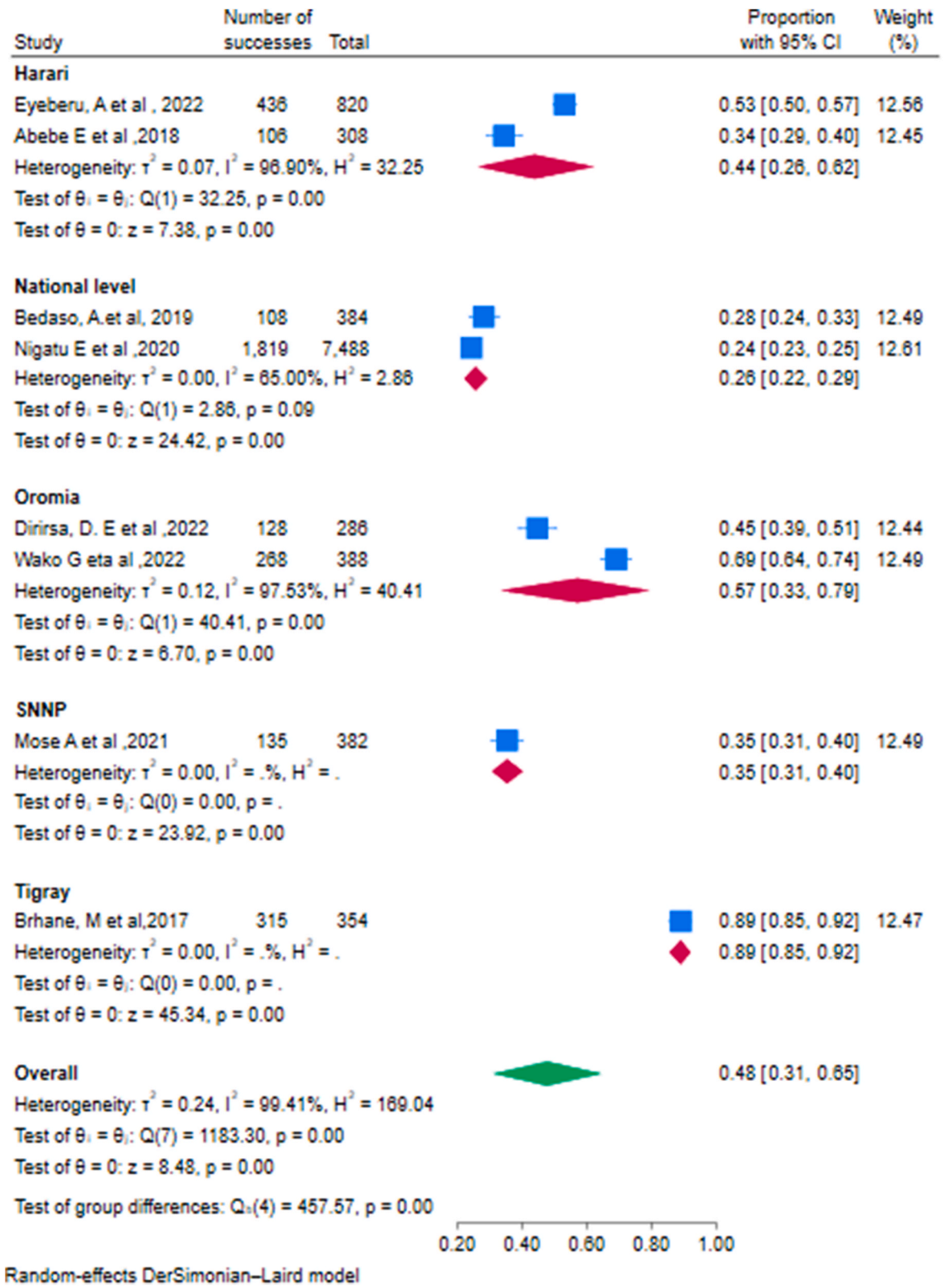

Fig. 4. Sub group analysis of level skin to skin care practices among post natal mothers in Ethiopia, 2023 by region.

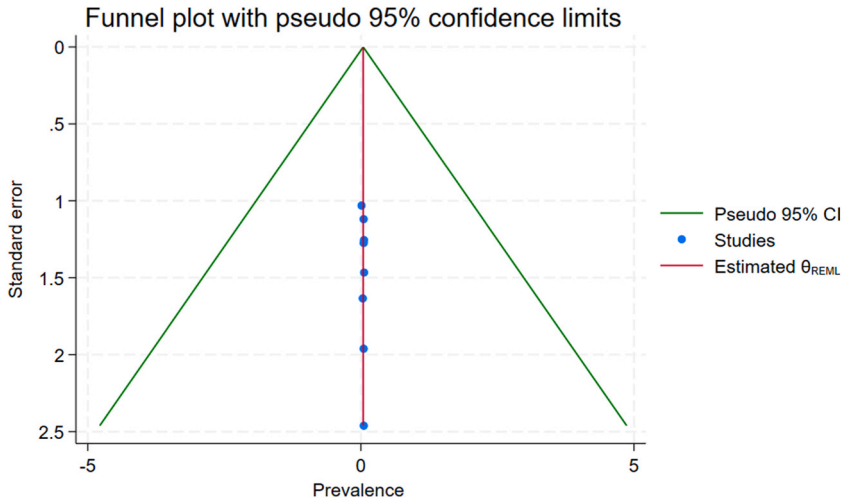

Fig. 5. Funnel plot of level skin to skin care practices among post natal mothers in Ethiopia, 2023.

Table 2
Bivariate and multivariate meta-regression analysis of level skin-to-skin care practices among postnatal mothers in Ethiopia, 2023.

Variables	Coefficients	Standard error	P	95 % CI
Region[a]	0.1123282	0. 1579663	0.477	−0.1972801, 0 0.4219364
Sample size[a]	−0.0000789	0.000067	0.239	−0.0002102, 0 0.0000525
Publication year	−0.0213595	0.0980724	0.828	−0.2135779, 0.1708589
Region[b]	0.151289	0.1775901	0.394	−0.1967812, 0.4993592
Sample size[b]	−0.0000884	0.0000815	0.278	−0.0002481, 0.0000714
Publication year[b]	0.042603	0.1156629	0.713	−0.184092, 0.2692981

[a] bivariate meta regression.
[b] multivariate meta regression.

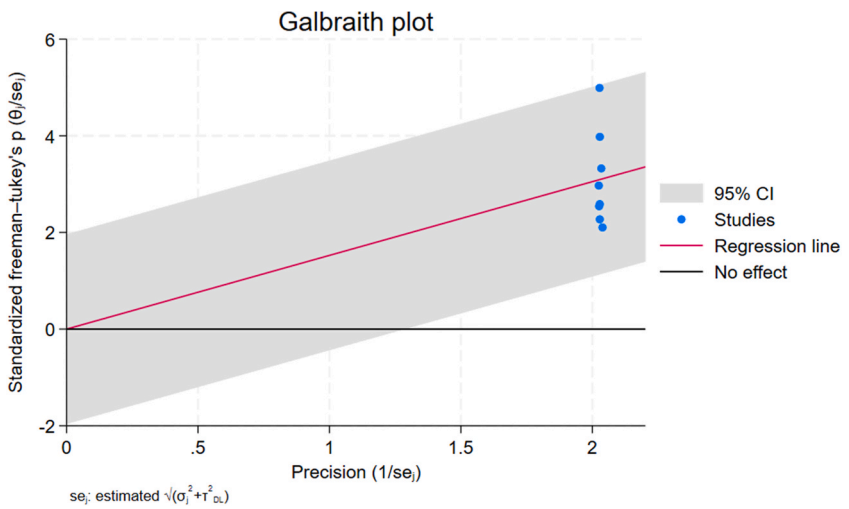

Fig. 6. Galbraith plot of level skin to skin care practices among post natal mothers in Ethiopia, 2023.

mothers are receiving less health education now than they did in earlier decades, which encourages the use of skin-to-skin care. Furthermore, little attention is now given at the national level to educating healthcare practitioners about critical newborn care, which eventually contributes to a decline in the delivery of this crucial and well-known life-saving treatment [31]. As a result, all parties involved must actively and completely engage in the clinical training of obstetric care providers on ENC, as this is crucial for educating mothers about the health advantages of skin-to-skin care.

Furthermore, this meta-analysis revealed that there are significant differences within the nation's regions. As a result, research

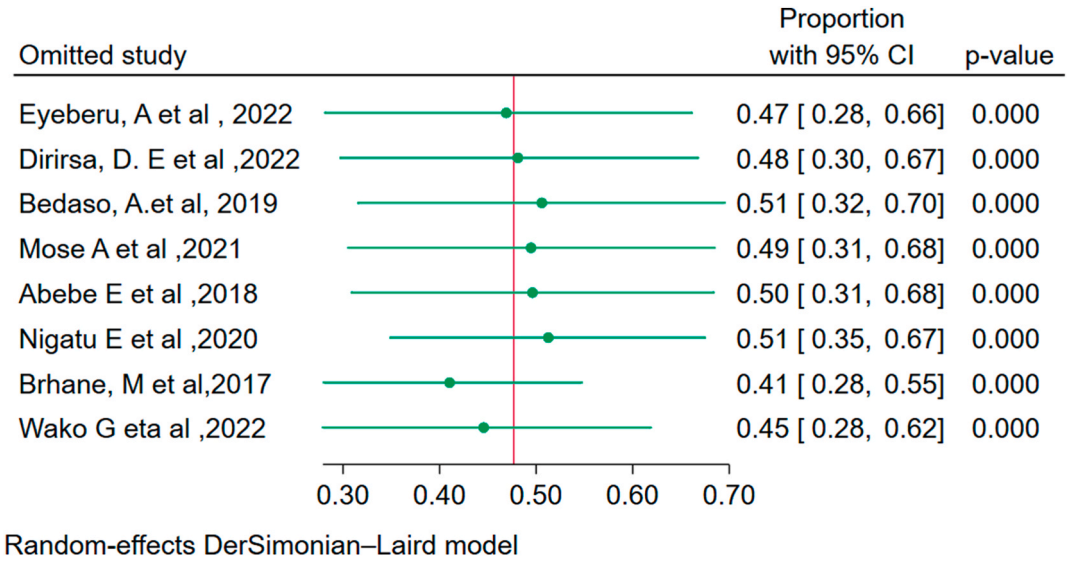

Fig. 7. Sensitivity analysis of level of skin to skin care practices among post natal mothers in Ethiopia, 2023

done in the Tigray region revealed that postnatal mothers practiced the highest level of skin-to-skin care (89 % (95 % CI 85–92). A possible justification could be found in the deeply embedded cultural norms, and traditions of the society, and several articles studied in the region. Skin-to-skin contact, which is proven to foster bonding and control the baby's temperature, might be widely practiced and encouraged. Furthermore, this practice may be reinforced by Tigray's emphasis on intergenerational knowledge sharing and community support networks, making it more common. Furthermore, the number of articles studied in the region is too small which can affect the overall estimate.

It is crystal clear that understanding the relationship between different factors and skin-to-skin care practices is enormously essential. Therefore, this study attempted to evaluate the determinants of skin-to-skin care among postnatal mothers. However, in the pooled estimates, we found that no factors were significantly associated with these primary outcome variables. Although there are a total of three studies that reported the association between the knowledge of the mothers regarding SSC and skin-to-skin care practices, we would not group pool it as there is an established association between knowledge of mothers and SSC practice.

Strengths and limitations of the study

The publications were searched in multiple reliable databases, which is the study's strongest point. However, most of the papers' research was done in a few Ethiopian regions. The study's results may have been impacted by the inclusion of solely English-language publications.

5. Conclusions

Roughly less than half of Ethiopian newborns had received skin-to-skin care. Moreover, there was a strong correlation between SSC practice and the mother's knowledge of SSC. Thus, it is imperative that the government and all relevant parties work together to enhance and broaden skin-to-skin care practices via health education, ensuring that all new mothers provide this essential newborn care.

Statement of significance

Problem or Issue: Despite its abundance of significance, the level of skin-to-skin care among mothers was not well practiced in Ethiopia. Due to this, neonatal mortality from hypothermia remains significant. It increases the risk of neonatal mortality by five times in the first seven days of life.

What is Already Known: Neonatal mortality accounts for 47 % of all child mortality. Hypothermia is one of the causes of neonatal mortality. Skin-to-skin contact remains the best solution to lessen the effect of hypothermia-related neonatal death.

What this Paper Adds: It will be crucial for policymakers to develop measures that will lessen the burden of mortality from hypothermia. Additionally, as skin-to-skin care practices have not been the subject of a meta-analysis study, this would help physicians and other interested parties improve the survival rate of newborns.

Ethical statement

Ethical approval is not necessary because the study is SRM.

Funding

The sponsor did not influence the study's design, data extraction, analysis, or interpretation, or the paper's development.

Data availability statements

There is no publicly accessible repository where the study's data are kept. All relevant data from this investigation are referenced, incorporated in the article, and provided as supplemental material. On the other hand, upon justifiable request, the associated author will furnish additional details.

CRediT authorship contribution statement

Adera Debella: Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Investigation, Data curation, Conceptualization. **Ibsa Mussa:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Data curation. **Tamirat Getachew:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Investigation, Formal analysis. **Addis Eyeberu:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Funding acquisition, Formal analysis, Conceptualization.

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.

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