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Mothers' health-seeking practices and associated factors towards neonatal danger signs in Ethiopia: a systematic review and meta-analysis

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ABSTRACT

Background A decrease in obtaining quality healthcare is a major cause of maternal and newborn deaths in low-income and middle-income countries. Ethiopia has one of the highest neonatal mortality rates. Increasing mothers' health-seeking practices related to neonatal danger signs is an essential strategy for reducing the death rate of newborns. However, the pooled prevalence of mothers' health-seeking practices related to neonatal danger signs is not well known in Ethiopia.

Objective The main aim of this systematic review and meta-analysis is to assess the mothers' health-seeking practices and associated factors towards neonatal danger signs in Ethiopia.

Design Systematic review and meta-analysis.

Primary and secondary outcomes The primary outcome was to assess the mothers' health-seeking practices towards neonatal danger signs and the secondary outcome was to identify factors associated with health-seeking practices.

Methods In total, comprehensive literature was searched in the PubMed, Google Scholar, HINARI, Embase and CINAHL databases published up to 30 December 2023. A random effect model was used to estimate the pooled prevalence and adjusted OR (AOR). Stata (V.17.0) was used to analyse the data. I^2 statistics were computed to assess heterogeneity among studies. To minimise the underlying heterogeneity, a subgroup analysis was conducted based on the study region and year of publication. To assess publication bias, Egger's test and funnel plots were used.

Results Overall, 1011 articles were retrieved, and 11 cross-sectional studies, with a total of 5066 study participants, were included in this systematic review. The overall pooled prevalence of mothers' health-seeking practices for neonatal danger signs in Ethiopia was 52.15%. Postnatal care follow-up (AOR 2.72; 95% CI 1.62 to 4.56), good maternal knowledge (AOR 3.20, 95% CI 2.24 to 4.56), educational status of secondary school and above (AOR 4.17, 95% CI 2.04 to 8.55), women's decision-making autonomy (AOR 3.59, 95% CI 1.60 to 8.06) and place of delivery (AOR 2.71, 95% CI 1.21 to 6.04) were significantly associated with mothers' health-seeking practices for neonatal danger signs.

Conclusion The maternal health-seeking practices of women towards neonatal danger signs were found to be low in Ethiopia. When barriers to seeking care for newborn danger signs are successfully removed, women's practices for seeking care for neonatal danger signs could decrease perinatal mortality.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ A robust search algorithm to include studies from various databases.
⇒ The first prevalence estimates of mothers' health-seeking practices for newborn danger signs in Ethiopia.
⇒ Identifying key factors crucial for maternal and neonatal health prevention.
⇒ The inclusion of only English articles and cross-sectional studies with a narrow focus.
⇒ Coverage of just three regions, potentially leaving other areas unrepresented.

INTRODUCTION

The word 'neonatal danger signs' (NDS) refers to clinically recognised markers that could point to a significant risk of newborn morbidity and death as well as the necessity of immediate medical treatment or intervention. Neonates often display non-specific symptoms and indicators of life-threatening illness. These symptoms may manifest in a newborn who presents to the hospital, over the course of a hospital stay or right after birth. Stabilisation and averting further deterioration are the goals of the first care given to a newborn exhibiting these symptoms.[1 2] The notifiable causes of NDSs are neonatal jaundice, vomiting, cord sepsis, inability to suck breast milk, convulsions, hyperthermia/hypothermia, no urine in the first 24 hours, no

bowel movement in the first 48 hours, a rapid breathing rate over 60 per minute, etc.[3]

The first 28 days of life remain the most crucial for a newborn's survival. In 2020, 2.4 million infants worldwide passed away in their first month of life. 667 newborn perish every day, making up 47% of all child mortality. In 2020, sub-Saharan Africa had the highest rate of newborn mortality, with 27 (25–32) deaths per 1000 live births. When compared with developed nations, the number of neonatal deaths in the first month of life is more than 10 times higher in sub-Saharan Africa or southern Asia.[4 5] Compared with other developing countries, Ethiopia has one of the highest neonatal mortality rates (29 deaths/1000 live births), Approximately half of the under-5 deaths reported in the 2016 and increasing to 30% of the 1000 live births reported in the 2019 Ethiopian Mini demographic health survey.[6 7]

Most neonatal deaths (75%) occur during the first week of life, and in 2019, approximately one million newborns died within the first 24 hours.[4] 80% of newborn deaths are known to be connected to three preventable and treatable disorders: prematurity-associated difficulties, intrapartum-related deaths (including asphyxia at birth) and neonatal infections. We have ways to deal with these problems and avoid long-term impairment.[8] Half of maternal deaths and 61% of newborn deaths are attributed to poor quality care and delayed healthcare seeking is a major factor in neonatal mortality.[9]

The Sustainable Development Goals (SDGs) recognise this and mandate that by 2030, all countries must achieve a neonatal mortality rate—defined as the probability that a newborn will die before turning 28 days old, 12 or fewer deaths per 1000 live births.[10] Mothers' health-seeking practices regarding NDSs are poor in countries with low or middle incomes.[11]

A woman's decision to seek care for her newborn may be delayed by a number of factors, including poor recognition of illness signs, a lack of decision-making skills, sociocultural traditions surrounding the seclusion of newborn, distance to a facility or provider, inadequate treatment received at facilities and insufficient funds for transportation or healthcare.[11–13]

Preventing delayed healthcare-seeking practices from pregnancy to the postnatal period and enhancing the quality of care provided to expectant mothers and newborn will be crucial to achieving the SDGs.[9]

Several studies on the practice of seeking healthcare for NDSs and the factors that are associated with this practice have been conducted in Ethiopia. The majority of the currently available studies are cross-sectional in design, have a narrow scope and are unable to address all regions of the country, we are unable to more precisely identify mothers' health-seeking practices for NDSs and associated factors at the national level.

However, the pooled prevalence of mothers' health-seeking practices related to NDSs is not well known in Ethiopia. Therefore, the main purpose of this systematic review was to determine the extent to which Ethiopian women practice seeking healthcare for NDSs and associated factors to provide reliable data that can support policy formulation and evidence-based decision-making.

METHODS

A systematic review and meta-analysis was also conducted to estimate the pooled prevalence of mothers' health-seeking practices for NDSs and their associated factors in Ethiopia. The Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines were used to report the results[14] (online supplemental information 1). Ethiopia is a country in the Horn of Africa that can be classified as low income. Ethiopia is split into 12 administrative regional states and 2 city administrations from an administrative standpoint.

Search strategies

The search strategy included international databases (ie, PubMed, Web of Science, Google Scholar and HINARI). This systematic review and meta-analysis included studies published up to 30 December 2023.

Our search terms used were "delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health care"[All Fields] OR "health"[All Fields] AND "care"[All Fields]) OR "health care"[All Fields]) AND seeking[All Fields] AND "behaviours"[All Fields] OR "behaviours"[MeSH Terms] OR "behaviour"[All Fields] OR "behaviours"[All Fields]) AND "practice"[All Fields] AND "infant, newborn"[MeSH Terms] OR ("infant"[All Fields] AND "newborn"[All Fields]) OR "newborn infant"[All Fields] OR "neonatal"[All Fields]) AND danger[All Fields] AND "diagnosis"[Subheading] OR "diagnosis"[All Fields] OR "signs"[All Fields] OR "diagnosis"[MeSH Terms]) AND "mothers"[MeSH Terms] OR "mothers"[All Fields]) AND "Ethiopia"[MeSH Terms] OR "Ethiopia"[All Fields]) (online supplemental additional file 1).

Inclusion criteria

Studies on mothers' health-seeking practices towards NDSs published up to 30 December 2023 were included.

Exclusion

Studies that did not include qualitative research and studies with insufficient data were excluded from the study of mothers' health-seeking practices for NDSs.

Data extraction

The datasets were exported to EndNote V.X8, after which the sequences were transferred to a Microsoft Excel spreadsheet for further analysis. The first step in the analysis involved removing any duplicate data from the review. To ensure accurate data extraction, three authors (WYF, BBE and TSY) independently extracted all the relevant data. In cases where there were disagreements between the reviewers, a second team of reviewers (MM, SBZ and EDY) was involved to resolve the discrepancies.

The resolution process involved critical discussions and evaluations of the articles by an independent group of reviewers. The following information was extracted from the articles: author name, sample size, publication year, study area, region, study design, prevalence of mothers' health-seeking practices for NDSs and adjusted ORs with 95% CIs for factors associated with mothers' health-seeking practices for NDSs. By following this systematic data extraction process, the study aimed to ensure consistency and accuracy in capturing the relevant information from the selected articles.

Quality assessment

The quality of the studies was assessed using the Newcastle-Ottawa Quality Assessment Scale[15] (online supplemental information 2). Three authors (WYF, BBE and TSY) independently assessed the quality of each study, covering various aspects such as methodological quality, sample selection, sample size, comparability, outcome assessment and statistical analysis. In cases of disagreement among the three authors during the quality assessment, three additional authors (MM, SBZ and EDY) were involved. Primary studies were considered to be of excellent quality if they had a score of 8 or higher. On the other hand, studies scoring between 6 and 7 points were considered to be of moderately high quality and were included in the meta-analysis and systematic review.

Measurement of outcome variables

The primary outcome examined in this systematic review and meta-analysis was the prevalence of mothers' health-seeking practices for NDSs. Identifying factors associated with mothers' health-seeking practices regarding NDSs was the second outcome of this study.

Data analysis

The data were entered into Microsoft Excel and subsequently exported to STATA V.17 statistical software for analysis.[16] Heterogeneity between mothers' health-seeking practices for NDSs was assessed by calculating the p values of I^2 statistics.[17]

Heterogeneity was observed among the studies assessing the polled prevalence of maternal health-seeking practices related to NDSs in Ethiopia (I^2=97.36%, p≤0.01). Therefore, random effect models were used to assess the pooled prevalence of mothers' health-seeking practices for NDSs in Ethiopia. Subgroup analysis was performed to identify possible source heterogeneity according to the year of publication, sample size and region where the studies were conducted. Funnel plots and Egger regression tests were used to assess publication bias between the studies.[18] Egger's test was used to determine the statistical significance of publication bias, and a p value of less than 0.05 was used to declare the statistical significance of publication bias.[19] In research where publication bias was detected, the Duval and Tweedie's non-parametric trim-and-fill analysis was employed to adjust for publication bias.

Patient and public involvement

Patients and the public were not involved in the planning and design of the study.

RESULT

Characteristics of the included studies

This research has revealed how common mothers' health-seeking practices for NDSs are in Ethiopia, as well as the factors that influence their use. PubMed, Google Scholar, HINARI, Embase, CINAHL and other sources described previously. A total of 1011 main studies were identified, with 342 articles remaining after eliminating 659 duplicates. 291 articles were excluded based on a review of their title and abstract, and the remaining articles underwent a full-text evaluation for inclusion criteria, resulting in the exclusion of an additional 61 papers. Ultimately, 11 papers met the eligibility criteria and were included in the final systematic review and meta-analysis (online supplemental figure 1).

Three of the studies included in the analysis were conducted in the Amhara region, four in Oromia and four in the South Nation Nationality and People Region of Ethiopia. All the studies that met the criteria for the meta-analysis and systematic review had a cross-sectional design and were reported in English. These studies collectively involved a total of 5066 participants, with individual sample sizes ranging from 285 to 772 participants. The prevalence of mothers' health-seeking practices related to NDSs varied between 34.5% and 78.7%. The study with the highest prevalence of these practices was conducted by Kebede *et al* in the Amhara region, involving a sample size of 772 participants. In contrast, the study with the lowest prevalence was conducted by Abute Idris *et al* in the South Nation Nationality and People Region of Ethiopia, with a sample size of 421 participants (table 1).

Mothers' health-seeking practices for NDSs in Ethiopia

The overall pooled prevalence of mothers' health-seeking practices for NDSs in Ethiopia was 52.15%, with 95% CI (43.41%, 60.90%). I^2 statistics showed significant heterogeneity across the included studies (I^2=97.70%, p≤0.001). As a result, random effect models were used to determine the pooled prevalence of mothers' health-seeking practices for NDSs in Ethiopia. According to the included studies, the highest prevalence of maternal health-seeking practices for NDSs was reported by Kebede *et al* (78.70%) (75.81%, 81.59%), and the lowest was reported by Abute Idris *et al* (34.50%) (29.96%, 39.04%) (figure 1).

Subgroup analysis of mothers' health-seeking practices for NDSs in Ethiopia

According to the results of this systematic review and meta-analysis, the subgroup analysis by region showed that the pooled prevalence of health-seeking practices for NDSs was highest in the Amhara region (55.69%; 95% CI 29.23%, 82.15%; I^2=99.18%; p=0.00). However, the results of the subgroup analysis were lowest for the South Nation

Table 1 Descriptive summary of 11 studies about mothers' health-seeking practices for neonatal danger signs and associated factors in Ethiopia: meta-analysis

Authors	Publication year	Region	Study period	Study design	Sample size	Prevalence (%)
Kebede *et al*[13]	2020	Amhara	01 July to 10 August 2019	Cros-sectional	772	78.7
Gomora Tesfaye *et al*[22]	2022	Oromia	01 June to 27 November 2020	Cross-section	400	44
Mesele *et al*[21]	2023	SNNPR	01 October to 30 October 2019	Cross-section	410	47.6
Bulto *et al*[31]	2019	Oromia	01 February to 30 March 2018	Cross-section	404	60.5
Bekele *et al*[20]	2020	Oromia	01 November 2018 to 30 October 2019	Cross-section	360	48.9
Abute Idris *et al*[26]	2022	SNNPR	15 June to 16 July 2019	Cross-section	421	34.5
Habtamu Chanie	2019	Amhara	June to September 2016	Cross-section	285	46.9
Gebeyaw *et al*[24]	2017	Amhara	23 October to 17 November 2015	Cross-section	527	41.3
T. Getachew *et al*[32]	2021	SNNPR	1 March to 30 March 2019	Cross-section	510	61
Gomora Tesfaye *et al*[22]	2022	Oromia	1 June to 22 June 2020	Cross-section	407	57.6
Ezo *et al*[25]	2023	SNNPR	1 February to 30 2020	Cross-section	570	52.2

SNNPR, South Nation Nationalities and Peoples' Regional State.

Nationalities and Peoples' Regional State (SNNPR) (48.85%; 95% CI 38.00%, 59.70%; I^2=95.86%; p=0.00) (table 2).

Meta-regression

Meta-regression was conducted to identify the possible source heterogeneity of mothers' health-seeking practices and associated factors towards NDSs using the publication years and sample size. Of these factors, none of them were statistically significant (online supplemental table 1).

Sensitivity analysis

To identify any reports that are outliers and may have an effect on the pooled prevalence of health-seeking practices on NDSs by providing a wide CI and variance instability, we checked each study's sensitivity. The results showed that there was no significant influence of individual study on the incidence of pooled health-seeking practices on NDSs (online supplemental figure 2).

Heterogeneity and publication bias

According to the findings of this study, there was markedly high heterogeneity across the studies, as evidenced by the I^2 statistics (I^2=97.70%, p≤0.001).

Publication bias among the included studies assessing health-seeking practices related to NDSs was checked using visual inspection of funnel plots and objectively by using Egger's regression test. Publication bias was assessed

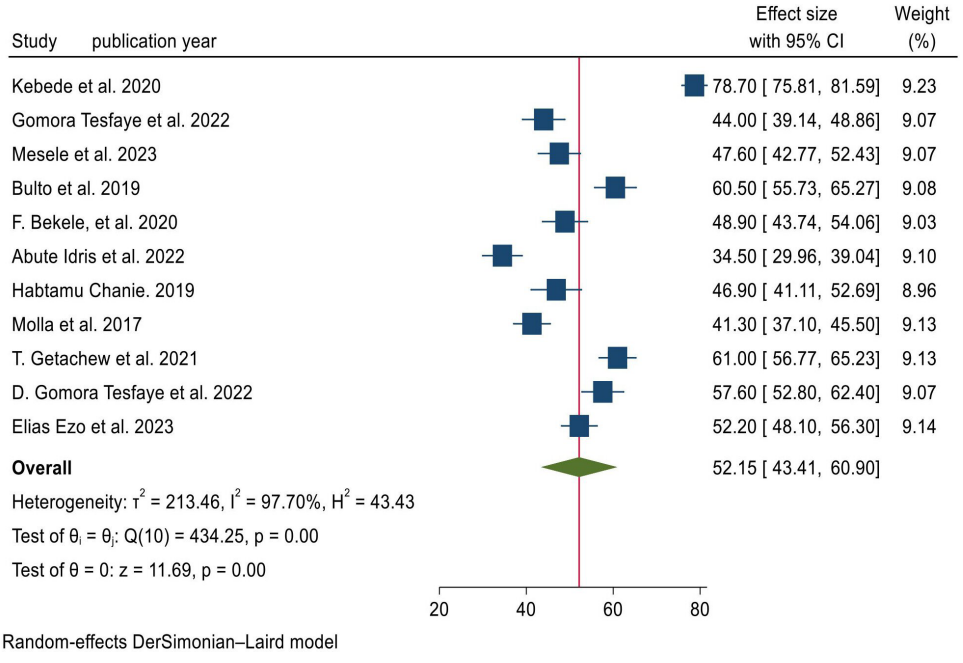

Figure 1 Forest plot for the pooled prevalence of mothers' health-seeking practices for neonatal danger in Ethiopia, 2023.

Table 2 Subgroup analysis by region and year of publication on pooled mothers' health-seeking practices for neonatal danger signs in Ethiopia

Subgroup analysis	Characteristics	Number of studies	Sample size	Pooled prevalence of health-seeking practices for neonatal danger signs (95% CI)	Heterogeneity (I^2 %)	P value
Region	Amhara	03	1584	55.69% (29.23%, 82.15%)	99.18	<0.001
	Oromia	04	1571	52.77% (45.22%, 60.33%)	89.51	<0.001
	SNNPR	04	1911	48.85% (38.00%, 59.70%)	95.86	<0.001
Year of publication	2019 and before	03	1216	49.56% (37.65%, 61.47%)	94.41	0.001
	After 2019	08	3850	53.11% (42.09%, 64.14%)	98.11	<0.001
Overall						

SNNPR, South Nation Nationalities and Peoples' Regional State.

using Egger's test, which revealed statistical significance for estimating the prevalence of health-seeking practices related to NDSs in Ethiopia (p=0.0315), and the shape of the funnel plots was asymmetrical (figure 2). Duval and Tweedie's non-parametric trim-and-fill analysis was conducted to correct publication bias among the 11 studies reporting on health-seeking practices for NDSs. However, no trimming was performed, indicating that the data were unchanged (online supplemental figure 3).

Factors associated with health-seeking practices for NDSs in Ethiopia

In our systematic review and meta-analysis, several factors were found to be significantly associated with health-seeking practices related to NDSs in Ethiopia. These factors include postnatal care (PNC) follow-up, knowledge of mothers, educational status secondary school and above, mothers' autonomy and place of delivery.

The association between PNC follow-up and health-seeking practices for NDSs was evaluated in three studies.[20–22]

Women who had a PNC follow-up were 2.72 times more likely to health-seeking practices for NDSs than were their counterparts (adjusted OR (AOR) 2.72, 95% CI 1.62, 4.56). Heterogeneity was observed across the studies (I^2=57.02%). Hence, a random effects model was used to evaluate the associations.

The pooled effect of four studies[13 20 22 23] revealed that having good knowledge of NDSs was significantly associated with health-seeking practices. Mothers who had good knowledge of NDSs had health-seeking practices threefold greater than women mothers who had poor knowledge of NDSs (OR 3.20; 95% CI 2.24, 4.56).

Mothers' decision-making power is another important factor significantly associated with appropriate health-seeking practices for NDSs. The pooled effect of four studies[13 22 24 25] revealed that mothers who had full decision-making power were 3.59 times more likely to practice appropriate healthcare seeking for their sick neonates than mothers who had less decision-making power (AOR 3.59, 95% CI 1.60, 8.06).

The pooled effect of three studies[23 24 26] also showed that maternal education level was associated with good healthcare-seeking practices; mothers with secondary education and higher were four times more likely than their counterparts to practice these practices (AOR 4.17, 95% CI 2.04, 8.55).

There was a significant association between institutional delivery and mothers' health-seeking practices for NDSs. The pooled effect of two studies[24 26] revealed that mothers who delivered a child at a health institution were 2.71 times more likely to seek neonatal medical care than mothers who delivered at home (AOR 2.71, 95% CI 1.21, 6.04) (figure 3).

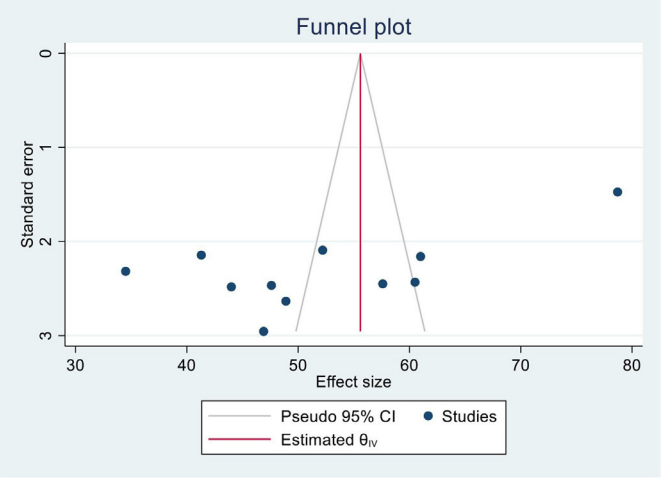

Figure 2 Funnel plot with a pseudo 95% CI for the pooled prevalence of maternal health-seeking practices towards neonatal danger signs in Ethiopia.

DISCUSSION

To the best of the author's knowledge, there is no pooled estimate of maternal health-seeking practices towards NDSs and their associated factors in Ethiopia. Therefore, this systematic review and meta-analysis provide the pooled prevalence of maternal health-seeking practices towards NDSs. A significant number of the world's health problems could be resolved if children's healthcare needs were adequately addressed. Improving the healthcare

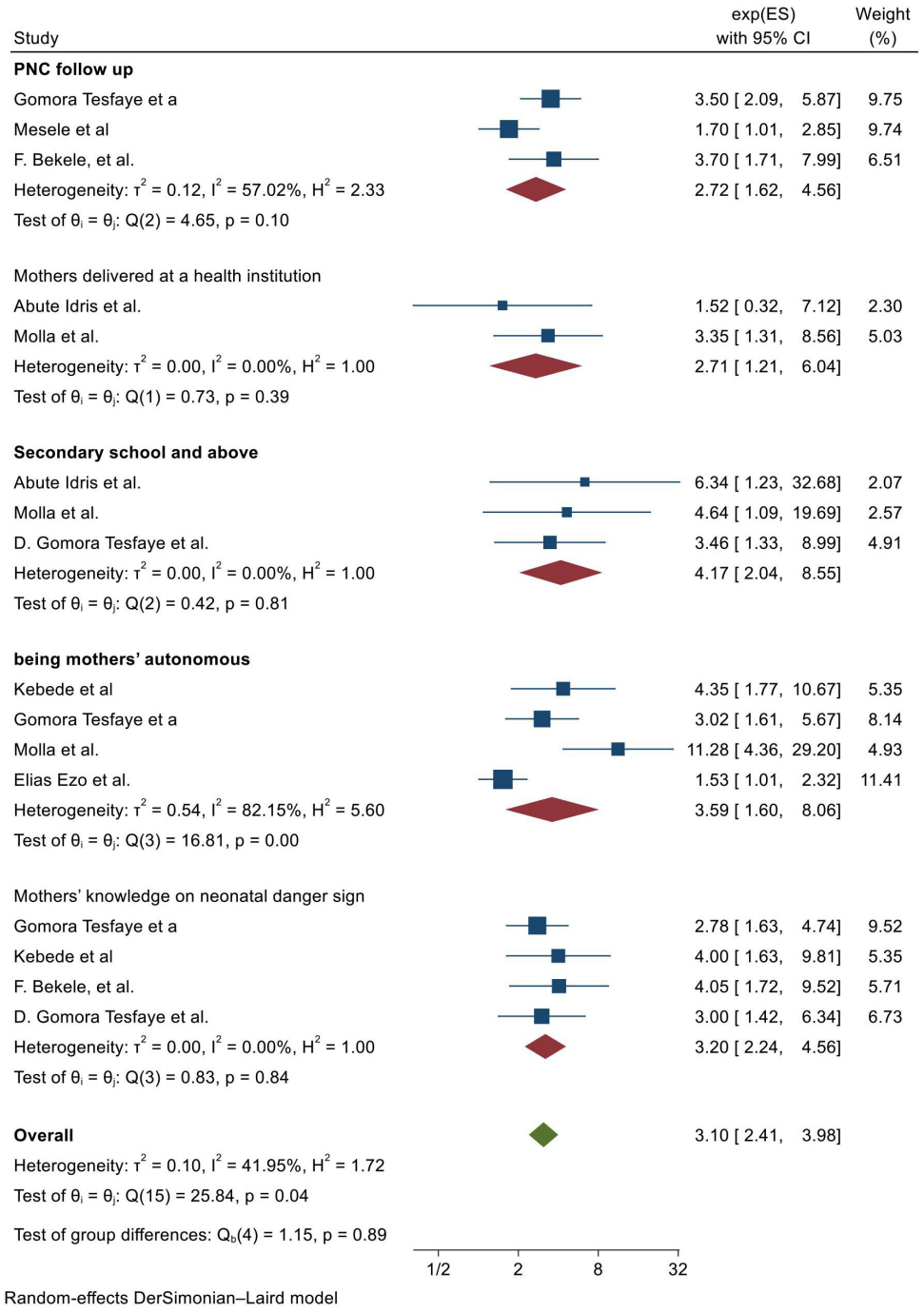

Figure 3 Factors associated with mothers' health-seeking practices towards neonatal danger signs in Ethiopia. PNC, postnatal care.

seeking for the health of newborn may avert many avoidable deaths.[27] Therefore, this systematic review found it promising to estimate the pooled prevalence of maternal health-seeking practices towards NDSs and their associated factors in Ethiopia.

The pooled prevalence of health-seeking practices for mothers on NDSs in Ethiopia was 52.15%, with 95% CI (43.41, 60.90). This conclusion is consistent with the findings of a systematic review conducted in low-income and middle-income countries, which revealed that 59% of caregivers sought care during newborn illness.[11] However, our findings were greater than those of a study conducted in Rajasthan.[28] This may be the result of differences in social, cultural and health services factors that influence decisions to seek care and cause delays in seeking healthcare.[29]

These findings suggest regional variations in the prevalence of health-seeking practices for NDSs in Ethiopia, with higher rates observed in the Amhara region ((55.69%), while the SNNPR region (48.85%) had the lowest prevalence. The differences may reflect variations in healthcare practices, resource availability or other

regional factors that influence health-seeking practices for NDSs and outcomes.

Compared with their counterparts, women who had a PNC follow-up were 2.72 times more likely to practice seeking healthcare for NDSs. This may be because postnatal counselling on NDSs is easily accessible and may help mothers become more knowledgeable about newborn illness, which provides a gateway to healthcare-seeking practices.

Mothers who had good knowledge of NDSs had threefold greater health-seeking practices than women mothers who had poor knowledge of NDSs. This could be due to parents' lack of knowledge about NDSs during the neonatal period, which could cause parents to become confused and provide less quality care, affecting the health of the newborn and increasing the risk of neonatal morbidity and mortality.[30]

The pooled effect of four studies revealed that mothers who had full decision-making power were 3.59 times more likely to practice seeking appropriate healthcare for their sick neonates than mothers who had less decision-making power. The most significant barrier to seeking care during illnesses has been identified as ineffective or unfair decision-making, particularly regarding decision-making autonomy, which is crucial when seeking healthcare in an institutional setting.[29]

The pooled effect of three studies also showed that maternal education level was associated with good healthcare-seeking practices; mothers who had a secondary education or above were four times more likely to practice good healthcare-seeking than their counterparts. The rationale could be to educate women in community-based interventions about essential newborn care and birth preparedness, including danger sign recognition, which can increase healthcare seeking for neonatal danger by 40%.[11 27]

Mothers who gave birth in a hospital were 2.71 times more likely to seek neonatal healthcare than mothers who gave birth at home, according to the combined effect of two studies; therefore, the place of delivery influences maternal healthcare-seeking practices. Therefore, it is feasible that an increase in facility births will result in better newborn danger signs and healthcare seeking in practice.

Our study underscores the significant benefits of healthcare-seeking practices for both women and their newborn. Therefore, it is imperative that public health initiatives and community efforts focus on enhancing maternal health-seeking practices, particularly in response to NDSs.

Strength

First, we employed a robust search algorithm to incorporate studies from various databases. Second, our study offers the first-ever prevalence estimates of mothers' health-seeking practice for newborn danger signs in Ethiopia. Additionally, we identified the factors influencing these health-seeking practices, which are essential for preventive maternal and neonatal health initiatives.

Limitations

This systematic review and meta-analysis has the following limitations: only articles published in English were included in the analysis. The majority of the currently available studies are cross-sectional in design, have a narrow scope and do not address all regions of the country, as only three regions were included in the analysis, leaving some regions potentially unrepresented.

Conclusion

According to the results of this systematic review and meta-analysis, maternal health-seeking practices involving NDSs were found to be low in Ethiopia. A higher educational status, PNC follow-up, good knowledge of NDSs, decision-making autonomy and giving birth at health institutions were factors associated with the health-seeking practices of women on NDSs.

After adjusting for these factors, women's barriers to seeking healthcare for newborn danger signs can be effectively addressed, which might improve their healthcare seeking for neonatal illnesses and decrease perinatal mortality.

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Contributors WYF, TSY, TG and BBE participated in formulating research problem and planning the study and explored the literature and considered the study. MM, SBZ, GM and HDA were involved in procedure development and data analysis. WYF, FAS, ABA, AKM, EDY and BBE wrote the first draft of the manuscript. WYF, BBE and TSY actively participated in data collection, analysis, interpretation, conclusion and preparing initial manuscript draft. WYF is responsible for overall content of the manuscript as a guarantor. All authors reviewed and edited the document and accepted the final version of the manuscript.

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Patient consent for publication Not applicable.

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