BMJ Open

Effect of adverse perinatal outcomes on postpartum maternal mental health in low-income and middle-income countries: a protocol for systematic review

Samrawit Mihret Fetene ,[1] Tsegaye Gebremedhin Haile ,[1] Abel Dadi[2,3]

To cite: Fetene SM, Haile TG, Dadi A. Effect of adverse perinatal outcomes on postpartum maternal mental health in low-income and middle-income countries: a protocol for systematic review. *BMJ Open* 2023;**13**:e074447. doi:10.1136/bmjopen-2023-074447

► Prepublication history for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2023-074447).

Received 06 April 2023
Accepted 20 November 2023

Check for updates

© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

[1]Department of Health Systems and Policy, University of Gondar, Gondar, Ethiopia
[2]Menzies School of Health Research, Charles Darwin University, Casuarina, Northern Territory, Australia
[3]Addis Continental Institute of Public Health, Addis Ababa, Ethiopia

Correspondence to
Samrawit Mihret Fetene; samrimih21@gmail.com

ABSTRACT

Introduction More than three-fourths of adverse perinatal outcomes (preterm, small for gestational age, low birth weight, congenital anomalies, stillbirth and neonatal death) occur in low-income and middle-income countries. These adverse perinatal outcomes can have both short-term and long-term consequences on maternal mental health. Even though there are few empirical studies on the effect of perinatal loss on maternal mental illness, comprehensive information on the impact of adverse perinatal outcomes in resource-limited settings is scarce. Therefore, we aim to systematically review and synthesise evidence on the effect of adverse perinatal outcomes on maternal mental health.

Methods and analysis The primary outcome of our review will be postpartum maternal mental illness (anxiety, depression, post-traumatic stress disorder and postpartum psychosis) following adverse perinatal outcomes. All peer-reviewed primary studies published in English will be retrieved from databases: PubMed, MEDLINE, CINAHL Ultimate (EBSCO), PsycINFO, Embase, Scopus and Global Health through the three main searching terms—adverse perinatal outcomes, maternal mental illness and settings, with a variant of subject headings and keywords. We will follow the Joanna Briggs Institute critical appraisal checklist to assess the quality of the studies we are including. The review findings will be reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 statement. Estimate-based meta-analysis will be performed. We will assess heterogeneity between studies using the I^2 statistics and publication bias will be checked using funnel plots and Egger's test. A subgroup analysis will be conducted to explore potential sources of heterogeneity (if available). Finally, the certainty of the evidence will be evaluated using the Grading of Recommendations, Assessment, Development and Evaluation approach.

Ethics and dissemination Since this systematic review does not involve human participants, ethical approval is not required. The review will be submitted for publication in a peer-reviewed journal.

PROSPERO registration number CRD42023405980.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Through linking adverse perinatal outcomes and postpartum maternal mental illness, we can examine the association that have not been examined at low-income and middle-income countries.
⇒ Use the Grading of Recommendations, Assessment, Development and Evaluation approach to determine the quality of evidence for each outcome.
⇒ We anticipate the possible limitation of language bias; we will include studies published in English.

INTRODUCTION

Adverse perinatal outcomes include both perinatal morbidity (low birth weight (LBW), small for gestational age (SGA), preterm birth or congenital anomalies) and perinatal mortality (stillbirth and neonatal death).[1 2] Every year, approximately 2.4 million children die within the first 28 days of life,[3] and there are 2.6 million reported stillbirth[4] worldwide. Perinatal morbidity rates also remain unacceptably high globally with nearly 15 million preterm babies[5] and 20 million babies with LBW each year.[6] Alarmingly, 98% of these cases occur in low-income and middle-income countries.[4 7] Infants suffering from perinatal morbidity are at increased risk of mortality and developmental problems. For instance, preterm babies are at high risk of hospitalisation and can suffer lifelong effects such as cerebral palsy, mental retardation, visual and hearing impairments, and poor health.[1 8–11] These adverse perinatal outcomes can have significant impacts on the well-being of their parents.

Evidence suggests that depression during pregnancy can predict preterm birth and LBW, indicating a bidirectional relationship between maternal mental health and adverse perinatal outcomes.[12–14] As a result, adverse perinatal

BMJ Open: first published as 10.1136/bmjopen-2023-074447 on 14 December 2023. Downloaded from http://bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

outcomes can have short-term and long-term consequences on maternal mental health and well-being.[15 16] Studies have shown that perinatal mortality was associated with an increased risk of depressive and anxiety disorder.[17–19] Similarly, studies showed that mothers of preterm babies or those with SGA experience higher levels of anxiety, depression, post-traumatic stress disorder (PTSD) and postpartum psychosis compared with parents of healthy term-born babies.[15 20–26] This could be due to the fact that preterm babies often require hospitalisation, complex interventions such as ventilation and incubation, and longer stays in neonatal care, which can be stressful for parents.[27] Other research has also found that mothers of LBW babies are more likely to experience depression[21 24 28] and PTSD[29–31] compared with mothers of average birth weight babies. Furthermore, parents of infants born with congenital anomalies are at high risk of developing symptoms of anxiety,[32 33] depression,[34–36] PTSD[37] and psychological distress.[38]

While many systematic review studies have focused on the effect of maternal mental illness on perinatal outcomes,[13 14 39–42] only a few studies have examined the effects of adverse perinatal outcomes on maternal mental illness.[16 17 24 28 37] Nearly 90% of these studies were conducted in high-income countries,[43] with one systematic study assessing maternal mental illness following perinatal loss in a global context.[17] Given the high incidence of adverse perinatal outcomes within low-income and middle-income settings and the lack of research, there is a pressing need to analyse maternal mental illness following adverse perinatal outcomes in low-income and middle-income countries.

To our knowledge, no comprehensive systematic review has been conducted to estimate rates of anxiety, depression, PTSD and postpartum psychosis for mothers following adverse perinatal outcomes in low-income and middle-income countries. Therefore, our aim is to synthesise evidence on effects of adverse perinatal outcomes on postpartum maternal mental illness, including anxiety, depression, PTSD and postpartum psychosis and to identify potential moderators of these associations, such as study quality, type of adverse outcome, economic status of the study country and maternal age. We hypothesise that measures of depression, anxiety, PTSD, postpartum psychosis show a significant increase following adverse perinatal outcomes compared with the normal perinatal outcomes.

METHODS

We will conduct a systematic review of empirical evidence regarding the effect of adverse perinatal outcomes on postpartum maternal mental illness in low-income and middle-income countries. The finding of this review will be reported based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 statement.[44]

Search Strategy

In this systematic review, the Patient/population-Intervention-Comparison-Outcomes-Type of study-Context approach is used to formulate and address the research questions.[45] The population will consist of adult women aged 18 years and older who have given birth. Exposed group will be postpartum women who experienced at least one of the adverse perinatal outcomes (preterm, SGA, LBW, congenital anomalies, stillbirth and neonatal death). The comparison group will consist of postpartum women who did not experience any adverse perinatal outcome. In this review, the outcomes will be postpartum maternal mental illness which includes anxiety, depression, PTSD and postpartum psychosis. All primary studies that report on the effect of adverse perinatal outcome on maternal mental illness for at least one of the conditions in low-income and middle-income countries (defined by World Bank) will be included.

Studies will be retrieved from seven electronic bibliographic databases, namely PubMed, MEDLINE, CINAHL Ultimate (EBSCO), PsycINFO, Embase, Scopus and Global Health. Google Scholar will also be considered to search for further literatures. Additional relevant studies from the included articles will be assessed and included (citation snowballing) in the final review. To build the search terms, subject headings and keywords related to adverse perinatal outcomes, postpartum maternal mental illness, and low-income and middle-income countries will be used (see sample MEDLINE search strategy on table 1). These terms will be linked using appropriate Boolean Operators such as “AND” and “OR” as per the requirements of the respective databases.[46]

Inclusion and exclusion

The review will include all peer-reviewed primary studies published in English from 1 January 2000 to the date of the review (to include the most up to date studies on the topic) that report on postpartum maternal mental illness for at least one adverse perinatal outcome in low-income and middle-income countries. As per the world bank’s definition for 2023, countries with a gross national income per capita of US$1085 or less are categorised as low-income countries, while those with a gross national per capita of US$1086–US$13 205) are deemed middle-income countries.[47] Among the identified countries, there are 28 low-income countries and 108 middle-income countries. The review will exclude abstracts, review papers, qualitative studies, theoretical and conceptual articles, conference papers, randomised controlled trials and letters or editorials. Finally, the full text of all relevant studies found to meet the inclusion criteria for the final review will be retained. The detailed inclusion and exclusion criteria are summarised in table 2.

Study selection

Once the search strategy is developed and tested, two authors (SMF and TGH) will retrieve all relevant articles from all the databases and export them to EndNote V.20 to remove duplicates. Then, after removing the duplicates, studies will be exported to Rayyan (a systematic review management software package) for screening.[48]

BMJ Open: first published as 10.1136/bmjopen-2023-074447 on 14 December 2023. Downloaded from http://bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

Table 1 Sample searching strategy for reviewing the effect of adverse perinatal outcomes on postpartum maternal mental health in LMICs

	Concept 1	Concept 2	Concept 3
Terms	Adverse Perinatal outcomes	Common mental illness	Low-income and middle-income countries
Keywords	((Adverse or perinatal or pregnancy or gestation or birth or neonatal or obstetric or infant or fetal or congenital or child) ADJ3(outcome* or death or defect or anomal* or complication or event or loss or mortalit* or morbidit* or consequence or sequelae)).tw,ab. OR (Stillbirth or still-birth or prematurity or preterm or small for gestational age or small baby or PTB or SGA or low birthweight or LBW).tw,ab.	((Anxiety or generalized anxiety or depression or depressive or posttraumatic stress) ADJ2(disorder or symptom)).tw,ab. Or ((Postpartum or postnatal or puerperal or PNC or post-delivery or maternal or maternity or perinatal) ADJ2 (Anxiety or generalized anxiety or depression or disorder)).tw,ab.	((Developing or undeveloped or low income or low-income* or middle income or middle-income or low resource or middle resource or low-and middle- income or low and middle income or non-industrialised or third world) ADJ3 (countr* or nation* or setting*)).tw,ab. Or (Africa, sub-Sahara or sub-Saharan or Eastern Africa or Middle East Asia or Asia or Latin America or South America).tw,ab. Or (Afghanistan or Burkina Faso or Burundi or Central African Republic or Chad or Congo Democratic Republic or Eritrea or Ethiopia or Gambia or Guinea or Guinea-Bissau or Korea Democratic People Republic or Liberia or Madagascar or Malawi or Mali or Mozambique or Niger or Rwanda or Sierra Leone or Somalia or South Sudan or Sudan or Syrian Arab Republic or Togo or Uganda or Yemen Republic or Zambia or Angola or Algeria or Bangladesh or Benin or Bhutan or Bolivia or Cabo Verde or Cambodia or Cameroon or Comoros or Congo Republic or Cote d Ivoire or Djibouti or Egypt Arab Republic or El Salvador or Eswatini or Ghana or Haiti or Honduras or India or Indonesia or Iran Islamic Republic or Kenya or Kiribati or Kyrgyz Republic or Lao People Democratic Republic or Lebanon or Lesotho or Mauritania or Micronesia Fed Sts or Mongolia or Morocco or Myanmar or Nepal or Nicaragua or Nigeria or Pakistan or Papua New Guinea or Philippines or Samoa or "Sao Tome and principe" or Senegal or Solomon Islands or Sri Lanka or Tanzania or Tajikistan or Timor-Leste or Tunisia or Ukraine or Uzbekistan or Vanuatu or Vietnam or "West Bank and Gaza" or Zimbabwe or Albania or American samoa or Argentina or Armenia or Azerbaijan or Belarus or Belize or "Bosnia and Herzegovina" or Botswana or Brazil or Bulgaria or China or Colombia or Costa Rica or Cuba or Dominica or Dominican Republic or Equatorial Guinea or Ecuador or Fiji or Gabon or Georgia or Grenada or Guatemala or Guyana or Iraq or Jamaica or Jordan or Kazakhstan or Kosovo or Libya or Malaysia or Maldives or Marshall Islands or Mauritius or Mexico or Moldova or Montenegro or Namibia or North Macedonia or Palau or Paraguay or Peru or Russian Federation or Serbia or South Africa or Saint Lucia or "Saint Vincent and the Grenadines" or Suriname or Thailand or Tonga or Turkiye or Turkmenistan or Tuvalu).tw,ab.
Subject heading			
Medline	Pregnancy Complications/ or Pregnancy Outcome/ or exp Fetal Death/ or exp Fetal Diseases/ or exp Perinatal Mortality/ or exp Perinatal Death/ or exp Premature Birth/ or Infant, Low Birth Weight/ or exp Congenital Abnormalities/ or Infant, Newborn, Diseases/	exp Depression, Postpartum/ or exp Depression/ or exp anxiety/ or exp psychological distress/ or exp Stress Disorders, Traumatic/	Developing Countries/ or exp Resource-Limited Settings/ or exp africa/ or exp africa, northern/ or exp "africa south of the sahara"/ or exp "Africa South of the Sahara"/ or exp Afghanistan/ or exp Albania/ or exp Algeria/ or exp American Samoa/ or exp Angola/ or exp Argentina/ or exp Armenia/ or exp Azerbaijan/ or exp Bangladesh/ or exp Belize/ or exp Benin/ or exp Bhutan/ or exp Bolivia/ or exp "Bosnia and Herzegovina"/ or exp Botswana/ or exp Brazil/ or exp Bulgaria/ or exp Burkina Faso/ or exp Burundi/ or exp Cabo Verde/ or exp Cambodia/ or exp Cameroon/ or exp Central African Republic/ or exp Chad/ or exp China/ or exp Colombia/ or exp Comoros/ or exp Congo/ or exp "Democratic Republic of the Congo"/ or exp Costa Rica/ or exp Cote d'Ivoire/ or exp Cuba/ or exp Djibouti/ or exp Dominica/ or exp Dominican Republic/ or exp Ecuador/ or exp Egypt/ or exp El Salvador/ or exp Equatorial Guinea/ or exp Eritrea/ or exp Eswatini/ or exp Ethiopia/ or exp Fiji/ or exp Gabon/ or exp Gambia/ or exp "Georgia (Republic)"/ or exp Ghana/ or exp Grenada/ or exp Guatemala/ or exp Guinea/ or exp Equatorial Guinea/ or exp Guinea-Bissau/ or exp Guyana/ or exp Haiti/ or exp Honduras/ or exp India/ or exp Indonesia/ or exp Iran/ or exp Iraq/ or exp Jamaica/ or exp Jordan/ or exp Kazakhstan/ or exp Kenya/ or exp "Democratic People's Republic of Korea"/ or exp "Republic of Korea"/ or exp Korea/ or exp Kosovo/ or exp Kyrgyzstan/ or exp Lebanon/ or exp Lesotho/ or exp Liberia/ or exp Libya/ or exp Madagascar/ or exp Malawi/ or exp Malaysia/ or exp Maldives/ or exp Mali/ or exp Mauritania/ or exp Mauritius/ or exp Mexico/ or exp "Gulf of Mexico"/ or exp New Mexico/ or exp Micronesia/ or exp Moldova/ or exp Mongolia/ or exp Montenegro/ or exp Morocco/ or exp Mozambique/ or exp Myanmar/ or exp Namibia/ or exp Nepal/ or exp Nicaragua/ or exp Niger/ or exp Aspergillus niger/ or exp Nigeria/ or exp Pakistan/ or exp Palau/ or exp Papua New Guinea/ or exp Paraguay/ or exp Peru/ or exp Philippines/ or exp "Republic of Belarus"/ or exp "Republic of North Macedonia"/ or exp Russia/ or exp Rwanda/ or exp Saint Lucia/ or exp "Saint Vincent and the Grenadines"/ or exp Samoa/ or exp "Sao Tome and Principe"/ or exp Senegal/ or exp Serbia/ or exp Sierra Leone/ or exp Somalia/ or exp South Africa/ or exp South Sudan/ or exp Sri Lanka/ or exp Sudan/ or exp South Sudan/ or exp Suriname/ or exp Syria/ or exp Tajikistan/ or exp Tanzania/ or exp Thailand/ or exp Timor-Leste/ or exp Togo/ or exp Tonga/ or exp Tunisia/ or exp Turkey/ or exp Turkmenistan/ or exp Uganda/ or exp Ukraine/ or exp Uzbekistan/ or exp Vanuatu/ or exp Vietnam/ or exp Yemen/ or exp Zambia/ or exp Zimbabwe/

BMJ Open: first published as 10.1136/bmjopen-2023-074447 on 14 December 2023. Downloaded from http://bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

Table 2 Study inclusion and exclusion criteria

PICOTC	Definition	Inclusion criteria	Exclusion criteria
Population	Postpartum women	All women aged 18 and older, women who gave birth and women up to 1 year after giving birth	► Women who have experienced substance abuse and intimate partner violence ► Women who experienced common mental illness during pregnancy (before giving birth)
Exposure / intervention	Adverse perinatal outcome	Postpartum women who experienced at least one of the adverse perinatal outcomes (preterm, SGA, LBW, congenital anomalies, stillbirth and neonatal death)	Another _
Comparison	With and without adverse perinatal outcome	► Articles reported the maternal mental illness among postpartum women experienced adverse perinatal outcome ► Articles reported maternal mental illness among postpartum women who did not experience adverse perinatal outcomes	_
Outcome	Maternal mental illness incurred due to the presence of adverse perinatal outcomes during postpartum period	► Articles quantitatively reported the mental illness among postpartum women experienced adverse perinatal outcomes	► Qualitatively assessed maternal mental illness
Type of studies	Types of articles/evidence to be included in the review	► All primary observational studies reported on association between adverse perinatal outcomes and postpartum maternal mental illness	► Qualitative studies ► Editorials and conference papers ► Review papers ► RCT studies
Context/ settings	Low-income and middle-income countries	All low-income and middle-income countries according to the world bank definition of 2023	► Country not low-income and middle- income in 2023, but low income andmiddle income prior to the review
Other criteria	Year	Article published after 1 January 2000	► Article published before 2000
	Language	Published in English	► Studies published in non-English language
	Studies species	Human studies	► Animal studies

LBW, low birth weight; PICOTC, Patient/population-Intervention-Comparison-Outcomes-Type of study-Context; RCT, randomised controlled trial; SGA, small for gestational age.

Two authors (SMF and TGH) will screen the studies based on the title and abstract. Then the full texts of remaining articles will be retrieved and reviewed by each of two authors independently based on the inclusion and exclusion criteria as presented in table 2. Any disagreement will be discussed and handled by the senior author (AD).

Data extraction and analysis

A consistent Excel form will be used to record extracted data from the studies included for assessment of study quality. The abstracted data will include: (1) The study characteristics: article title, authors, year of publication, country of the study, year of publication, study design (cohort, case–control and cross-sectional); (2) Study population; (3) Participants characteristics: mean/ median age, and sample size, baseline characteristics; (4) type of adverse perinatal outcomes (preterm, SGA, LBW, congenital anomalies, stillbirth and neonatal death); (5) Outcomes of the study: maternal mental illness (anxiety, depression, PTSD and postpartum psychosis) and (6) Each primary raw data will be taken to calculate the measurements of association (if any), associated variables with β coefficient or adjusted risk ratio with their CI.

A narrative summary of maternal mental illness will be made for studies that do not report effects by systematically organising the information based on the mental illness classification. Characteristics of the studies will be described in box 1. The postpartum maternal mental

Box 1 Data abstraction sheet elements to describe the study in the final review

Data abstraction sheet elements
1. Author(s), year.
2. Country.
3. Study design.
4. Study population/participants.
5. Sample size.
6. Outcome.
7. Measurement tool.
8. Methods of analysis.
9. Exposure.
10. Mental illness category.
11. Key finding.

BMJ Open: first published as 10.1136/bmjopen-2023-074447 on 14 December 2023. Downloaded from http://bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

illness will include anxiety, depression, PTSD and postpartum psychosis.

In the meta-analysis, we will calculate the OR for binary variables and the standard mean difference for continuous variables with 95% CI. A random-effects model will be selected under the assumption that studies included in the meta- analysis have been carried out with heterogeneous populations. Statistical heterogeneity between studies will be evaluated using the I^2 statistics (I^2 test), which can quantify the heterogeneity ranging from 0% (no heterogeneity) to 100% (the differences between the effect sizes can completely be explained by chance alone).[49] Subgroup and meta-regression analyses will be conducted to explore the potential source of heterogeneity. We will adopt Egger's and Begg's test to check the publication bias and funnel plot asymmetry to assess the effect of publication bias if the number of studies greater than or equal to 10, based on Cochrane Handbook recommendation.[50] In addition, we will perform sensitivity analysis by excluding studies one at a time to ensure the stability of the results. All data will be analysed using the STATA V.16.

Risk of bias assessment

For the quality appraisal, the Joanna Briggs Institute critical appraisal checklist for observational studies will be used.[51]

Quality of evidence assessment

The quality of evidence for each outcome will be determined using the Grading of Recommendations, Assessment, Development and Evaluation approach.[52] This system helps to evaluate the quality of evidence in the domains of risk of bias, consistency, directness, precision and publication bias. Accordingly, the quality of the evidence will be classified as high, moderate, low or very low.[53] Interpretation of the grading scores is presented in table 3.

Patient and public involvement

No patientsand public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

ETHICS AND DISSEMINATION

This systematic review will not directly involve human participants and requires no ethical approval. The findings of this systematic review will be disseminated through peer-reviewed publication and will be presented at international conferences related to this field. In addition, findings will be used by other relevant organisations and stakeholders for decision-making.

Strengthens and limitations

This study will quantify the effect of adverse perinatal outcomes on postpartum maternal mental illness in low-income and middle-income countries, focusing on common conditions such as anxiety, depression and PTSD. This will give a comprehensive picture of the burden of adverse perinatal outcomes on maternal mental illness in low-income and middle-income countries. Consequently, which help to design a system wide integrated strategies to improve maternal mental illness following adverse perinatal outcome in resource-limited settings. By publishing the research protocol, we reinforce the clarity of the strategy and minimise the risk of bias. However, we anticipate some limitations, including

Table 3 Criteria for assessing the quality of evidence based on GRADE approach

Quality of evidence	Interpretation of grading score	Criteria for grading		
		Type of evidence	Decrease grade if	Increase grade if
High	Further research is very unlikely to change our confidence in the estimate of effect	► Randomised trial=high ► Observational study=low ► Any other evidence=low	► Serious (–1) or very serious (–2) limitations to study quality ► Important inconsistency (–1) ► Some (–1) or major (–2) uncertainty about directness ► Imprecision or sparse data (–1) ► High probability of reporting bias (–1)	► Strong evidence of association significant RR of >2 (<0.5) based on consistent evidence from two or more observational studies, with no plausible confounders (+1) ► Very strong evidence of association—RR of >5 (<0.2) based on direct evidence with no major threats to validity (+2) ► Evidence of dose response gradient (+1) ► All plausible confounders would have reduced the effect (+1)
Moderate	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate			
Low	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate			
Very low	Any estimate of effect is very uncertain			

GRADE, Grading of Recommendations, Assessment, Development and Evaluation.

BMJ Open: first published as 10.1136/bmjopen-2023-074447 on 14 December 2023. Downloaded from http://bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

the use of English language limiters and heterogeneity of the studies.

Amendments of the review

Any change to this protocol will be updated on the PROSPERO registration database (registration number: CRD42023405980) and the updated part of the protocol will be published together with the full systematic review.

Contributors SMF and TGH conceptualised and designed the protocol, drafted the initial manuscript, and reviewed the manuscript. SMF, TGH and AD defined the concepts and search items, data extraction process and methodological appraisal of the studies. SMF and TGH planned the data extraction and statistical analysis. AD and TGH provided critical insights. All authors have approved and contributed to the final written 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.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

ORCID iDs

Samrawit Mihret Fetene http://orcid.org/0000-0002-6312-0267
Tsegaye Gebremedhin Haile http://orcid.org/0000-0002-7076-6146

REFERENCES

1 Jaleta DD, Abdisa DK. Predictors of adverse perinatal outcome among women who gave birth at medical center of Southwest Ethiopia: a retrospective cohort study. *BMJ Open* 2022;12:e053881.
2 Sharan A, Stuurman AL, Jahagirdar S, *et al*. Estimating baseline rates of adverse perinatal and neonatal outcomes using a facility-based surveillance approach: A prospective observational study from the WHO global vaccine safety multi-country collaboration on safety in pregnancy. *EClinicalMedicine* 2022;50:101506.
3 World Health Organization. Newborn mortality WHO report. 2021. Available: https://www.who.int/news-room/fact-sheets/detail/newborns-reducing-mortality
4 The lancet ending preventable stillbirths series. 2016. Available: https://www.thelancet.com/series/ending-preventable-stillbirths
5 Swann T. "'anarchist Technologies': anarchism, cybernetics and mutual aid in community responses to the COVID-19 crisis". *Organization (Lond)* 2023;30:193–209.
6 UNICEF-WHO Low birthweight estimates, Available: https://www.unicef.org/reports/UNICEF-WHO-low-birthweight-estimates-2019
7 Blencowe H, Cousens S, Oestergaard MZ, *et al*. National, regional, and worldwide estimates of Preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. *Lancet* 2012;379:2162–72.
8 Burden C, Bradley S, Storey C, *et al*. From grief, guilt pain and stigma to hope and pride–a systematic review and meta-analysis of mixed-method research of the Psychosocial impact of Stillbirth. *BMC Pregnancy Childbirth* 2016;16:9.
9 You D, Hug L, Ejdemyr S, *et al*. Global, regional, and national levels and trends in Under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN inter-agency group for child mortality estimation. *Lancet* 2015;386:2275–86.
10 Muller-Nix C, Forcada-Guex M, Pierrehumbert B, *et al*. Prematurity, maternal stress and mother–child interactions. *Early Hum Dev* 2004;79:145–58.
11 Yaari M, Treyvaud K, Lee KJ, *et al*. Preterm birth and maternal mental health: longitudinal Trajectories and predictors. *J Pediatr Psychol* 2019;44:736–47.
12 Grote NK, Bridge JA, Gavin AR, *et al*. A meta-analysis of depression during pregnancy and the risk of Preterm birth, low birth weight, and Intrauterine growth restriction. *Arch Gen Psychiatry* 2010;67:1012–24.
13 Dadi AF, Miller ER, Bisetegn TA, *et al*. Global burden of Antenatal depression and its association with adverse birth outcomes: an umbrella review. *BMC Public Health* 2020;20:173.
14 Fekadu Dadi A, Miller ER, Mwanri L. Antenatal depression and its association with adverse birth outcomes in low and middle-income countries: a systematic review and meta-analysis. *PLoS One* 2020;15:e0227323.
15 Bener A. Psychological distress among postpartum mothers of Preterm infants and associated factors: a neglected public health problem. *Braz J Psychiatry* 2013;35:231–6.
16 Campbell-Jackson L, Horsch A. The psychological impact of Stillbirth on women: A systematic review. *Illness, Crisis & Loss* 2014;22:237–56.
17 Herbert D, Young K, Pietrusińska M, *et al*. The mental health impact of perinatal loss: A systematic review and meta-analysis. *J Affect Disord* 2022;297:118–29.
18 Davoudian T, Gibbins K, Cirino NH. Perinatal loss: the impact on maternal mental health. *Obstet Gynecol Surv* 2021;76:223.
19 Hunter A, Tussis L, MacBeth A. The presence of anxiety, depression and stress in women and their partners during pregnancies following perinatal loss: A meta-analysis. *J Affect Disord* 2017;223:153–64.
20 Carson C, Redshaw M, Gray R, *et al*. Risk of psychological distress in parents of Preterm children in the first year: evidence from the UK millennium cohort study. *BMJ Open* 2015;5:e007942.
21 Helle N, Barkmann C, Bartz-Seel J, *et al*. Very low birth-weight as a risk factor for postpartum depression four to six weeks Postbirth in mothers and fathers: cross-sectional results from a controlled Multicentre cohort study. *J Affect Disord* 2015;180:154–61.
22 Pace CC, Spittle AJ, Molesworth CM-L, *et al*. Evolution of depression and anxiety symptoms in parents of very Preterm infants during the newborn period. *JAMA Pediatr* 2016;170:863–70.
23 Jotzo M, Poets CF. Helping parents cope with the trauma of premature birth: an evaluation of a trauma-preventive psychological intervention. *Pediatrics* 2005;115:915–9.
24 Vigod SN, Villegas L, Dennis CL, *et al*. Prevalence and risk factors for postpartum depression among women with Preterm and Low-Birth-Weight infants: a systematic review. *BJOG* 2010;117:540–50. 10.1111/j.1471-0528.2009.02493.x Available: https://obgyn.onlinelibrary.wiley.com/toc/14710528/117/5
25 Indredavik MS, Vik T, Evensen KAI, *et al*. Perinatal risk and psychiatric outcome in adolescents born Preterm with very low birth weight or term small for gestational age. *J Dev Behav Pediatr* 2010;31:286–94.
26 Dadi AF, Mwanri L, Woodman RJ, *et al*. Causal mechanisms of postnatal depression among women in Gondar town, Ethiopia: application of a stress-process model with generalized structural equation modeling. *Reprod Health* 2020;17:63.
27 Carter JD, Mulder RT, Bartram AF, *et al*. Infants in a neonatal intensive care unit: parental response. *Arch Dis Child Fetal Neonatal Ed* 2005;90:F109–13.
28 Treyvaud K. Parent and family outcomes following very Preterm or very low birth weight birth: a review. *Semin Fetal Neonatal Med* 2014;19:131–5.
29 Kersting A, Dorsch M, Wesselmann U, *et al*. Maternal Posttraumatic stress response after the birth of a very low-birth-weight infant. *J Psychosom Res* 2004;57:473–6.
30 Ringland CP. Posttraumatic stress disorder and the NICU graduate mother. *Infant* 2008;4:14–7.
31 Elklit A, Hartvig T, Christiansen M. Psychological sequelae in parents of extreme low and very low birth weight infants. *J Clin Psychol Med Settings* 2007;14:238–47.
32 Aite L, Trucchi A, Nahom A, *et al*. A challenging intervention with maternal anxiety: babies requiring surgical correction of a congenital anomaly after missed Prenatal diagnosis. *Infant Mental Health J* 2003;24:571–9. 10.1002/imhj.10075 Available: https://onlinelibrary.wiley.com/toc/10970355/24/6
33 Kaasen A, Helbig A, Malt U, *et al*. Acute maternal social dysfunction, health perception and psychological distress after ultrasonographic detection of a fetal structural anomaly. *BJOG* 2010;117:1127–38. 10.1111/j.1471-0528.2010.02622.x Available: https://obgyn.onlinelibrary.wiley.com/toc/14710528/117/9
34 Leithner K, Maar A, Fischer-Kern M, *et al*. Affective state of women following a Prenatal diagnosis: predictors of a negative psychological outcome. *Ultrasound Obstet Gynecol* 2004;23:240–6.

BMJ Open: first published as 10.1136/bmjopen-2023-074447 on 14 December 2023. Downloaded from http://bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

35 Pinelli J, Saigal S, Bill Wu Y-W, *et al*. Patterns of change in family functioning, resources, coping and parental depression in mothers and fathers of sick newborns over the first year of life. *J Neonatal Nurs* 2008;14:156–65.
36 Rotberg B, Horváth-Puhó E, Vigod S, *et al*. Increased maternal New-Onset psychiatric disorders after delivering a child with a major anomaly: a cohort study. *Acta Psychiatr Scand* 2020;142:264–74.
37 Woolf-King SE, Anger A, Arnold EA, *et al*. Mental health among parents of children with critical congenital heart defects: a systematic review. *J Am Heart Assoc* 2017;6:e004862.
38 Nes RB, Røysamb E, Hauge LJ, *et al*. Adaptation to the birth of a child with a congenital anomaly: A prospective longitudinal study of maternal well-being and psychological distress. *Dev Psychol* 2014;50:1827:1827–39.:.
39 Adane AA, Bailey HD, Morgan VA, *et al*. The impact of maternal Prenatal mental health disorders on Stillbirth and infant mortality: a systematic review and meta-analysis. *Arch Womens Ment Health* 2021;24:543–55.
40 Grigoriadis S, Graves L, Peer M, *et al*. Maternal anxiety during pregnancy and the association with adverse perinatal outcomes: systematic review and meta-analysis. *J Clin Psychiatry* 2018;79:17r12011.
41 Grigoriadis S, VonderPorten EH, Mamisashvili L, *et al*. The impact of maternal depression during pregnancy on perinatal outcomes: a systematic review and meta-analysis. *J Clin Psychiatry* 2013;74:e321–41.
42 Gold KJ, Marcus SM. Effect of maternal mental illness on pregnancy outcomes. *Expert Rev Obstetr Gynecol* 2008;3:391–401.
43 Farren J, Mitchell-Jones N, Verbakel JY, *et al*. The psychological impact of early pregnancy loss. *Hum Reprod Update* 2018;24:731–49.
44 Page MJ, McKenzie JE, Bossuyt PM, *et al*. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Int J Surg* 2021;88:S1743-9191(21)00040-6.
45 Munn Z, Moola S, Lisy K, *et al*. Methodological guidance for systematic reviews of observational Epidemiological studies reporting prevalence and cumulative incidence data. *Int J Evid Based Healthc* 2015;13:147–53.
46 Thielen FW, Van Mastrigt G, Burgers LT, *et al*. How to prepare a systematic review of economic evaluations for clinical practice guidelines: database selection and search strategy development. *Expert Rev Pharmacoecon Outcomes Res* 2016;16:705–21.
47 World Bank. Country-Rankings/low-and lower middle-income-countries. 2023. Available: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups
48 Ouzzani M, Hammady H, Fedorowicz Z, *et al*. Rayyan-a web and mobile App for systematic reviews. *Syst Rev* 2016;5:210.
49 Huang J, Cheng Y, Li C, *et al*. Genetic heterogeneity on sleep disorders in Parkinson's disease: a systematic review and meta-analysis. *Transl Neurodegener* 2022;11:21.
50 Higgins JPT, Thomas J, Chandler J, *et al*. Cochrane Handbook for systematic reviews of interventions. In: *Cochrane handbook for systematic reviews of interventions*. Hoboken: Wiley, 2019.
51 Joanna Briggs Institute (JBI). JBI critical appraisal tool for observational studies. n.d. Available: https://jbi.global/critical-appraisal-tools
52 Grading quality of evidence and strength of recommendations. *BMJ* 2004;328:1490.
53 Brozek JL, Akl EA, Alonso-Coello P, *et al*. Grading quality of evidence and strength of recommendations in clinical practice guidelines: part 1 of 3. An overview of the GRADE approach and grading quality of evidence about interventions. *Allergy* 2009;64:669–77.

BMJ Open: first published as 10.1136/bmjopen-2023-074447 on 14 December 2023. Downloaded from http://bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.