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Research paper

Prevalence and risk factors of perinatal depression among women in South Asian countries: A systematic review and meta-analysis

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ABSTRACT

Background: More than one-third of South Asian women of reproductive age experience mental health issues during the perinatal period. We aim to systematically summarise existing evidence to conduct a meta-analysis to estimate the prevalence and key risk factors for perinatal depression in South Asia.

Methods: We searched across multiple databases for prospective studies that reported the prevalence of perinatal depression and associated risk factors among women in South Asian countries. We performed a meta-analysis of estimates of the prevalence of perinatal depression-related outcomes and associated risk factors (odds ratios) using random-effects models. Meta-regression and subgroup analyses were performed to explore the source of heterogeneity.

Results: The systematic review and meta-analysis included 29 studies published between 2015 and 2024. The overall pooled prevalence of perinatal depression was 28 % (95 % CI: 24 % to 32 %; $I^2 = 95.1$ %, $p \leq 0.001$). The prevalence varied widely by country, where the pooled prevalence of perinatal depression was highest in Bangladesh (46 %) and lowest in Sri Lanka (15 %). Son preference was identified as a risk factor for perinatal depression (OR 2.6, 95 % CI: 1.6-4.2, $I^2 = 26$ %). Lack of family support, unwanted pregnancy, women's history of health problems, and poor economic conditions were key predictors of perinatal depression.

Conclusions: The prevalence of perinatal depression in South Asian countries is high and caused by a combination of multiple risk factors. Targeted intervention, particularly on social norms around son preference and family support, is probably effective in addressing perinatal mental health risks during pregnancy and postpartum periods.

1. Introduction

Mental health is a global health concern; nearly one billion people live with mental illness, and women are disproportionately affected, experiencing higher rates of mental health burden compared to men (WHO, 2022a). The global literature focuses on mental health, asserting that “no health without mental health” (Prince et al., 2007), and “no health without perinatal mental health” (Howard et al., 2014). The perinatal mental health deals with both the pregnancy and the first year after giving birth (Helfer, 1987; Stevenson et al., 2023), a period during which mental health issues are most common and can significantly affect the well-being of both mother and child (Stevenson et al., 2023). Globally, 10 % of pregnant women and 13 % of new mothers suffer from mental ill health, but in low-and middle-income countries (LMICs), the prevalence rates are much higher, 16 % and 20 %, respectively (WHO, 2022a). The burden of perinatal depression is estimated to be substantially higher among South Asian women (18–35 %) compared to global estimates (10–20 %)(WHO, 2022a), and estimates in South Asian populations range widely. Prevalence estimates vary by women's socioeconomic status, ethnicity, and maternal health conditions (WHO, 2022a). The prevalence of perinatal depression also varies due to measurement disparities and cultural backgrounds, reporting rates ranging from 12 to 42 % in LMICs and 4 % to 63 % in Asian and Middle-East countries (Alfayumi-Zeadna et al., 2022; Klainin and Arthur, 2009).

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The antenatal depression rates also vary between 4 % and 47 % (Phoosuwan et al., 2018) depending on the trimester of pregnancy, respondents' socio-cultural backgrounds, and measurement disparities.

Perinatal mental health is a global health issue, and in South Asian countries, cultural beliefs and values play a major role in how women seek mental healthcare (Jain et al., 2025). Traditional gender norms and societal expectations prioritise women's roles as mothers and housewives, making it difficult for women to seek psychological support or talk about their emotional difficulties during the perinatal period (Insan et al., 2022a). Furthermore, mental healthcare priorities in South Asian countries are often overlooked due to highly fragmented services, limited funding, poor integration with primary care, and deeply rooted stigma and misconceptions about mental health (Hossain et al., 2020; Lemon et al., 2024). Studies also show that while some women develop mental ill health during pregnancy and others during the postpartum period (Rai et al., 2015), pregnant women are generally more prone to mental health issues compared to non-pregnant women (Sunday et al., 2018).

Perinatal mental ill health is associated with adverse health outcomes for both the mother and the child, including low birth weight, premature delivery, and mental health difficulties in adulthood (Tirumalaraju et al., 2020). Individual-related issues around economic difficulties, poor marital relationships, the stigma associated with mental health, unsupportive family members or absence of social support, women from ethnic minorities, and exposure to violence are major risk factors for perinatal mental health problems in both developed and LMICs (Djatche Miafo et al., 2023; Fekadu Dadi et al., 2020; Insan et al., 2022a; Jain et al., 2025; Nilaweera et al., 2014). To date, there has been no systematic review or meta-analysis of the prevalence and risk factors of perinatal depression in South Asian countries. This study's findings can support prevention and early interventions to address perinatal mental health illnesses among women in South Asian countries.

2. Methods

This systematic review was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Moher et al., 2009). The study protocol was pre-registered with PROSPERO (CRD42023477473).

2.1. Search strategy and selection criteria

We searched MEDLINE, CINAHL, PsycINFO, Maternity & Infant Care Database (MIDIRS) and Scopus databases. The search was restricted to peer-reviewed articles published between January 2015 and February 2024 to better understand the context of the Sustainable Development Goals (SDG) period (United Nations General Assembly, 2015). The search terms comprised combinations of MeSH terms using keywords such as (“Perinatal mental health” OR “Postpartum mental health” OR “Maternal mental health” OR “Antenatal mental health” OR “Perinatal mental health” OR “Depression”), and (“Prevalence” OR “Burden” OR “Risk factor”), (Women OR adolescents OR “Girls” OR “Female”), and (“Afghanistan” OR “Bangladesh” OR “Bhutan” OR “India” OR “Maldives” OR “Nepal” OR “Pakistan” OR “Sri Lanka” OR “South Asia” OR “SAARC Countries” OR “South Asian Association for Regional Cooperation”). A detailed search strategy is provided in Supplementary Table 1.

The database search results were collated in EndNote X3 bibliographic management software and duplicates were removed. Rayyan (https://rayyan.ai) was used to screen the literature. Two reviewers (AKT and SPW) independently screened the titles and abstracts, selecting the studies to be included in the review based on the inclusion and exclusion criteria. Any disagreements in study selection were resolved by meeting with the author not involved in data screening (VSG).

2.2. Inclusion and exclusion criteria

We included studies reporting the prevalence and the risk factors of perinatal depression, published in peer-reviewed English language journals, and studies conducted in South Asian countries. The perinatal period is defined as the time from the onset of pregnancy up to a year after giving birth (Helfer, 1987; Stevenson et al., 2023). We included epidemiological or cross-sectional studies on the prevalence of perinatal mental health and associated risk factors. We excluded studies that did not report the prevalence of perinatal mental health and associated risk factors from countries other than South Asia. Furthermore, this review excluded qualitative studies, literature reviews, case studies, book reviews, manuals, and news articles.

2.3. Data extraction and quality assessment

After evaluating the titles and abstracts, two authors (AKT and PW) reviewed the full text of each selected study and extracted the data from the included studies using a standardised proforma. The data extraction included the title, first author, publication year, year of study, study design, study population, settings, sample size, data collection procedure, study country, prevalence and risk factors. Two authors (SPW and VSG) double-checked the extracted data for its accuracy.

The quality of each included study was assessed using the Joanna Briggs Institute (JBI) critical appraisal checklist for analytical cross-sectional studies and cohort studies (Joanna Briggs Institute, 2020). The checklists for cross-sectional and cohort studies included 8 and 11 questions, respectively. Each question was answered as “yes”, “no”, “unclear” or “not applicable”. We assigned a value of 1 for “yes” responses and 0 for all other responses, resulting in a maximum score of 8 for analytical cross-sectional studies and 11 for cohort studies. As in the previous review (Nguyen et al., 2016), the scores on these tools were categorised into poor (0–3), moderate (4–6) and high (7 and above). The quality assessment of the included studies was undertaken independently by two authors (AST and SPW). Disagreements were resolved through discussion, and a final discussion was held between the two authors.

2.4. Statistical analysis

The meta-analysis was performed in R, using the *meta* package (Schwarzer et al., 2015; R Core Team, 2023). A random effects model, as the prevalence rates varied across the studies, was used to calculate the pooled prevalence of depression and its 95 % confidence interval (CI). The heterogeneity of studies was determined using Cochran's Q test and I^2 test statistics. A sensitivity analysis was performed to determine how each study affected the overall estimated prevalence of perinatal mental health illnesses. The list of predictors (i.e., risk factors) of perinatal mental health illness varied between studies, and we included the risk factors that are described in two or more studies to calculate the pooled odds ratio. The publication bias of studies was examined using visual inspection of funnel plots and Egger's test. A $p \leq 0.05$ was considered statistically significant (two-sided).

3. Results

3.1. Study selection

In total, we identified 758 articles from electronic database searches. After removing 126 duplicates in EndNote, we scanned the titles and abstracts of 632 articles. A total of 29 articles were included in this systematic review and meta-analysis. The study selection process is summarised in Fig. 1.

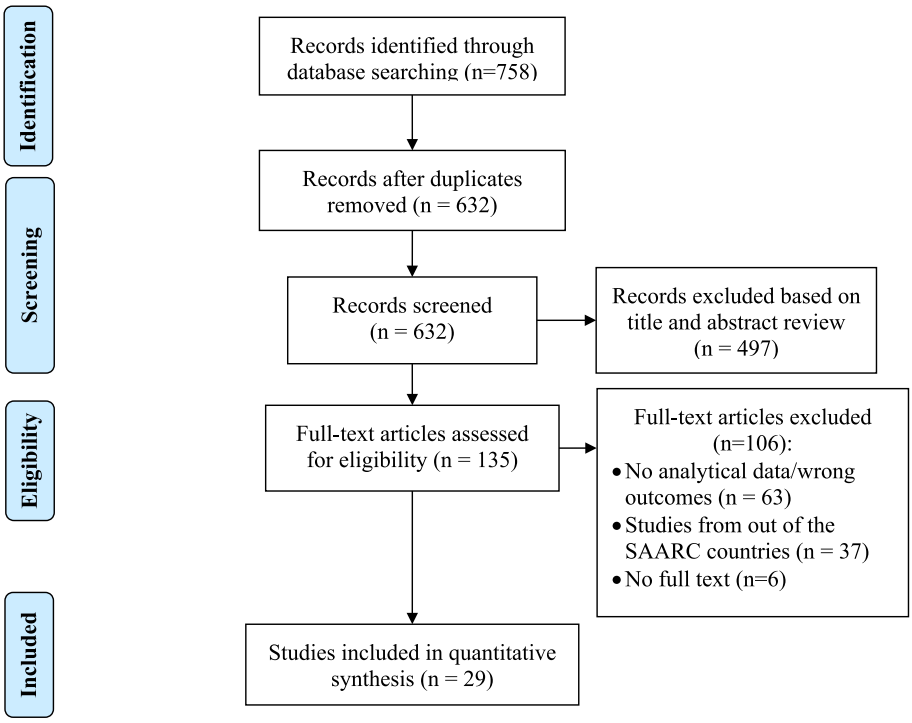

Fig. 1. PRISMA flow diagram of the study selection process.

3.2. Studies characteristics

A total of 12,118 women were included from 29 studies, with the largest sample (1349 participants) from Sri Lanka (Fan et al., 2020), while a study from Nepal included the smallest sample (143 participants) (Joshi et al., 2019). Almost all studies (n = 27) were a cross-sectional design, followed by two cohort studies (Nayak et al., 2021; Raheem et al., 2018). The majority of the studies (n = 9) were conducted in India (Agarwala et al., 2019; Basu et al., 2021; George et al., 2016; Kamali et al., 2023; Lanjewar et al., 2021; Nayak et al., 2021; Nisarga et al., 2022; Raghavan et al., 2021; Shidhaye et al., 2017), and Nepal (n = 9) (Adhikari et al., 2022; Aryal et al., 2018; Bhusal and Bhandari, 2018; Bhusal et al., 2023; Chalise et al., 2022; Giri et al., 2015; Joshi et al., 2019; Khadka et al., 2020; Singh et al., 2021), with the remaining being conducted in Bangladesh (n = 4)(Azad et al., 2019; Insan et al., 2023; Islam et al., 2017; Khan and Flora, 2017), Pakistan (n = 4)(Ahmed et al., 2022; Din et al., 2016; Khan et al., 2015; Khan et al., 2021), and one each in Afghanistan (Niazi et al., 2023), Sri Lanka (Fan et al., 2020), and the Maldives (Raheem et al., 2018). Most of the studies (n = 17) were carried out in health facilities (Adhikari et al., 2022; Ahmed et al., 2022; Basu et al., 2021; Bhusal and Bhandari, 2018; Bhusal et al., 2023; Din et al., 2016; Fan et al., 2020; Giri et al., 2015; Islam et al., 2017; Joshi et al., 2019; Kamali et al., 2023; Lanjewar et al., 2021; Nayak et al., 2021; Niazi et al., 2023; Nisarga et al., 2022; Raheem et al., 2018; Singh et al., 2021), followed by 12 in the community (Agarwala et al., 2019; Aryal et al., 2018; Azad et al., 2019; Chalise et al., 2022; George et al., 2016; Insan et al., 2023; Khadka et al., 2020; Khan and Flora, 2017; Khan et al., 2015; Khan et al., 2021; Raghavan et al., 2021; Shidhaye et al., 2017).

The Edinburgh Postnatal Depression Scale (EPDS) was the most commonly used tool (n = 20) for assessing perinatal depression (Adhikari et al., 2022; Agarwala et al., 2019; Azad et al., 2019; Basu et al., 2021; Bhusal and Bhandari, 2018; Bhusal et al., 2023; Chalise et al., 2022; Fan et al., 2020; Giri et al., 2015; Islam et al., 2017; Joshi et al., 2019; Kamali et al., 2023; Insan et al., 2023; Lanjewar et al., 2021; Nayak et al., 2021; Nisarga et al., 2022; Raghavan et al., 2021; Raheem et al., 2018; Shidhaye et al., 2017; Singh et al., 2021), followed Patient Health Questionnaire-9 (PHQ-9, n = 2) (Khadka et al., 2020; Khan et al., 2021), and the Depression, Anxiety and Stress (DAS, n = 2) ((Din et al., 2016; Niazi et al., 2023) tool, respectively. The remaining 5 studies each used a different assessment tool: the Hospital Anxiety and Depression Scale (HADS) (Ahmed et al., 2022), the Hopkins Symptom Checklist (Aryal et al., 2018), the self-reporting questionnaire-20 (SRQ-20) (Khan and Flora, 2017), the Harvard trauma questionnaire (Khan et al., 2015), and the Diagnostic criteria (Clinical Interview Schedule–Revised) (George et al., 2016). Out of 29 studies that examined perinatal depression, 20 focused on postpartum depression and nine on antenatal depression (Ahmed et al., 2022; Aryal et al., 2018; George et al., 2016; Insan et al., 2023; Joshi et al., 2019; Khan et al., 2021; Nisarga et al., 2022; Raheem et al., 2018; Shidhaye et al., 2017). The mean age of the participants varied between 22 (Shidhaye et al., 2017; Singh et al., 2021) to 30 years (Khadka et al., 2020), a range that appears to be consistent throughout the included studies (Table 1).

3.3. Methodological quality

The quality assessment scores ranged from 4 to 9, and over half of the included studies (n = 15, 51.7 %) were rated as high quality, while the remaining studies (n = 14, 48.3 %) were rated as having moderate quality (Table 1). See Supplementary Tables 2 and 3 for details. Pooled prevalence for studies with a high risk of bias was higher than those with a moderate risk of bias (31 % vs 25 %, $p > 0.5$).

3.4. The pooled prevalence of perinatal depression

The overall pooled prevalence of perinatal depression (Fig. 2) from 29 studies was 28 % (95 % CI: 24 %–32 %; $I^2 = 95.1$ %, $p \leq 0.001$). The prevalence of perinatal depression ranges between 15 % in Sri Lanka (Fan et al., 2020) and 46 % in Bangladesh (Khan and Flora, 2017).

3.5. Subgroup analysis of perinatal depression

As shown in Table 2, subgroup analyses revealed that different study designs, country-specific studies, study sites, and measurement tools

Table 1
Study characteristics.

Author(s), year; country	Study design	Sample size	Study sites	Mean age (years)	Measurement tools	Prevalence of depression	Significant risk factors	Quality score
Adhikari et al., 2022; Nepal	Cross-sectional survey	347	Health facility	25 (±4.43	EPDS	PPD: 32.9 %	Sex of baby girls and unplanned pregnancy were the risk factors for depression.	Moderate
Agarwala et al., 2019; India	Cross-sectional survey	410	Community	55.4 % (25–30 years)	EPDS	PPD: 21.5 %	Mothers' and husbands' level of education, history of abortion, more than two children and sleep disturbance of the mother were the risk factors of depression.	High
Ahmed et al., 2022; Pakistan	Cross-sectional survey	390	Health facility	28.06 ± 4.52	HADS	AD: 33.1 %	Poor household income, anxiety during the pandemic for visiting a doctor and unplanned pregnancy were the risk factors of depression.	High
Aryal et al., 2018; Nepal	Cross-sectional survey	778	Community	67 % (16–25 years)	Hopkins Symptom Checklist 25	AD: 23.8 %	Dalit ethnicity, unplanned pregnancy, and current smoking were associated with depression.	High
Azad et al., 2019; Bangladesh	Cross-sectional survey	376	Community	NR	EPDS	PPD: 39.4 %	Job loss due to pregnancy, history of miscarriage or stillbirth or child death, unintended pregnancy, management of delivery cost by borrowing, selling or mortgaging assets, depressive symptoms during pregnancy and intimate partner violence were key predictors of depression.	High
Basu et al., 2021; India	Cross-sectional survey	210	Health facility	25.95	EPDS (Hindi)	PPD: 29 %	Low/medium level social support was found to be a key predictor of PP depression.	High
Bhusal and Bhandari, 2018; Nepal	Cross-sectional survey	346	Health facility	22.75 ± 4.51	EPDS	PPD: 17.1 %	Women without adequate rest during pregnancy, abortion history, marital dissatisfaction and stressful life events were found as predictors of PP depression.	High
Bhusal et al., 2023; Nepal	Cross-sectional survey	173	Health facility	NR	EPDS	PPD: 20.2 %	Mothers having female children, unplanned pregnancies, and pregnancy-induced health problems were associated with an increased risk of postpartum depression.	High
Chalise et al., 2022; Nepal	Cross-sectional survey	250	Community	26.6 ± 4.6	EPDS	PPD: 24.8 %	Multigravida, unintended pregnancy, male child preference by family and intimate partner violence were found predictors of antenatal depression.	High
Din et al., 2016; Pakistan	Cross-sectional survey	230	Health facility	23.30	DAS	PPD: 42 %	Monthly income, life events, family type, young children in the family, pregnancy-related concerns and domestic violence were identified as predictors of perinatal depression.	High
Fan et al., 2020; Sri Lanka	Cross-sectional survey	1349	Health facility	NR	EPDS	PPD: 15.5 %	Mothers' delivery age over 35, over four living children, and mothers' illnesses before or during pregnancy were identified as PP depression.	Moderate
George et al., 2016; India	Cross-sectional survey	202	Community	24.7 ± 3.4	CIS-R	AD: 16.3 %	Pressure to have a male child, financial difficulties, non-arranged marriage, a history of miscarriage-still birth, and marital conflict were identified as antenatal depression risk factors.	High
Giri et al., 2015; Nepal	Cross-sectional survey	346	Health facility	24.0 ± 4.7	EPDS	PPD: 30 %	The mother's age, history of pregnancy-induced health problems, and subjective feelings of stress were identified as risks of PP depression.	High
Islam et al., 2017; Bangladesh	Cross-sectional survey	426	Health facility		EPDS	PPD: 35.2 %	Women who reported exposure to physical, sexual, and psychological IPV during pregnancy were identified as key risk factors for PP depression.	High
Insan et al., 2023; Bangladesh	Cross-sectional survey	235	Community	25 (median)	EPDS	AD: 56.6 %	Intimate partner violence before pregnancy and perceived husband's male gender preference were significantly associated with increased antenatal depressive symptoms.	High
Joshi et al., 2019; Nepal	Cross-sectional survey	143	Health facility	24 ± 4.1	EPDS	AD: 18 %	Pregnant women with health problems, sex preference for the child and husband's alcoholic behaviours were more likely to report depressive symptoms.	Moderate
Kamali et al., 2023; India	Cross-sectional survey	260	Health facility	86.15 % (<30 years)	EPDS	AD: 14.62 %	Women with marital conflicts and women who perceived a lack of social support had higher levels of antenatal depression.	Moderate

(*continued on next page*)

Table 1 (*continued*)

Author(s), year; country	Study design	Sample size	Study sites	Mean age (years)	Measurement tools	Prevalence of depression	Significant risk factors	Quality score
Khadka et al., 2020; Nepal	Cross-sectional survey	380	Community	30 ± 3.9; range: 19–42	PHQ-2	PPD: 18.7 %	Having no post-natal care, living in a nuclear family, living in a rural area, having a male baby, having complications after delivery, introducing complementary foods before 6 months of age and having poor sleep quality were identified as postpartum depressive symptoms.	Moderate
Khan et al., 2015; Pakistan	Cross-sectional survey	349	Community	Range: 19–30	Harvard Trauma Questionnaire	Psychological distress: 38.1 % ($n = 349$)	Primigravida, living with a joint family, and a history of major life events in the post-conflict were identified as predictors of psychological distress.	Moderate
Khan and Flora, 2017; Bangladesh	Cross-sectional survey	264	Community	25.30 ± 5.65	SRQ-20	CMD: 46.2 %	Having maternal CMD in a moderately and severely food-insecure household, underweight mothers were identified as key predictors of CMDs.	High
Khan et al., 2021; Pakistan	Cross-sectional survey	872	Community	26.9 ± 4.80	PHQ-9	AD: 27.8 %	Women living in a joint family, unsupportive family members, pregnant women who were psychologically abused by their partners and no suitable accommodation were identified as key predictors of antenatal depression.	Moderate
Lanjewar et al., 2021; India	Cross-sectional survey	240	Health facility	26.68	EPDS	PPD: 26.3 %	No social support or attention shift from mother to baby caused a higher level of PP depression.	Moderate
Nayak et al., 2021; India	Cohort	890	Health facility	26.4 ± 4.9	EPDS, PHQ-9	PPD: 21 %	Women with no formal education and those who had a stillbirth had PPD symptoms.	Moderate
Niazi et al., 2023; Afghanistan	Cross-sectional survey	691	Health facility	26.17 ± 6.06	DASS-42 (Dari)	PPD: 42.8 %	Factors predicting depression were due to poor women's health status, unplanned pregnancy status, unsupportive husband, unsupportive family, and poor family economic status.	Moderate
Nisarga et al., 2022; India	Cross-sectional survey	222	Health facility	18–25 years: 69.4 %	EPDS	AD: 25.6 %	Living in urban areas, fear of labour, intimate partner violence, and poor relationships with in-laws and parents were found to be predictors of antenatal depression.	Moderate
Raghavan et al., 2021; India	Cross-sectional survey	564	Community	23.4 (3.7)	EPDS	PPD: 23.9 %	Risk factors for perinatal depression were due to women who experienced ill-treatment by in-law's family, women with weak financial status, physical illness and women who had a history of previous abortions.	Moderate
Raheem et al., 2018; Maldives	Prospective cohort	458	Health facility	25–34 years: 61 %	EPDS	PPD: 27 %	Having experienced stressful life events, no family support and households whose income is less than <90,000 Maldivian Rufiyaa were identified as a risk factor for perinatal depression.	High
Shidhaye et al., 2017; India	Cross-sectional survey	302	Community	22.4	EPDS	AD: 16.9 %	Feeling pressured to deliver a male child, the unsatisfactory reaction of in-laws to dowry and difficult relationship with in-laws were significantly associated with antenatal depression.	Moderate
Singh et al., 2021; Nepal	Cross-sectional survey	415	Health facility	22.2 ± 3.8	EPDS (Nepali)	PPD: 33.7 %	Family monthly income <150 USD, migrated husband, living more than 60 min walking distance of health facility, delivered their last child by caesarean section, received less than four ANC visits, women who had unplanned pregnancy had higher odds of depressive symptoms.	Moderate

AD: Antenatal Depression; CIS-R: Clinical Interview Schedule–Revised; CMD: Common Mental Disorder; PPD: Postpartum Depression; DASS: Depression Anxiety Stress Scale; EDPS: Edinburgh Postnatal Depression Scale; PHQ-2: Patient Health Questionnaire-2; PHQ-9: Patient Health Questionnaire-9; PP: Postpartum; NR: Not Reported; SRQ-20: Self Reporting Questionnaire-20.

were significantly associated with the prevalence of perinatal depression. The pooled prevalence of perinatal depression was found to be lower in cohort studies than cross-sectional studies (22.4 % vs. 28.4 %, $p < 0.05$). Studies conducted in Bangladesh had a significantly higher prevalence of perinatal depression than those conducted in other South Asian countries (44.2 %, $p < 0.0001$). Studies conducted in the community have a higher proportion of perinatal depression than those conducted in health facilities (29.9 % vs. 26.9 %), and the use of EPDS as a measurement tool had a lower level of depression than any other measurement tool (26.3 % vs. 31.9 %). However, these differences were non-significant ($p \geq 0.05$).

3.6. Meta regression

We conducted mixed effects meta-regression analyses to explore potential moderators of the pooled effect of perinatal depression

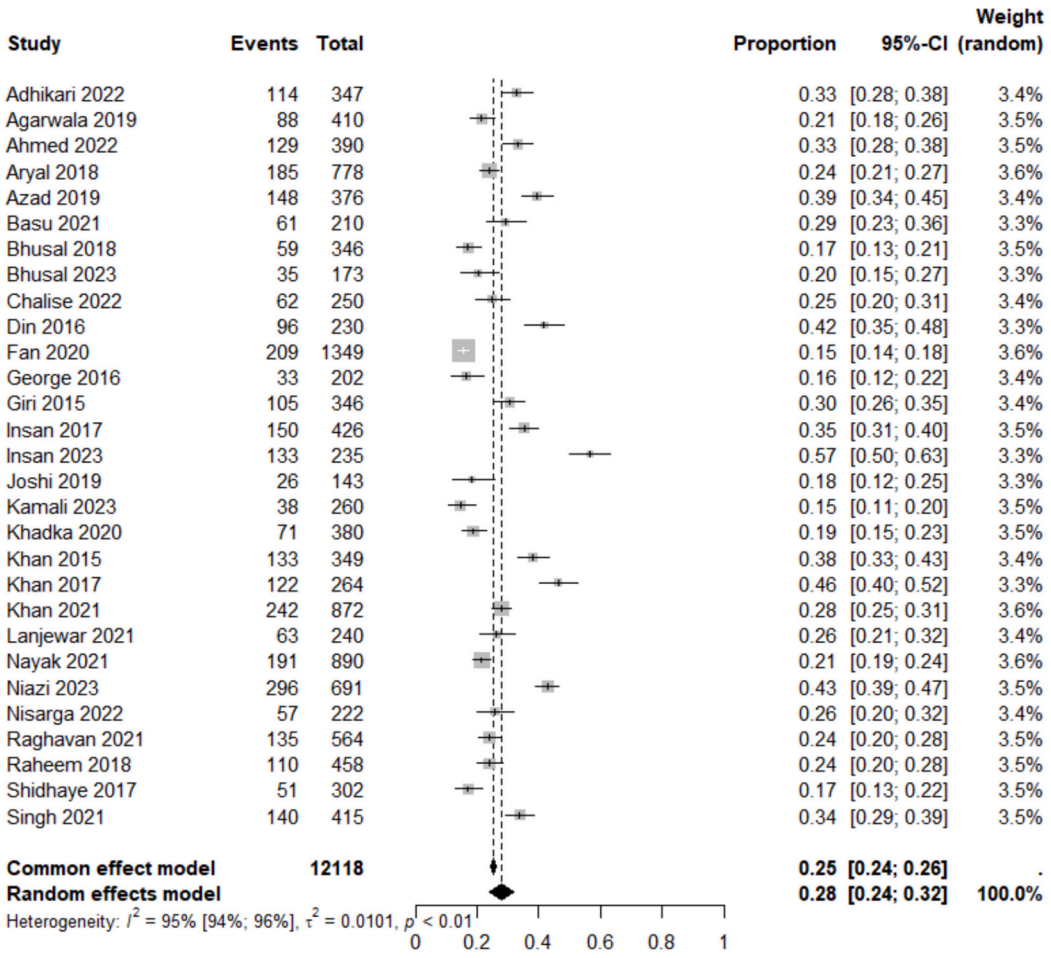

Fig. 2. The prevalence of perinatal depression.

Table 2
Pooled prevalence of depression and subgroup analysis.

Subgroup	No. of studies	Total	Event	Prevalence (%)	95 % CI	I^2 (%)	Q (p values across subgroups)
Pooled prevalence	29	12,118	3282	28.0	24.1–32.0	95.1	
Study design							6.47 (p < 0.05)
Cross-sectional	27	10,770	2981	28.4	24.2–32.6	95.3	
Cohort	2	1348	301	22.4	6.8–37.9	10.1	
Country							420.63 (p < 0.0001)
India	9	3300	717	21.5	17.8–25.2	73.9	
Nepal	9	3178	797	24.4	19.4–29.4	86.7	
Bangladesh	4	1301	553	44.2	29.3–59.0	90.6	
Pakistan	4	1841	600	34.8	25.0–44.5	86.7	
Sri Lanka	1	1349	209	15.5	13.6–17.4	–	
Afghanistan	1	691	296	42.8	39.2–46.5	–	
Maldives	1	458	110	24.0	20.1–27.9	–	
Study sites							0.10 (p = 0.747)
Health facility	18	7700	2014	26.9	22.7–31.2	94.7	
Community	11	4418	1268	29.9	21.0–38.7	95.7	
Measurement tools							2.25 (p = 0.134)
EPDS	20	7962	1975	26.3	21.6–30.9	94.1	
Other tools	9	4156	1307	31.9	23.5–40.3	95.5	

(Table 3). The potential moderating variables used in the analyses were the same as for the subgroup analyses. Of these variables, only the country was a significant covariate that independently and significantly affected the prevalence of perinatal depression.

3.7. Publication bias

We generated funnel plots to assess publication bias for the prevalence of perinatal depression. For the overall prevalence, the asymmetry observed in the funnel plot indicates the possibility of publication bias. Egger's linear regression test for publication bias for the prevalence of perinatal depression (intercept = 7.46, SE = 2.3, t = 3.24, df = 27, $p \leq 0.01$) was significant (Fig. 3).

Table 3
Mixed effects meta-regression analysis – effect of covariates on the prevalence of perinatal depression.

Covariate	Coefficient	95 % CI	SE	Z	P value
Cross-sectional studies	0.057	−0.09, 0.21	0.07	3.1202	0.457
Health facility	−0.028	−0.11, 0.05	0.04	−0.71	0.482
Moderate study quality	−0.050	−0.13, 0.03	0.04	−1.32	0.196
Bangladesh	0.011	−0.13, 0.16	0.07	0.16	0.874
India	−0.212	−0.35, −0.08	0.07	−3.26	0.004
Maldives	−0.188	−0.37, −0.01	0.09	−2.15	0.042
Nepal	−0.184	−0.32, −0.05	0.07	−2.83	0.010
Pakistan	−0.081	−0.22, 0.06	0.07	−1.16	0.258
Sri Lanka	−0.273	−0.45, −0.1	0.09	−3.2	0.004
Tools other than EPDS	0.057	−0.03, 0.14	0.04	1.38	0.177

Dependent variable: prevalence of postnatal depression; Reference categories of independent variables: study design – cohort studies, study setting – community, study quality – high, country – Afghanistan, measurement tool – EPDS.

3.8. Risk factors for perinatal depression from the systematic review

Table 4 summarises the pooled odds ratios (ORs) for the risk factors for perinatal depression. Sex preference, particularly son preference, history of abortion, partner with alcoholism, intimate partner violence and poor household income were associated with increased risk for postnatal depression. At the same time, the mother with formal education had a decreased risk of perinatal depression.

As it was not possible to perform a quantitative synthesis of all risk factors other than those presented in Table 4, we performed a narrative synthesis of other risk factors (Table 5). Unsupportive families, unplanned pregnancy, mother's health problems, sex preferences, intimate partner violence (IPV), and poor household income were the most repeatedly reported risk factors for perinatal depression. Table 5 depicts that a total of eleven studies reported an unsupportive family situation has been identified as key risk factor for perinatal depression (Basu et al., 2021; Bhusal and Bhandari, 2018; George et al., 2016; Kamali et al., 2023; Khan et al., 2021; Lanjewar et al., 2021; Niazi et al., 2023; Nisarga et al., 2022; Raghavan et al., 2021; Raheem et al., 2018; Shidhaye et al., 2017). Similarly, a total of ten studies found that social norms around son preference had a significant effect on perinatal depression risk factors, especially in societies where male kids are highly valued (Adhikari et al., 2022; Bhusal et al., 2023; Chalise et al., 2022; Fan et al., 2020; George et al., 2016; Giri et al., 2015; Insan et al., 2023; Joshi et al., 2019; Khadka et al., 2020; Shidhaye et al., 2017). Social norms on son preference create significant psychological pressure on pregnant women who have given birth to a female child. In many societies, sons are viewed as future breadwinners, carriers of the family name, and sources of assistance in old age and women who fail to give birth to male children face abuse from their partners and in-laws (Le and Nguyen, 2022; Qadir et al., 2011; Shidhaye et al., 2017).

Moreover, a total of eight studies reported that an unplanned pregnancy often leads to a higher perinatal mental health illness, either in antenatal or postpartum period (Adhikari et al., 2022; Ahmed et al., 2022; Aryal et al., 2018; Azad et al., 2019; Bhusal et al., 2023; Chalise et al., 2022; Niazi et al., 2023; Singh et al., 2021). This may have resulted in concerns about the expected mother's mental illness and birth preparedness (Table 5). A total of eight studies reported that perinatal period women having any health problems impeded in increasing the risk of perinatal depression (Bhusal et al., 2023; Din et al., 2016; Giri et al., 2015; Joshi et al., 2019; Khadka et al., 2020; Khan and Flora, 2017; Niazi et al., 2023; Raghavan et al., 2021). Similarly, a total of eight studies reported intimate partner violence as a key risk factor for perinatal depression, which heightens the risk since it can cause direct physical harm to the pregnant foetus, raise stress levels, and discourage women from seeking perinatal care (Azad et al., 2019; Chalise et al., 2022; Din et al., 2016; Insan et al., 2023; Islam et al., 2017; Kamali et al., 2023; Khan et al., 2021; Nisarga et al., 2022). Likewise, a total of six studies reported that poor household family income was also a risk factor for perinatal depression (Ahmed et al., 2022; George et al., 2016; Niazi et al., 2023; Raghavan et al., 2021; Raheem et al., 2018; Singh et al., 2021). However, the unsupportive families were most frequently reported in studies from India ($n = 7$), followed by son preference ($n = 6$), unplanned pregnancy ($n = 5$) and a history of health problems among

Table 4
Odds ratios for the different risk factors of perinatal depression.

Risk factors	No of studies	Odds ratio (95 % CI)	I^2 (%)	*p*-value
Sex preference	6	2.6 (1.6–4.2)	26	0.24
Partner with alcoholism	3	1.7 (0.3–9.6)	47	0.15
History of abortion	2	3.7 (0.5–26.2)	0	0.70
Mother's education	2	0.4 (0.0–41.8)	0	0.39
Intimate partner violence	2	2.1 (0.2–21.3)	0	0.58
Poor household income	2	2.9 (0.1–64.8)	0	0.88

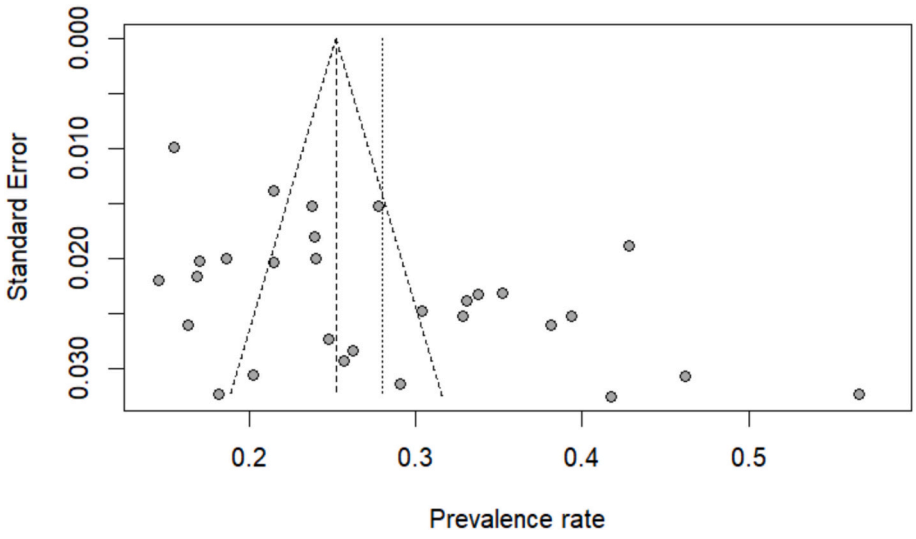

Fig. 3. Funnel plot for 29 included studies in the meta-analysis.

Table 5
Summary of risk factors of perinatal depression.

Authors and country	Unsupportive families	Son-preferences	Unplanned pregnancy	Having any health problems	Intimate partner violence	Poor household income
Adhikari et al., 2022, Nepal		X	X			
Agarwala et al., 2019, India						
Ahmed et al., 2022, Pakistan			X			X
Aryal et al., 2018, Nepal			X			
Azad et al., 2019, Bangladesh			X		X	
Basu et al., 2021, India	X					
Bhusal and Bhandari, 2018, Nepal	X					
Bhusal et al., 2023, Nepal		X	X	X		
Chalise et al., 2022, Nepal		X	X		X	
Din et al., 2016, Pakistan				X	X	
Fan et al., 2020, Sri Lanka		X				
George et al., 2016, India	X	X				X
Giri et al., 2015, Nepal		X		X		
Insan al., 2017, Bangladesh					X	
Insan et al., 2023, Bangladesh		X			X	
Joshi et al., 2019, Nepal		X		X		
Kamali et al., 2023, India	X				X	
Khadka et al., 2020, Nepal		X		X		
Khan et al., 2015, Pakistan						
Khan and Flora, 2017, Bangladesh				X		
Khan et al., 2021, Pakistan	X				X	
Lanjewar et al., 2021, India	X					
Nayak et al., 2021, India						
Niazi et al., 2023, Afghanistan	X		X	X		X
Nisarga et al., 2022, India	X				X	
Raghavan et al., 2021, India	X			X		X
Raheem et al., 2018, Maldives	X					X
Shidhaye et al., 2017, India	X	X				
Singh et al., 2021, Nepal			X			X
Total	11	10	8	8	8	6

women (n = 4) in Nepal. Similarly, three studies from Bangladesh identified intimate partner violence, while two studies from India highlighted poor household incomes as a key risk predictor of perinatal depression (Table 5).

4. Discussion

This section discusses the overall pooled prevalence of depression, followed by the determinants of perinatal depression, which are covered in further detail below.

4.1. Pooled prevalence of perinatal depression

The pooled prevalence of perinatal depression symptoms among women living in South Asian countries in our study was found to be above a quarter (28 %), during either the antenatal or postnatal periods. This finding is consistent with previous studies; the pooled prevalence of antenatal depression in LMICs was 19 to 25 % (Insan et al., 2022b) and postpartum depression was 27 % in the Middle East (Alshikh Ahmad et al., 2021), a slightly higher rate (31.5 %) in North Africa (Mitchell et al., 2023), and around three times (67.3 %) higher in Iran (Ekpenyong and Munshitha, 2023). The variation in prevalence rates could be attributed to the use of different screening tools, assessment timelines, geographical variation, and sample characteristics related to either antenatal or postpartum depression, as well as the tool's cut-off points. The current review identified six different depression measurement tools, and among them, most of the studies (n = 20) used EDPS tool, whose measurement cut-off criteria were highly varied. For example, among the studies that used the EDPS tool, they used a cut-off value of either 10 and above or 12 and above for perinatal depression.

Likewise, the prevalence of perinatal depressive symptoms varied greatly depending on the perinatal period, sample size, and methodological variations in the cross-sectional study design compared to the cohort studies. It may also highlight the heterogeneity between the countries. Moreover, other reasons might be due to the cross-cultural variation, and social similarities faced by women living in South Asian countries, which might include stressful life events, poverty, and supportive families towards perinatal periods at large (Insan et al., 2022b). Literature shows that mental healthcare priorities in South Asian countries are often overlooked due to fragmented mental health systems with limited mental health budgets, poorly integrated mental health services with primary care, and stigma and misconceptions in seeking mental health services (Hossain et al., 2020; Lemon et al., 2024).

4.2. Risk factors of perinatal depression

The systematic review and meta-analysis included 29 studies from seven South Asian countries. The findings indicated several socio-cultural-related factors directly impacting perinatal depression among women living in South Asian countries. Social norms around son preference were found a significant predictor in perinatal depressive symptoms which findings are consistent with earlier studies. A systematic review and meta-analysis in South Asia reported that social norms around son preference were significantly associated with antenatal depression (Insan et al., 2022b). In many South Asian cultures, there is a strong son preference, which increases stress and anxiety during pregnancy and also increases the risk of developing postpartum depression (Insan et al., 2022a). Studies also revealed that son preference can sometimes lead to gender-based violence or intimate partner violence, which is a significant risk factor for poor perinatal mental health illness outcomes because women are often placed at a disadvantage (Shidhaye et al., 2017). Study also revealed that male children are considered a blessing to carry the family name and caring for their parents in old age whereas female children are viewed as a burden for the family (Qadir et al., 2011). Therefore, it is critical that each country's health system prioritises perinatal mental health issues and addresses cultural norms

around son preference. Promoting comprehensive sociocultural, legal, and healthcare interventions such as empowering women economically, promoting gender equality, valuing daughters, and improving access to mental health services could potentially alleviate the mental health illness associated with son preference during pregnancy and the postpartum period.

Similarly, our systematic review findings revealed that the unsupportive family was the key risk predictor of perinatal depression in this region. Literature also suggests that social support is vital in maintaining mental wellness, especially in countries like South Asia, where traditional family structure plays a crucial role in individuals' lives (Jones et al., 2014; Wasti et al., 2024). Study shows that having a social support system funds protective factors against the perinatal mental health illness (Ekpenyong and Munshitha, 2023; Jones, 2019). The World Health Organisation (WHO) also recommends promoting perinatal mental health well-being by strengthening social support which is an effective strategy for treating and preventing depression. The feeling of being respected and cared for during and after the pregnancy may be linked to the improved emotional and mental well-being of the mother (WHO, 2022b). This exemplifies the need for strong family support and active involvement of partners in counselling. Community awareness-building programmes can also contribute to alleviating symptoms of perinatal depression. Healthcare providers can involve family members during antenatal counselling to help them understand the importance of perinatal care and implement community-based awareness campaigns for the early identification, prevention, and treatment of perinatal mental health issues.

Likewise, our systematic review findings showed that women who experienced intimate partner violence were found to be a key risk factor for perinatal depression. Previous studies also indicated that all forms of domestic violence were strongly associated with higher levels of emotional distress during the pregnancy and postpartum periods (Capaldi et al., 2012; Islam et al., 2017; Wasti et al., 2024). There might be several reasons for having intimate partner violence, and understanding the causal pathway is complex and multifactorial. Previous studies have also indicated that the female sex of a newborn is associated with a higher rate of intimate partner violence (Capaldi et al., 2012). Pregnant women with poor marital relationships and exposure to violence were more likely to report perinatal depression (Fekadu Dadi et al., 2020). Likewise, the spouse's sexual violence during pregnancy was also seen as a factor contributing to the incidence of postpartum depression (Ghaedrahmati et al., 2017). The findings suggest that couple-focused interventions during the early antenatal period may reduce the risk of perinatal depression. Strong partner support at this crucial stage of a woman's life can serve as a protective factor against perinatal depression.

Unintended pregnancy compared to women who had planned pregnancies was identified as a risk factor for perinatal depression in South Asia. This finding is consistent with previous research and demonstrates a strong correlation between unplanned pregnancies and the increased prevalence of perinatal mental health illness (i.e., depression and anxiety) among South Asian women (Bahk et al., 2015; Insan et al., 2022b; Nelson et al., 2022). Addressing the underlying causes of unwanted pregnancies and improving care and support throughout the postpartum period may address the psychological problems associated with this circumstance. There should be an early screening programme for all expectant mothers, and they should receive continuing counselling throughout the perinatal period.

The history of health problems among perinatal women was identified as a risk factor for perinatal depression in our systematic review, consistent with earlier publications that reported women who have a history of mental illness were more likely to be depressed in the perinatal period (Fekadu Dadi et al., 2020; Ghaedrahmati et al., 2017). Health service providers need to focus on the early identification, prevention, and treatment of mental health illness over the perinatal period.

Poor economic conditions of perinatal women were also identified as a risk factor for perinatal depression in our study, which finding is also consistent with the earlier publication (Alshikh Ahmad et al., 2021) and women whose child delivery costs were managed by borrowing, selling assets or through loans were also identified as key predictors of perinatal depression (Azad et al., 2019). A comparative study of five South Asian countries found that rich women had 60 to 65 percentage points more access to maternal health care than poor women in Afghanistan, Bangladesh, Nepal, and Pakistan, compared with 21 percentage points higher in India (Rahman et al., 2017). Implementing free maternity health services, including counselling, in all South Asian countries would incentivise regular prenatal care. By removing the financial stress of childbirth-related costs, this policy would help lower the incidence of perinatal mental illness and lead to a significant reduction in maternal and newborn deaths.

4.3. Strengths and limitations of the study

The strength of the study was that this systematic review and meta-analysis is the first attempt to synthesise the existing evidence on the prevalence and risk factors of perinatal depression among women in South Asian countries in the SDG era, where we could get the current situation and efforts to meet the 2030 SDGs. The search of various databases, subgroup analysis and sensitivity analyses were among the strengths of this review. The review included studies that reported the odds ratios, either unadjusted or adjusted, to examine the association between perinatal depression and its predictors. However, this review had some important limitations. First, the methodological differences in the included studies may have led to a high, statistically significant heterogeneity. Due to the variability in several social determinants of perinatal depression, socio-cultural and religious beliefs and values in the South Asian countries, the true burden of perinatal mental health illness could be much higher than we found in this study.

Our review included only studies published in the English language, as we had limited local language expertise representing eight South Asian countries. Consequently, we might have missed studies published in the local language. Finally, not all included studies reported risk factors for perinatal depression; therefore, it was not possible to generate a pooled effect size for all risk factors.

4.4. Implications for perinatal mental health policy making and practice

The findings of the study carry important implications for informing targeted interventions aimed at assisting perinatal mental health practitioners and policymakers in South Asian countries to develop and implement efficient strategies for the early screening, diagnosis and management of perinatal mental health illness. Prioritising mental health well-being, allocating resources towards healthcare, and ensuring healthcare providers are adequately trained in providing friendly and confidential counselling are crucial strategies for addressing perinatal mental health challenges in South Asian countries. Promoting social welfare, empowering women, and providing family support are integral components in combating poverty, unemployment, and gender disparities in the status of women in South Asian countries.

5. Conclusions

The findings revealed that over a quarter (28 %) of perinatal women in South Asian countries experienced perinatal depressive symptoms. Cultural norms around preference for male child was the most significant risk factor for perinatal depression. In addition, intimate partner violence, unsupportive families, unplanned pregnancy, women's previous health problems, and poor economic conditions were the top five risk factors for perinatal depression. Therefore, there should be integrated and comprehensive mental health well-being services throughout the perinatal period, whether during pregnancy or the postpartum period. Healthcare providers should be aware of addressing the

perinatal mental health illness, including early detection, prevention, and the integration of basic healthcare counselling services into maternal health services. Integrating perinatal mental health wellbeing services into the current public health services and implementing targeted interventions for early screening and continuing care in place is essential to addressing the complex nature of the perinatal mental health burden in South Asian countries.

CRediT authorship contribution statement

Ashmita Khan Thakuri: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Vijay S. GC:** Writing – review & editing, Visualization, Methodology. **Nadya Belenky:** Writing – review & editing, Validation, Methodology. **Pratikshya Wasti:** Writing – review & editing, Data curation. **Roselini Shrestha:** Writing – review & editing, Formal analysis, Data curation. **Sharada P. Wasti:** Writing – review & editing, Supervision, Project administration, Formal analysis, Conceptualization.

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Declaration of competing interest

All other authors declare they have no conflict of interest.

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Appendix A. Supplementary data

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