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Psychosocial Interventions for Pregnant Women: A Systematic Review and Meta-Analysis with Implications for Informal Workers in Coastal Areas

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Abstract

Background: Pregnant informal workers in coastal regions experience unique socioeconomic, occupational, geographic, and environmental vulnerabilities that significantly elevate maternal mental health risks. Despite these intersecting challenges, tailored psychosocial interventions specifically designed to support this demographic remain scarce.

Objective: This study examines the efficacy of various psychosocial interventions on maternal mental health outcomes and evaluates their pragmatic implications for vulnerable pregnant informal workers within coastal communities.

Methodology: A systematic review and meta-analysis of randomised controlled trials published between 2014 and 2024 was executed across PubMed, ScienceDirect, and Scopus, in accordance with the PRISMA 2020 guidelines. Methodological quality was evaluated using the Joanna Briggs Institute Critical Appraisal Checklist, and pooled effects were computed using Review Manager 5.4. The study protocol was prospectively registered in PROSPERO (CRD420251137446), yielding a final sample of 32 eligible trials.

Results: The findings indicate that the meta-analysis revealed significant pooled reductions in stress and postpartum depression. However, no statistically significant effects were observed for antenatal depression or sleep quality. Furthermore, the interaction between different intervention types demonstrates that although frameworks spanned cognitive behavioural therapy, mindfulness, task-sharing, mHealth, and music therapy, no retrieved study directly targeted pregnant informal workers residing in coastal environments.

Conclusion: The study concludes that psychosocial interventions yield positive effects on specific maternal mental health outcomes, though their efficacy varies across different gestational and postpartum stages. Overcoming existing structural, occupational, and geographic barriers requires a shift towards highly accessible delivery models.

Unique Contribution: This research advances maternal health literature by providing a critical evaluation of how task-sharing frameworks and mobile-health-based (mHealth) interventions represent the most pragmatic, scalable, and adaptable models for this population, effectively mitigating both occupational barriers and geographic isolation where institutional healthcare infrastructure is limited.

Key Recommendation: Public health authorities and policymakers in coastal regions should design maternal health programmes that integrate task-sharing models and mHealth-driven psychosocial interventions. Additionally, stakeholders should implement targeted digital health initiatives to safeguard maternal-infant health and enhance healthcare accessibility for underserved informal workers.

Keywords: Systematic Review; Meta-analysis; Psychosocial Intervention; Maternal Mental Health; Informal Workers; Coastal Communities; Task-Sharing; mHealth.

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Introduction

Research suggests that social support promotes mental health during pregnancy by reducing anxiety and mental illness (Al-Mutawtah et al., 2023).

Informal female workers are socioeconomically vulnerable and prone to poverty due to unstable employment and income (Haskins et al., 2023). This indirectly affects their health, as they more often receive inadequate wages and work in unhygienic environments (Mishra, 2023). Pregnant women working in the informal sector face a higher risk than non-working pregnant women (APR = 1.8), and those with moderate-to-severe depression are far more likely to experience complications (APR = 15) (Duque et al., 2024). Coastal areas introduce location-based risks, such as unstable environmental conditions like extreme weather and limited accessibility, which disrupt food access, undermine the continuity of health service programs, and reduce social support. Combined with employment insecurity, these factors can further exacerbate psychosocial problems (Baker et al., 2024; Kyei-Gyamfi & Kyei-Arthur, 2025),

Evidence on the effectiveness of psychological interventions for antenatal depression remains limited. However, given mothers' reluctance to take antidepressants during pregnancy and clinicians' concerns about prescribing them, psychological interventions are particularly important during this period (Evans et al., 2021). The objective of this literature review is to understand the psychosocial intervention models for informal sector pregnant women in the coastal area that have been implemented over the past 10 years.

Methods

Study procedure and data collection

This review searched PubMed, Science Direct, and Scopus for literature published between 2014 and 2024, using the following keyword combinations: (Bio-psychosocial support intervention model) OR (Social support intervention in pregnancy) OR (Mental health intervention in pregnancy) OR (Intervention for pregnant informal workers) OR (Intervention in coastal areas) OR (Occupational health intervention in pregnancy). Of 18,348 records identified, 17,572 non-RCT articles were excluded through methodological filtering (automatic for Science Direct and PubMed; manual for Scopus), and a further 228 records were removed due to unavailable full text. The remaining 548 records were screened by abstract, after which 482 were excluded. Of the 66 full-text articles assessed for eligibility, 34 were excluded, yielding 32 RCTs included in the final synthesis (see Figure 1).

Study instruments and Data Analysis

This study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework for literature screening and employed the JBI (Joanna Briggs Institute) Checklist to assess the methodological quality of the included studies. Systematic review data were synthesized using the Joanna Briggs Institute table format. Meta-analysis was conducted using Review Manager 5.4 software to evaluate the effects of the interventions on psychosocial outcomes.

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Eligibility Criteria

Although this review primarily aimed to identify psychosocial interventions for pregnant informal workers in coastal areas, the scarcity of studies explicitly targeting this population led us to broaden the inclusion criteria to studies involving pregnant women in general, provided the intervention was psychosocial in nature and potentially adaptable to informal or low-resource settings. The included studies were characterized by difficult access, locations far from urban centers, or low socioeconomic conditions and conditions analogous to coastal contexts, which are similarly distant from health services, have limited access to information, and are vulnerable due to low socioeconomic status. This approach enabled the extraction of transferable insights while acknowledging the contextual gaps in the existing literature.

Inclusion Criteria : Population Target : pregnant women informal worker**,** Type of intervention : psychosocial, Psychoeducation, mental health intervention**;** Measured outcomes : depression, stress, sleep quality, depression postpartum, anxiety**;** Language of publication : only articles published in English; Design Studi : randomized control Trial.

Exclusion Criteria : Studies not available in full text or inaccessibl, Studies using intervention irrelevant to the review focus *and* Studies that do not report relevant outcome.

Ethical aspects

As this study is based on publicly available data, ethical approval was not required.

Protocol Registration

This systematic review protocol was registered in PROSPERO (International Prospective Register of Systematic Review) Under registration number CRD420251137446

RESULTS

PRISMA MODEL

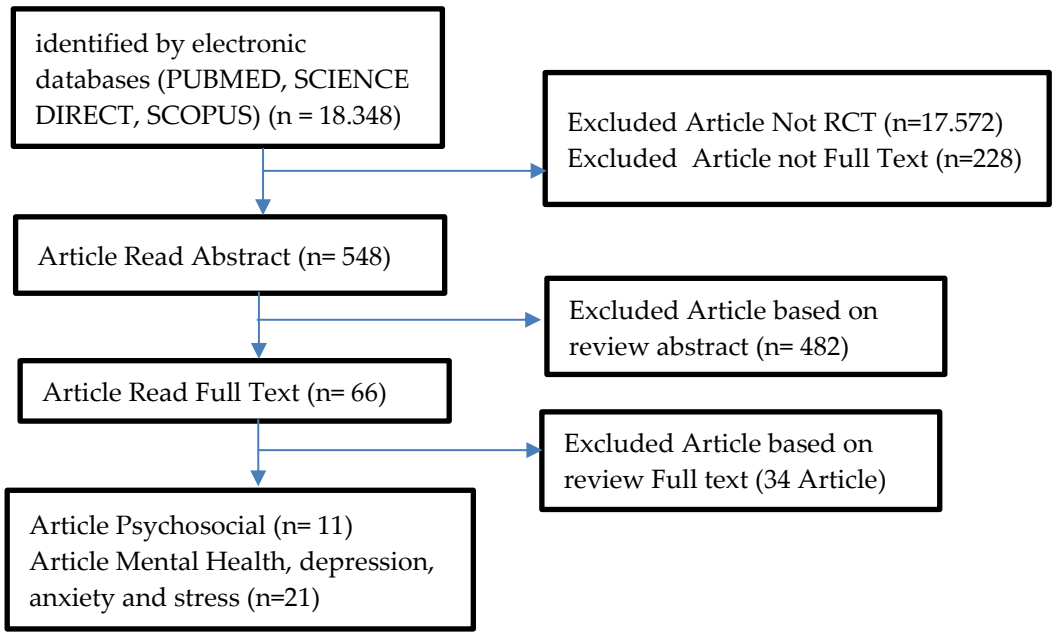

Figure 1. PRISMA Flow diagram of study selection process

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After screening, we found 11 articles with titles containing the word 'Psychosocial' and 21 articles using the words 'mental health,' 'depression,' 'anxiety,' and 'stress.' Some sections within them indicate psychosocial problems.

JBI Critical Appraisal

Table 2. JBI Critical Appraisal Checklist for Randomized Controlled Trials

Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Score	Point
Lund., et al (2014)	2	2	2	2	2	2	2	2	2	2	2	2	2	26	100
K.R.M. Sanfilippo., et al (2020)	2	2	2	1	1	1	2	2	2	2	2	2	2	23	88.4
Sun., et al., (2023)	2	1	2	1	0	1	2	2	2	2	2	2	2	21	80.7
M. Abbasi., et al (2022)	2	2	2	2	2	1	2	2	2	2	2	2	2	25	96.1
D. Wilczynska., et al (2023)	2	1	1	1	1	1	1	2	2	2	2	2	2	20	76.9
Kim H.B and A.-H. Hyun (2022)	1	1	1	1	1	1	1	1	1	2	2	1	1	15	57.6
Abazarnejad., et al (2019)	2	1	2	0	0	2	2	2	2	2	2	2	2	21	80.7
Perkovic., et al (2021)	2	1	2	1	1	1	2	2	2	2	2	2	2	22	84.6
Chomat., et al (2019)	2	0	2	0	0	1	1	2	2	2	2	2	2	18	69.2
M. Sudhinaraset et al., (2022)	2	2	1	2	1	1	2	2	2	2	2	2	2	23	88.4
M.E. Feinberg., et al (2015)	2	1	2	1	1	1	1	2	2	2	2	2	2	21	80.7
Cicek Ediz & Kavak Budak (2023)	2	2	2	1	1	1	2	0	2	2	2	2	2	21	80.7
Hassdenteufel, et al (2023)	2	1	2	1	0	1	2	2	1	2	2	2	2	20	76.9
Canfield. et al (2023)	2	1	2	1	1	1	2	2	2	2	2	2	2	22	84.6
Seiiedi-Biarag., et al (2021)	2	2	2	1	0	2	2	0	2	2	2	2	2	21	80.7
Pan., et al (2019)	2	2	2	0	0	1	0	2	2	2	2	2	2	19	73.0
Evans., et al (2021)	2	2	2	1	1	2	2	2	2	2	2	2	2	24	92.3
Tandon., et al (2014)	2	1	2	1	1	2	2	2	2	2	2	2	2	23	88.4
Arakawa., et al (2023)	2	0	2	0	0	2	2	2	2	2	2	2	2	20	76.9
Hankin., et al (2023)	2	1	1	1	0	2	2	2	2	2	2	2	2	21	80.7
Segre., et al (2015)	2	1	2	0	0	0	2	2	2	2	2	2	2	19	73.0
Huberty., et al (2020)	2	2	2	0	2	1	2	2	2	2	2	2	2	23	88.4

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Moradi., et al (2022)	2	2	2	1	0	1	2	2	2	2	2	2	2	22	84.6
Guney., et al (2022)	2	1	2	1	1	1	0	2	2	2	2	2	2	20	76.9
Nasrollahi., et al (2022)	2	1	2	1	1	1	2	2	2	2	2	2	2	22	84.6
Hawkins., Et al (2021)	2	1	2	1	1	1	2	2	2	2	2	2	2	22	84.6
Wulff et al., (2021)	2	1	2	1	0	1	2	0	2	2	2	2	2	19	73.0
Golshani., et al (2021)	2	2	2	1	1	2	2	2	2	2	2	2	2	24	92.3
Pinheiro., et al (2021)	2	1	2	1	0	1	2	2	2	2	2	2	2	21	80.7
Baranov., et al (2022)	2	1	2	2	1	2	2	2	2	2	2	2	2	24	92.3
Berhane (2021)	2	2	2	2	1	1	0	2	2	2	2	2	2	22	84.6
El heis et al., (2023)	2	1	2	1	1	1	2	1	2	2	2	2	2	21	80.7

Quality appraisal using the JBI Critical Appraisal Checklist (Table 2) showed that 28% (n = 9) of the 32 included studies were rated 'Excellent' (JBI score > 85%), 65% (n = 21) 'Good', and 6.25% (n = 2) 'Fair'. The most common methodological limitations were in blinding of participants and outcome assessors (Q4–Q6), while measurement reliability (Q7–Q10) and statistical analysis (Q11–Q12) were rated highly across nearly all studies. Overall, the methodological quality of the included studies was acceptable for synthesis.

Forest Plot

Figure 2. Forest Plot Depression

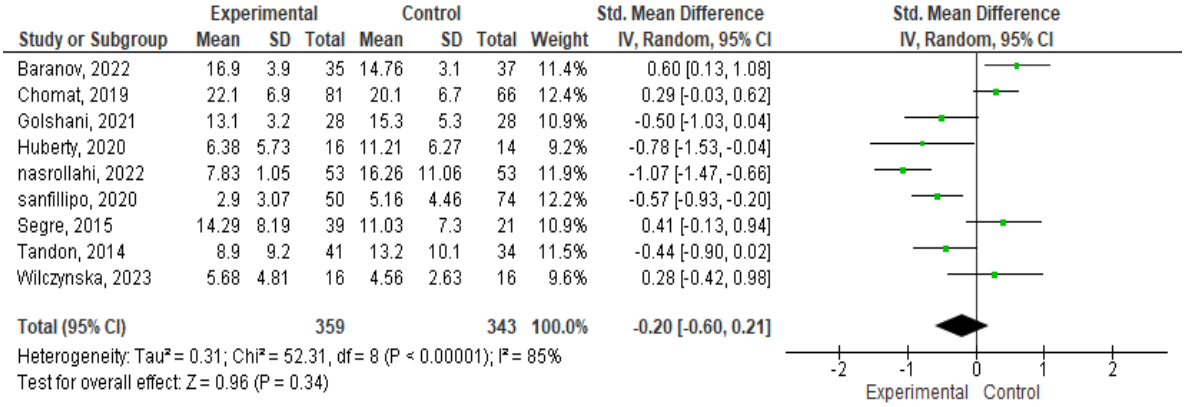

Figure 2 shows that Pooled analysis of nine RCTs (n = 359 intervention; n = 343 control) showed no statistically significant effect of psychosocial interventions on depression (SMD = -0.20; 95% CI: -0.60 to 0.21; p = 0.34), with substantial heterogeneity (I^2 = 85%; p < 0.00001). A random-effects model was applied. Although several studies reported significant individual reductions, considerable between-study variability limited the overall effect.

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Figure 3. Forest Plot Stress

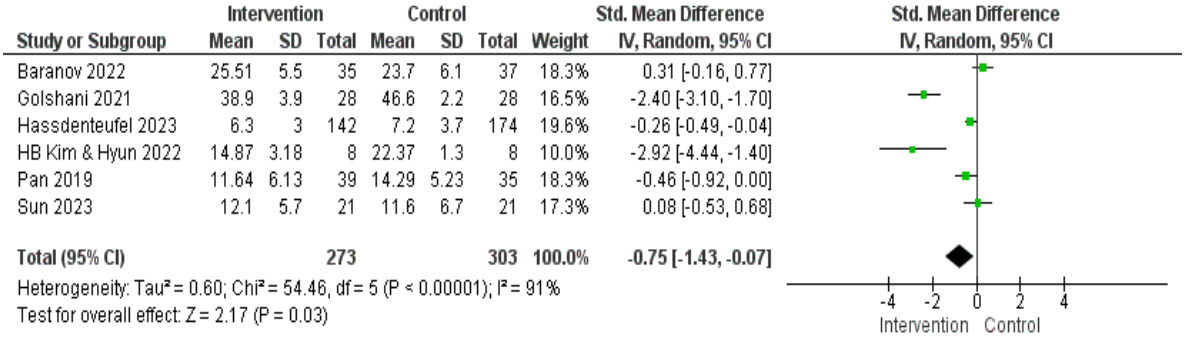
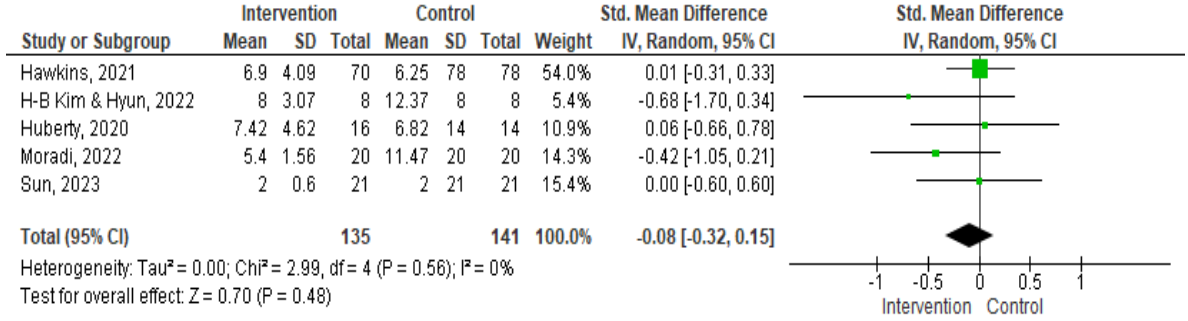


Figure 3 shows that Pooled analysis of six RCTs (n = 273 intervention; n = 303 control) showed a statistically significant reduction in stress (SMD = -0.75; 95% CI: -1.43 to -0.07; p = 0.03), favouring the intervention group, although heterogeneity was very high (I^2 = 91%; p < 0.00001). A random-effects model was applied. Four of six studies reported significant individual reductions, while two showed non-significant or opposite effects.

Figure 4. Forest Plot Sleep Quality



In Figure 4, Pooled analysis of five RCTs (n = 135 intervention; n = 141 control) showed no significant effect of psychosocial interventions on sleep quality (SMD = -0.08; 95% CI: -0.32 to 0.15; p = 0.48), with no observable heterogeneity (I^2 = 0%; p = 0.56). None of the individual studies reached statistical significance.

Figure 5. Forest Plot Depression Post Partum

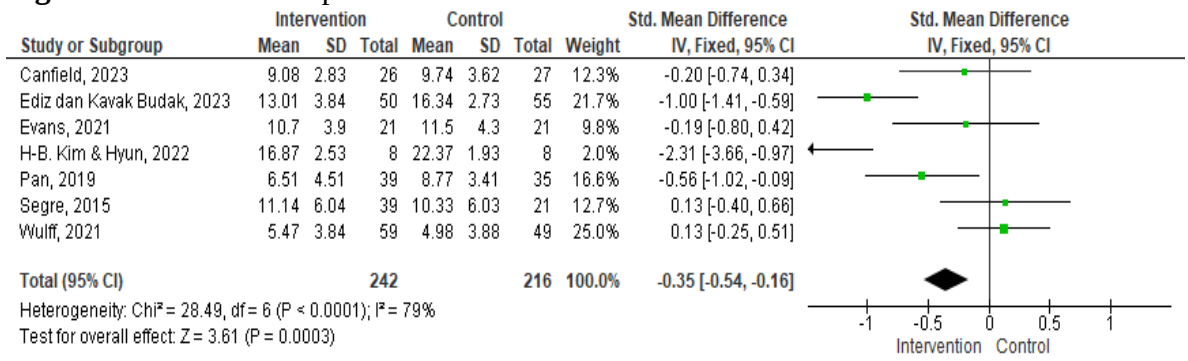


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Figure 5 shows a pooled analysis of seven RCTs (n = 242 intervention; n = 216 control), which demonstrated a statistically significant reduction in postpartum depression (SMD = -0.35; 95% CI: -0.54 to -0.16; p = 0.0003), favouring the intervention group, with substantial heterogeneity (I^2 = 79%). Three of seven studies reported significant individual reductions.

Discussion

General results discussion

This systematic review and meta-analysis synthesised 32 RCTs evaluating psychosocial interventions for pregnant and postpartum women. The included studies addressed a wide spectrum of psychosocial outcomes, predominantly depression, anxiety, and stress and employed diverse intervention modalities, ranging from cognitive behavioural therapy (CBT) and mindfulness-based approaches to community-based, digital, music, and movement-based programs. Notably, no included study specifically targeted pregnant informal workers in coastal areas, despite their compounded socioeconomic and environmental vulnerabilities.

Figure 2 presents a forest plot from the meta-analysis results for the outcome variable Depression. The meta-analysis indicated a negative effect size of -0.20, but it was not statistically significant for reducing depression outcomes (P = 0.34, 95% CI: -0.60 to 0.21). We applied the random-effects model because the I^2 value was 85% (P < 0.00001), indicating substantial heterogeneity across studies. This heterogeneity is due to differences in intervention models for the depression outcome. The management of depression may require more specific interventions compared to general psychosocial intervention models.

Figure 3 is a forest plot illustrating the effectiveness of various interventions in reducing stress symptoms. Six studies were included in the forest plot, each employing different intervention models targeting the stress variable, namely: The Thinking Healthy Program, Peer-delivered (maternal intervention), cognitive behavioural therapy-based counselling, electronic mindfulness-based intervention, online Pilates exercise, the Mindfulness-Based Childbirth and Parenting (MBCP) program, and virtual reality. Among these interventions, four studies showed a negative impact on stress (i.e., stress reduction), while two studies showed a positive impact (i.e., increased stress). Overall, the six interventions demonstrated a statistically significant reduction in depression symptoms, with a P-value of 0.03 and a Standardised Mean Difference of -0.75 (95% CI: -1.43 to -0.07). Nevertheless, the I^2 value was 91%, likely due to differences in intervention types across studies, non-uniform intervention durations, and varying baseline stress levels among the intervention targets. In several studies, interventions were found to affect stress biomarkers (serotonin in H.-B. Kim & Hyun, 2022, and cortisol in Baranov, 2022). However, there are also studies showing no effect of stress biomarkers (cortisol) on stress (cortisol by Wilczynska, 2023) (Baranov et al., 2022b; Kim & Hyun, 2022; Wilczyńska et al., 2023).

In the first image of Figure 4, the heterogeneity value is 0% or less than 50%, indicating that a fixed-effect model is more appropriate. Figure 6 presents five studies included in the meta-analysis to examine the effect of the intervention on sleep quality. The results show that the interventions implemented in these five studies did not significantly affect sleep quality compared to the control

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group. The results show that the interventions implemented in these five studies did not significantly affect sleep quality compared to the control group. This indicates that the intervention had no meaningful effect on sleep quality, possibly because it is a distal outcome of the intervention.

Figure 5 presents the results of a meta-analysis from seven studies evaluating interventions aimed at reducing postpartum depression. The interventions included: Mothers and Babies Online Course (eMB), Psychosocial Support-Based (PSSB) Psychoeducation, Interpersonal Counselling, Online Pilates Exercise, Mindfulness-Based Childbirth and Parenting (MBCP) Program, Listening Visits, and Music and Singing Intervention. The forest plot shows that the combined effect of these interventions resulted in a reduction of 0.35, and this difference between the intervention and control groups was statistically significant ($p = 0.0003$).

Psychosocial interventions such as the Women's Circle are regarded as effective in regions lacking adequate psychosocial support, even though research indicates that the Women's Circle does not significantly influence distress scores. Several psychosocial interventions—including the Women's Circle, community-based psychosocial music interventions, family foundation psychoeducation, and other approaches included in this study—did not examine the relationship between psychosocial interventions and family support. Yet, family support is a critical determinant of psychosocial outcomes such as stress and anxiety (Feinberg et al., 2015; Sanfilippo et al., 2020).

Although the initial focus of this review was on pregnant informal workers in coastal regions, the scarcity of targeted studies necessitated a broader inclusion of research involving pregnant women across diverse settings. This methodological adjustment enabled the synthesis of psychosocial intervention models that, while not originally designed for informal workers, may offer foundational elements for future adaptation. The absence of context-specific interventions highlights a critical gap in maternal health research, particularly for populations facing compounded vulnerabilities due to informal employment and geographic isolation. Future studies should prioritise the development and evaluation of psychosocial strategies tailored to the lived realities of pregnant informal workers in coastal communities.

Implication

Pregnant informal workers in coastal areas face dual vulnerabilities requiring differentiated intervention strategies. Occupational and economic risks (inadequate wages, limited social protection, inability to disengage from work) are best addressed by task-sharing approaches such as timed and targeted counselling (ttC), which extend care delivery through community health workers without requiring women to leave their work environment. Geographic and environmental risks (extreme weather, isolated settlements, limited access to health services) are most effectively mitigated by mobile-based and mHealth interventions, which overcome distance and accessibility barriers through flexible, low-cost delivery. Future research should prioritise hybrid models combining task-sharing and mHealth delivery, tailored to the lived realities of pregnant informal workers in coastal communities.

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Limitations

This review was limited to studies indexed in PubMed, ScienceDirect, and Scopus and to English-language publications, which may have excluded relevant regional studies. The high heterogeneity (I^2 = 85–91%) across most pooled outcomes limits the strength of conclusions and reflects substantial variability in intervention type, duration, dose, and target population. Search keywords were oriented toward intervention models and may have under-captured spiritually or culturally grounded approaches.

Conclusions

Despite a decade of research, no psychosocial intervention has targeted pregnant informal workers in coastal areas. Our meta-analysis showed significant effects on stress and postpartum depression, but not antenatal depression or sleep quality. Task-Sharing (ttC) and Mobile/Digital-based interventions emerge as the most pragmatic and scalable strategies—task-sharing extends care beyond specialist services through community health workers, while mobile interventions overcome geographic and occupational barriers. These models warrant contextual adaptation and rigorous evaluation.

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Declarations

AI Use Statement : During the preparation of this work, the authors used Microsoft Copilot and Claude AI for paraphrasing and language refinement, Grammarly for grammar and spelling checking, and DeepL for translation assistance. These tools were used only to improve language clarity and were not used for data analysis, interpretation of results, or generation of scientific content. After using these tools/services, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author, Yahya Thamrin, upon reasonable request

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Conflicts of Interest: The authors declare no conflict of interest.

Ethical Approval: Ethical approval was not required for this study, as it is based on previously published data and does not involve direct human participants.

Author Contributions: The authors confirm contribution to the paper as follows: study conception and design: LMT, YT, and VH; data collection: LMT; analysis and interpretation of

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results: LMT, YT, VH; draft manuscript preparation: LMT, YT, VH, MS, AS and NAT. All authors reviewed the results and approved the final version of the manuscript.

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