

Prevalence and Sociodemographic Correlates of Postpartum Depression in the Immediate Postpartum Period: A Cross-sectional Study in a Secondary Care Hospital Setting, India

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ABSTRACT

Background: Postpartum Depression (PPD) is a significant public health concern affecting maternal and infant well-being. Evidence from India remains limited within secondary care settings, where early postpartum contact offers an opportunity for timely screening. **Objectives:** The objective of the study is to estimate the prevalence of immediate postpartum PPD and examine its associations with sociodemographic and obstetric factors among women in a secondary care hospital in South India. **Materials and Methods:** A hospital-based cross-sectional study was conducted among 125 postpartum women assessed within 24-48 hr of delivery. Data were collected through interviewer-administered questionnaires and a review of medical records. PPD was evaluated using the Edinburgh Postnatal Depression Scale (EPDS). Moderate-to-high PPD risk was defined as an EPDS score ≥ 7 . Descriptive statistics, chi-square tests, and binary logistic regression were used to analyse associations between predictor variables and PPD risk. **Results:** The mean EPDS score was 3.94 ± 4.18 . The prevalence of moderate-to-high PPD risk (EPDS ≥ 7) was 17.6% (95% CI: 10.9%-24.3%). Bivariate analysis showed significant associations between PPD risk and education level ($p=0.020$) and household income ($p=0.019$). No variable remained statistically significant in multivariable logistic regression, though lower income (adjusted OR=4.85, 95% CI: 0.94-25.03) and college education (adjusted OR=7.09, 95% CI: 0.66-76.60) approached significance. **Conclusion:** Nearly one in five postpartum women assessed during the immediate postpartum period demonstrated moderate-to-high PPD risk. These findings underscore the importance of integrating early PPD screening into postpartum care pathways, particularly in secondary care hospitals, to support timely detection and intervention.

Keywords: Breastfeeding, Edinburgh Postnatal Depression Scale, India, Maternal Mental Health, Postpartum Depression, Prevalence, Secondary Care Hospital.

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INTRODUCTION

Postpartum Depression (PPD) is a major maternal mental health concern with substantial consequences for maternal well-being, infant development, and overall family functioning. Despite increasing recognition of its impact, structured psychological assessment and early screening remain limited in many healthcare settings, particularly in low- and middle-income countries. Globally, PPD affects approximately 10-30% of women (Slomian *et al.*, 2019; Shorey *et al.*, 2018). In India, studies estimate a prevalence between 18% and 22%, though substantial regional

variation persists due to diverse socioeconomic, cultural, and healthcare contexts (Lanjewar *et al.*, 2021; Panolan and Thomas, 2024). Secondary care hospitals, which manage large volumes of deliveries and serve as key intermediaries between primary and tertiary care, are especially critical for early detection; however, research in these settings remains limited (Kumari and Basu, 2024; Kansagra *et al.*, 2025).

The immediate postpartum period represents a crucial window for identifying mental health concerns, yet structured psychological screening is often lacking. Known PPD risk factors such as socioeconomic disadvantage, limited social support, obstetric complications, and psychosocial stressors are frequently present in these hospital settings, underscoring the need for systematic early assessment (Aneja and Kaur, 2025; Dadhwal *et al.*, 2023). Recent global evidence further highlights the importance of integrating perinatal mental health services into routine maternal care in low- and middle-income countries (Manolova *et al.*,



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2023). It also points to emerging challenges and opportunities in strengthening mental health support within perinatal systems (Feyissa *et al.*, 2025). Early identification of PPD during hospitalization provides an opportunity for timely, culturally sensitive interventions that may prevent symptom escalation and improve maternal-infant outcomes. This study aims to estimate the prevalence of immediate postpartum PPD and examine its associations with sociodemographic and obstetric factors in a secondary care hospital in India, addressing a critical evidence gap relevant to public health policy and clinical practice.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based cross-sectional study was conducted in a secondary care hospital providing obstetric and gynaecological services in South India. The study focused on women during their immediate postpartum period, specifically during their hospital stay, without any intervention or follow-up component. Data collection was carried out over six months and included women within 24-48 hr after delivery to estimate the prevalence and determinants of Postpartum Depression (PPD).

Sample Size

The sample size was calculated using the single-population proportion formula based on a previously reported PPD prevalence of 20% in India (Lanjewar *et al.*, 2021), assuming a 7% margin of error and a 95% confidence interval. The minimum required sample size was 123; with a 5% anticipated non-response rate, 125 women were recruited. This sample provided approximately 80% statistical power to detect moderate effect-size associations between sociodemographic or obstetric variables and PPD risk.

Participants

Participants were recruited consecutively from the postnatal ward 24-48 hr after delivery, allowing the sample to naturally mirror the hospital's mode-of-delivery profile. During the study period, the hospital's caesarean rate was 73.6%, and the final participant distribution closely matched this pattern, with 73.6% caesarean and 26.4% vaginal births. Eligible women were aged 19-34 years, had delivered a live infant within the previous 24-48 hr, were medically stable, and were able to communicate in English or the local language while remaining available during their postpartum stay. Women were excluded if they had a prior clinical diagnosis of psychiatric, depressive, or anxiety disorders; experienced severe obstetric complications requiring ICU admission; had newborns admitted to the NICU in a way that interfered with participation; declined or withdrew consent; or submitted incomplete or invalid questionnaires. Data were collected using structured tools capturing demographic, obstetric, and psychological variables.

Data Collection and Variables

Data were collected using a structured questionnaire administered through interviewer-led face-to-face interviews to ensure comprehension among women in the immediate postpartum period. The questionnaire was available only in English; however, it was administered to participants in their local language by trained interviewers to ensure comprehension and cultural appropriateness. A combination of interview data and medical record review was captured:

Sociodemographic data: age, education, occupation, family type, household income.

Obstetric characteristics: mode of delivery, parity, antenatal complications, prior miscarriages.

Breastfeeding practices: initiation time, exclusivity, feeding frequency, and challenges (e.g., latching difficulty, pain, low milk supply).

Assessment of Postpartum Depression

PPD was assessed using the Edinburgh Postnatal Depression Scale (EPDS) (Cox *et al.*, 1987), a validated 10-item instrument with scores ranging from 0 to 30. Classification followed established cut-offs:

0-6: Low risk.

7-12: Moderate risk.

≥13: High risk.

These thresholds align with previous Indian hospital-based studies (Panolan *et al.*, 2024; Kumari *et al.*, 2024).

Statistical Analysis

Data were coded and entered into Microsoft Excel and analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). A binary logistic regression analysis was conducted to identify independent predictors of PPD, categorized as EPDS ≥13 versus <13.

Analytical steps included

Descriptive statistics: means (SD) for continuous variables; frequencies (%) for categorical variables

Chi-square tests for bivariate associations

Variables with $p < 0.05$ or clinical relevance were entered into the binary logistic regression model.

Presentation of results as odds ratios (OR) with 95% confidence intervals (CI).

Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee (Approval No. AUCP/IEC/2024-2025/Ph.D/08/01). Verbal informed consent was obtained from all participants. Anonymity was maintained through coded data, and no procedures beyond standard postpartum care were introduced.

RESULTS

Participant Characteristics

A total of 125 postpartum women were included in this study. The mean age was 25.97 ± 3.35 years, with most participants aged between 19 and 34 years. Nearly half (46.4%) had a secondary-level education, while 26.4% had attended college. The majority were homemakers (94.4%) and belonged to lower or mid-income groups (48% each, earning <10,000 and 10,001-30,000 INR per month, respectively). Most were Hindu (73.0%). Obstetric profiles revealed that the majority were primigravida or secundigravida (80.0%), with caesarean section being the predominant delivery method (73.6%). Birth outcomes were favourable, with 99.2% live births and 96.8% healthy infants (Table 1).

Prevalence of Postpartum Depression

The overall mean EPDS score was 3.94 ± 4.18 . According to EPDS risk categories, 47.2% scored 0-3 (low risk), 35.2% scored 4-6 (mild symptoms, low risk), 8.0% scored 7-9 (moderate risk), 4.0% scored 10-12, and 5.6% scored ≥ 13 (high risk), indicating a moderate/high-risk prevalence of 17.6%. Using EPDS cut-offs, the prevalence of moderate/high PPD risk (EPDS ≥ 7) was 17.6%, comprising: moderate risk (7-12): 12.0% and high risk (≥ 13): 5.6% (Table 2).

Breastfeeding Practices and Challenges

Most women practised exclusive breastfeeding (78.4%), and 79.2% initiated breastfeeding within the first hour after delivery. The most frequent breastfeeding challenges were latching problems (38.4%) and pain/low milk supply (32.0%); no cases of mastitis were reported (Figure 1). Feeding frequency varied, with most women breastfeeding 3-6 times daily.

Associations with Sociodemographic and Clinical Variables

Bivariate analysis demonstrated significant associations between postpartum depression risk and education level ($\chi^2=7.79$, $p=0.020$) as well as monthly household income ($\chi^2=9.97$, $p=0.019$). Women with secondary education and those belonging to low-income households (<10,000 INR) were disproportionately represented in the moderate/high-risk category (Table 3). No significant associations were observed for age, mode of delivery, employment status, breastfeeding practices, or obstetric history (Figure 2).

A comparative summary of EPDS-based risk levels across key variables is presented in Table 4.

Multivariable Logistic Regression

All variables with $p<0.05$ in the bivariate analysis (education level, household income) and those deemed clinically relevant (age, mode of delivery, parity, history of miscarriage) were entered into a binary logistic regression model to identify independent predictors of moderate to high PPD risk. None of the variables

Table 1: Demographic and Clinical Characteristics of Study Participants (n=125).

Characteristic	Total Sample (n=125)
Age (years)	
Mean $\pm$ SD	25.97 $\pm$ 3.35
Median (IQR)	26 (23-28)
Range	19-34
Education level	
Primary	34 (27.2%)
Secondary	58 (46.4%)
College	33 (26.4%)
Employment status	
Homemaker	118 (94.4%)
Employed	7 (5.6%)
Monthly household income (INR)	
<10,000	60 (48.0%)
10,001-30,000	60 (48.0%)
Religion	
Hindu	91 (73.0%)
Others	34 (27.0%)
Number of pregnancies	1.90 $\pm$ 0.72
1-2 pregnancies	100 (80.0%)
Number of live births	1.50 $\pm$ 0.60
History of miscarriage	35 (28.0%)
Mode of delivery	
Caesarean section	92 (73.6%)
Vaginal delivery	33 (26.4%)
Birth outcomes	
Live births	124 (99.2%)
Stillbirth	1 (0.8%)
Infant health status	
Healthy	121 (96.8%)
NICU admission required	4 (3.2%)
Pregnancy complications	
Any complications	52 (41.6%)
Hypertension/Preeclampsia	24 (19.2%)
Anaemia	20 (16.0%)
Gestational diabetes	6 (4.8%)
Delivery complications	26 (20.8%)

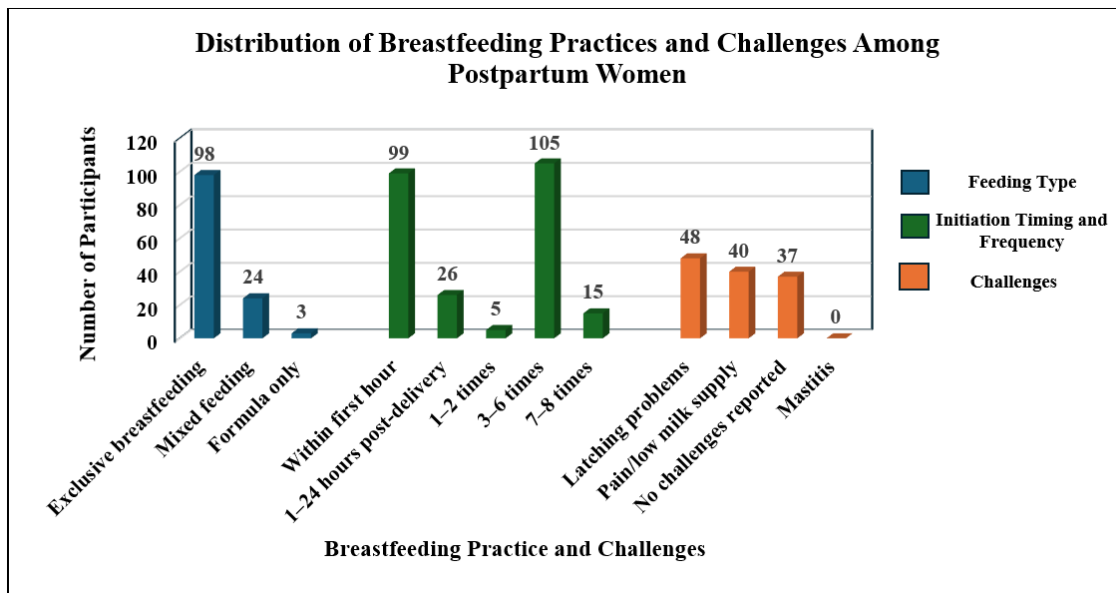


Figure 1: Distribution of breastfeeding practices and challenges among postpartum women (n=125). Most participants practised exclusive breastfeeding (78.4%) and initiated breastfeeding within the first hour after delivery (79.2%). The most frequent breastfeeding challenges were latching problems (38.4%) and pain/low milk supply (32.0%), while no cases of mastitis were reported.

Table 2: Prevalence and Distribution of Postpartum Depression Risk (n=125).

EPDS Score Category	n (%)	Risk Classification
0-3	59 (47.2%)	Low risk
4-6	44 (35.2%)	Low risk (mild)
7-9	10 (8.0%)	Moderate risk
10-12	5 (4.0%)	High risk
≥13	7 (5.6%)	High risk

remained statistically significant after adjustment for multiple comparisons.

However, two predictors approached significance

Low household income (<10,000 INR): Adjusted OR=4.85, 95% CI: 0.94-25.03, $p=0.059$

College education: Adjusted OR=7.09, 95% CI: 0.66-76.60, $p=0.107$.

Although these associations did not reach statistical significance, the direction and magnitude of the adjusted odds ratios suggest that socioeconomic disadvantage and educational background may influence early postpartum depressive symptoms. Full results, including both significant and non-significant predictors, are presented in Table 5.

EPDS Item Analysis

Women most frequently reported sleep difficulties (mean 0.81 ± 1.03) and feeling overwhelmed (mean 0.70 ± 0.93). No participant reported thoughts of self-harm (Figure 3).

DISCUSSION

This study identified a 17.6% prevalence of moderate-to-high PPD risk in women assessed during the immediate postpartum period (24-48 hr postpartum) in a secondary care hospital in India. This prevalence aligns with recent Indian studies, such as those by (Lanjewar *et al.*, 2021) and Panolan and Thomas (2024), which report comparable early postpartum depressive symptoms in diverse settings. It also resonates with findings from rural populations (Dadhwal *et al.*, 2023) and regional analyses (Kansagra *et al.*, 2025), collectively highlighting the persistent burden of PPD across sociodemographic strata in India.

Internationally, the prevalence observed in this study aligns with emerging global evidence from sub-Saharan Africa, where early postpartum assessments have documented moderate-to-severe depressive symptoms among Malawian women (Moya *et al.*, 2023) and notable depression-anxiety comorbidity in Tanzanian samples (Mwita *et al.*, 2024). Although the relatively lower prevalence observed in this cohort may reflect the availability of early support systems during hospitalization, this interpretation should be made cautiously, given the cross-sectional design and the absence of temporal data, which prevent establishing whether symptoms would increase or decline after discharge.

Systematic reviews conducted between 2020 and 2024 further reinforce that socioeconomic disadvantage, limited social support, obstetric complications, and psychosocial stressors consistently predict higher PPD risk across countries, underscoring the global relevance of early screening (Mitchell *et al.*, 2023; Prom *et al.*, 2022; Yaqoob *et al.*, 2024; Tol *et al.*, 2020). In the current study, although no independent predictors reached statistical significance in the multivariable model, trends indicating higher

odds of PPD among women of lower income and education levels echo consistent findings from recent Indian work (Kumari and Basu, 2024; Priyadarshini *et al.*, 2023). These socioeconomic gradients are intertwined with India's cultural context, where family structure, marital dynamics, and postpartum caregiving expectations substantially shape maternal emotional well-being.

Traditional confinement practices, differential access to support, and the centrality of extended family involvement may buffer or intensify psychological distress depending on the level and quality of support available. Limited spousal involvement,

societal stigma around emotional disclosure, and prioritization of infant over maternal health further compound vulnerabilities, especially among low-income women.

Breastfeeding practices in this sample were largely positive, with high rates of early initiation and exclusivity. The absence of a significant association between breastfeeding challenges and PPD risk supports earlier findings suggesting that the relationship between breastfeeding and maternal mental health is complex, potentially moderated by cultural norms, expectations, and support systems (Chaput *et al.*, 2016).

Table 3: Bivariate Analysis of Factors Associated with Postpartum Depression Risk (Low: 0-6; Moderate: 7-12; High: ≥ 13).

Characteristic	Low Risk (n=103)	Moderate/High Risk (n=22)	Test Statistic	p-value
Age (years)	25.89 $\pm$ 3.31	26.83 $\pm$ 3.74	t=-0.96	0.338
Education level			$\chi^2=7.79$	0.020*
Primary	32 (28.3%)	2 (16.7%)		
Secondary	48 (42.5%)	10 (83.3%)		
College	33 (29.2%)	0 (0.0%)		
Employment status			$\chi^2=0.15$	0.700
Homemaker	107 (94.7%)	11 (91.7%)		
Employed	6 (5.3%)	1 (8.3%)		
Monthly household income			$\chi^2=9.97$	0.019*
<10,000 INR	50 (44.2%)	10 (83.3%)		
10,001-30,000 INR	63 (55.8%)	2 (16.7%)		
Mode of delivery			$\chi^2=1.84$	0.175
Caesarean section	85 (75.2%)	7 (58.3%)		
Vaginal delivery	28 (24.8%)	5 (41.7%)		
Breastfeeding practices			$\chi^2=0.11$	0.739
Exclusive breastfeeding	89 (78.8%)	9 (75.0%)		
Mixed/Formula feeding	24 (21.2%)	3 (25.0%)		

*Significant at $p < 0.05$.

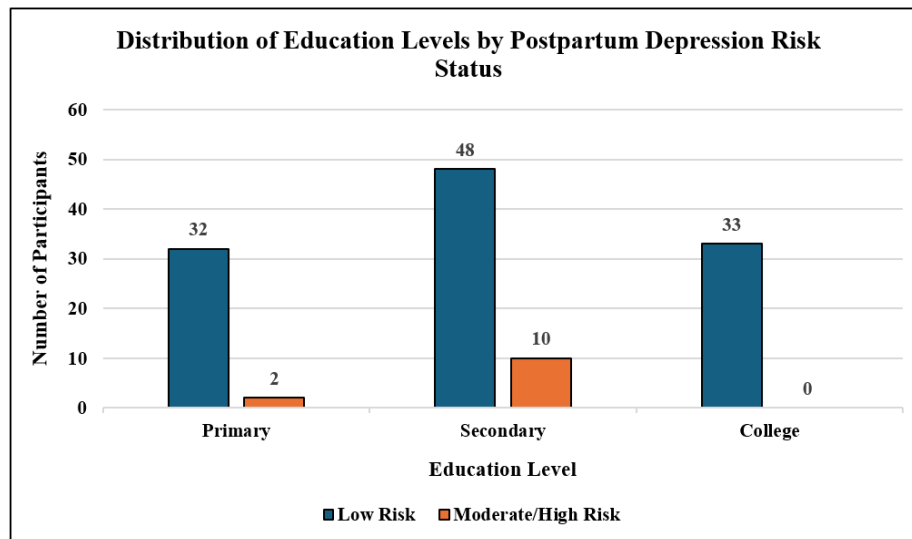


Figure 2: Distribution of education levels by postpartum depression risk status among 125 postpartum women. The clustered bar chart shows that secondary education was significantly more prevalent in the moderate-to-high-risk group (83.3%) compared to the low-risk group (42.5%). Notably, no moderate/high-risk participants had a college education ($\chi^2=7.79$, $p=0.020$).

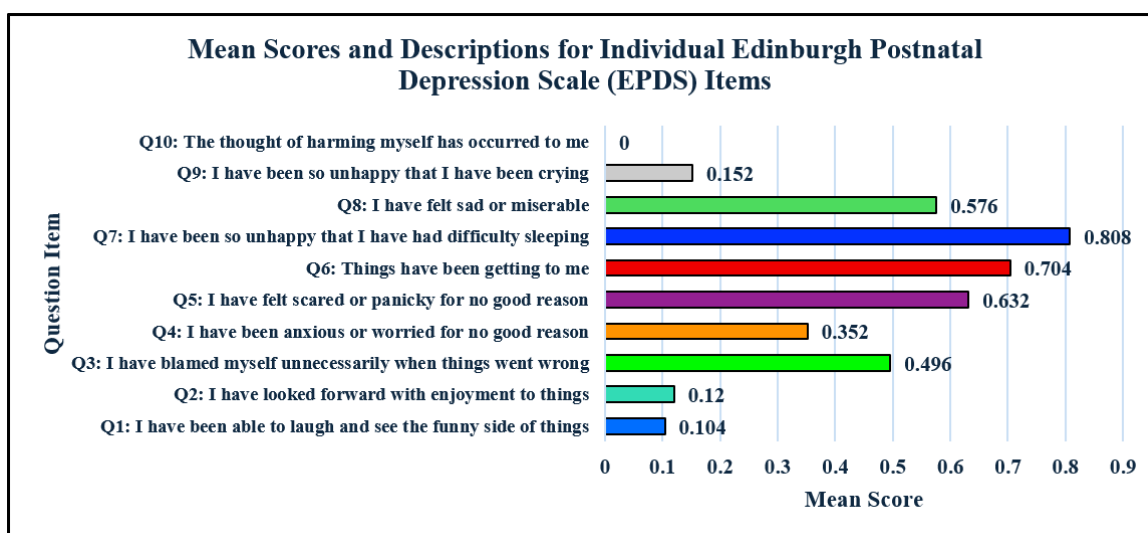


Figure 3: Mean scores for individual Edinburgh Postnatal Depression Scale items among 125 postpartum women. Items are scored 0-3, with higher scores indicating greater symptom severity. Sleep difficulties and feeling overwhelmed showed the highest mean scores, while no participants reported self-harm thoughts.

Table 4: Comparison of Key Characteristics Across EPDS Risk Levels (Low: 0-6; Moderate: 7-12; High: ≥ 13).

Variable	Low Risk (n=103)	Moderate Risk (n=15)	High Risk (n=7)	p-value
Mean Age (years)	25.8 $\pm$ 3.3	26.5 $\pm$ 3.4	27.0 $\pm$ 3.9	0.321
Secondary Education (%)	40.8%	73.3%	85.7%	0.014*
Low Income <10,000 INR (%)	44.7%	66.7%	85.7%	0.009*
Caesarean Delivery (%)	75.8%	66.7%	57.1%	0.218
Exclusive Breastfeeding (%)	79.6%	73.3%	71.4%	0.490
Pregnancy Complications (%)	39.8%	46.7%	57.1%	0.332

*Significant at $p < 0.05$.

Strengths and Limitations

This study contributes to the limited literature examining PPD within secondary care settings, an essential but understudied tier within India's health system. The use of the validated EPDS during the immediate postpartum period enhances the relevance of early detection.

However, several limitations warrant attention:

Timing of assessment (24-48 hr postpartum): Emotional fluctuations and immediate physical recovery during this period may lead to underreporting or overreporting of symptoms, and the early timing restricts interpretation of whether the lower prevalence reflects genuine early support effects or merely transient postpartum adjustment.

Recall bias: Self-reported responses, particularly regarding psychosocial stressors or breastfeeding challenges, may be influenced by social desirability or fatigue.

Generalizability: The single-centre design, predominantly involving caesarean deliveries, limits wider applicability to diverse hospital types and geographic regions.

Cross-sectional design: Limits causal inference; symptom trajectories cannot be established.

Language and administration: Although administered by trained interviewers in the local language, the EPDS is originally validated in English, which may introduce subtle interpretation variance.

Clinical and Interdisciplinary Implications

The findings underscore the urgent need for structured PPD screening in secondary care hospitals, where large volumes of postpartum women can be reached before discharge. Integrating clinical pharmacists, nurses, obstetricians, and mental health professionals into collaborative care pathways could significantly enhance early identification and counselling.

Clinical pharmacists, often involved in medication reconciliation, patient education, and perinatal counselling, can contribute to:

- Screening support and referral during routine postpartum rounds
- Educating mothers on medication safety during breastfeeding

Table 5: Multivariable Logistic Regression for Predictors of Moderate/High PPD Risk.

Variable	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value
Education level	-	-	0.132
Primary	1.00	1.00	
Secondary	3.33 (0.69-16.07)	1.82 (0.32-10.44)	0.501
College	-	7.09 (0.66-76.60)	0.107
Monthly household income	-	-	0.061
10,001-30,000	1.00	1.00	-
<10,000	6.30 (1.37-28.98)	4.85 (0.94-25.03)	0.059
Mode of delivery	-	-	0.301
Caesarean	1.00	1.00	-
Vaginal delivery	2.17 (0.67-7.04)	1.95 (0.55-6.94)	0.301
Age (per year increase)	1.08 (0.93-1.26)	1.05 (0.89-1.25)	0.558
Number of pregnancies	1.42 (0.71-2.82)	1.35 (0.62-2.93)	0.445
History of miscarriage	-	-	0.385
No	1.00	1.00	-
Yes	1.99 (0.59-6.69)	1.78 (0.48-6.58)	0.385

- Identifying drug-disease interactions relevant to mental health
- Reinforcing adherence and monitoring when antidepressants are prescribed

Strengthening interdisciplinary mechanisms can enhance continuity of care and ensure timely psychosocial support, aligning with national maternal mental health priorities and global recommendations for integrated perinatal mental health care.

Future Directions

Longitudinal studies tracking women beyond the immediate postpartum period are needed to capture evolving symptom patterns and validate early screening findings. Further research should examine the moderating role of family support, cultural expectations, and healthcare access on maternal mental health trajectories. Region-specific interventions, delivered through multidisciplinary teams, may optimize prevention and management strategies tailored to India's sociocultural context.

CONCLUSION

This study contributes to the growing body of evidence on postpartum depression in India by documenting a 17.6% prevalence of moderate-to-high PPD risk among women assessed in the immediate postpartum period within a secondary care setting. The incorporation of structured early PPD screening into standard postpartum care pathways, particularly within secondary care hospitals, holds significant potential to improve maternal mental health outcomes and foster healthier maternal-infant trajectories. Investments in multidisciplinary,

context-specific approaches are essential to ensuring that women receive the support they need during this critical period.

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None.

ABBREVIATIONS

PPD: Postpartum Depression; **EPDS:** Edinburgh Postnatal Depression Scale; **OR:** Odds Ratio; **CI:** Confidence Interval; **SD:** Standard Deviation; **IQR:** Interquartile Range; **NICU:** Neonatal Intensive Care Unit; **ICU:** Intensive Care Unit; **INR:** Indian Rupee; **SPSS:** Statistical Package for the Social Sciences; **BMI:** Body Mass Index; **CMAJ:** Canadian Medical Association Journal; **LMICs:** Low- and Middle-Income Countries; **ANC:** Antenatal Care; **GDM:** Gestational Diabetes Mellitus; **HTN:** Hypertension; **N.A.:** Not Applicable; **AI:** Artificial Intelligence.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AI USE STATEMENT

The authors declare that AI-based assistance was used during manuscript preparation to improve language clarity and formatting. Specifically, Grammarly was utilized for language refinement.

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