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Relationship Between the Risk of Postpartum Depression and the Quality of Mother-Infant Bonding Attachment in Postpartum Mothers

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Abstract

The postpartum period is a critical phase for establishing mother–infant bonding, and untreated postpartum depression (PPD) may disrupt this process and affect infant development. This study examined the association between PPD risk and bonding quality among postpartum mothers. A cross-sectional quantitative design was applied to 92 respondents selected through simple random sampling at Miri and Tlogowungu Community Health Centers, with data collection conducted from August to September 2025. PPD risk was assessed using the Edinburgh Postnatal Depression Scale (EPDS), and bonding quality was measured using the Postpartum Bonding Questionnaire (PBQ). Data were analyzed using the Chi-Square test, with association strength reported as Odds Ratio (OR) and a 95% Confidence Interval (CI). Results showed that 31.5% of mothers were at risk for PPD. Normal bonding was identified in 72.8%, while 27.2% experienced bonding disturbances, including 18.5% with severe impairment and 8.7% with mild disruption. A significant association was observed between PPD risk and bonding disturbance ($p < 0.001$). Mothers at risk of PPD were substantially more likely to experience severe bonding impairment compared with those not at risk (OR = 100.9; 95% CI: 16.1 – 632.2). These findings indicate that PPD risk is strongly associated with impaired maternal–infant bonding, underscoring the need for routine screening and early psychosocial support in postpartum care.

INTRODUCTION

Postpartum Depression (PPD) affects approximately 14% of new mothers during the first postpartum year and represents a prevalent psychological condition with significant mental health implications. This disorder emerges from complex interactions among biological, psychological, and social factors, including hormonal fluctuations, genetic predisposition, and environmental stressors. More than half of PPD cases remain undetected, primarily due to social stigma and mothers' reluctance to report emotional difficulties (Karen Carlson et al., 2024). These circumstances highlight the urgency of addressing PPD as a critical public health issue, given its wide-ranging consequences for maternal well-being, infant development, and early mother-infant relationships.

Previous studies have identified several key predictors of PPD, such as stressful life experiences, antenatal anxiety, and a personal or family history of depression (Anokye et al., 2018). Beyond maternal outcomes, infants born to mothers experiencing PPD are at a higher risk for growth disturbances, low birth weight, and increased susceptibility to physical health problems (Chen et al., 2022; Zhao & Zhang, 2020). PPD may also impair maternal responsiveness and emotional availability, which are essential components of healthy bonding. Although various intervention strategies, including psychosocial, psychological, pharmacological, and somatic approaches, have been developed, their implementation remains hindered by limited health service accessibility and persistent social stigma related to postpartum mental health (Stewart & Vigod, 2019).

Maternal mental health is essential in establishing early interaction patterns between mothers and infants, especially in terms of bonding attachment, which significantly affects the child's socioemotional growth. Disruptions in bonding have been associated with long-term challenges in emotional regulation, behavioral issues, and insecure attachment styles (Hildingsson & Rubertsson, 2022). Research indicates that postpartum depression diminishes maternal sensitivity, emotional responsiveness, and the capacity to accurately interpret infant signals, thereby heightening the risk of bonding difficulties (Ana Luisa et al., 2019). Family support also plays a crucial role in shaping maternal emotional stability, as the presence of an inner familial bond can foster comfort, affection, and a sense of being cared for, helping individuals manage emotional reactions. As noted in the document, an emotional bond within the family can foster comfort and mutual care (Syfa & Yuniartika, 2022). Crucially, psychological issues that

remain unaddressed can develop into postpartum depression, thereby diminishing early maternal behaviors such as the initiation and duration of breastfeeding, which are essential for fostering mother–infant attachment (Mufida & Sulastri, 2022). Considering the considerable developmental hazards linked to compromised bonding, it is vital to investigate the connection between postpartum depression and bonding attachment to inform preventive and therapeutic strategies in maternal–child health interventions.

Despite numerous international studies investigating the relationship between postpartum depression and maternal bonding across regions, including Europe, North America, South America, China, and Singapore, empirical evidence from Indonesia remains scarce (Hailemeskel, 2022; Wang et al., 2021). The number of existing studies in Indonesia is limited, predominantly descriptive in nature, and seldom investigates the direct relationship between the risk of postpartum depression (PPD) and bonding attachment. This deficiency is significant because of the considerable differences in cultural norms, family dynamics, and social support systems compared to Western and Asian contexts, rendering the generalization of global findings to Indonesian mothers inappropriate. Consequently, there is an urgent need for region-specific research that accurately reflects the contextual realities of postpartum mental health in Indonesia (Putri et al., 2023). Consequently, this study makes a significant contribution by investigating the risks of postpartum depression and the quality of bonding attachment among mothers receiving care from the Miri Community Health Center in Sragen Regency and the Tlogowungu Community Health Center in Pati Regency, thus filling a notable gap in the national literature.

RESEARCH METHODS

Study Design

This study employed a cross-sectional quantitative-analytic design to examine the relationship between postpartum depression (PPD) risk and mother-infant bonding quality at a single point in time. Simultaneous measurement of both variables, without long-term follow-up, is efficient and suitable for community-based maternal mental health research. The cross-sectional design was chosen for its capacity to assess exposure and outcomes concurrently within a community context, its efficiency in terms of time, and its ability to account for variability in postpartum conditions. Nevertheless, a significant limitation of this design is its inability to establish causal direction or temporal sequence between the variables.

Population and Sample

The study population comprised all postpartum mothers registered at the Miri Community Health Center in Sragen Regency and the Tlogowungu Community Health Center in Pati Regency during the study period (August-September 2025). A total sample of 92 respondents was selected from a population of 120 postpartum mothers using simple random sampling. Inclusion criteria included mothers within six months postpartum, able to communicate in Indonesian, willing to participate by providing written informed consent, and having no prior diagnosis of severe psychiatric disorders. Sample size was determined using the Slovin formula, with a 5% margin of error, to ensure representativeness. To minimize sampling bias, the sampling frame was derived from the health center registry, and random selection was conducted using a computer-generated random list.

Variables and Instruments

The independent variable was risk of postpartum depression, and the dependent variable was mother-infant bonding attachment quality, and both variables were categorical. Postpartum depression risk was assessed using the Edinburgh Postnatal Depression Scale (EPDS), a 10-item instrument rated on a 0-3 scale with total scores ranging from 0 to 30. Scores ≤ 10 indicated low risk, while scores > 10 indicated elevated risk for postpartum depression (Gila-d et al., 2020). Mother-infant bonding quality was measured using the Postpartum Bonding Questionnaire (PBQ), which contains 25 items scored on a 0-5 Likert scale, yielding a total score of 0-125. Categories included normal bonding (0-25), mild impairment (26-39), and severe impairment (≥ 40) (Id et al., 2019). Sample items include statements such as "I feel close to my baby" and "I feel irritated with my baby," which illustrate mothers' emotional and behavioral responses. Both instruments underwent translation and cultural adaptation at the Institute of Language and General Sciences (LBIPU), Universitas Muhammadiyah Surakarta. This

adaptation followed a standardized methodology that included forward translation, expert panel evaluation, backward translation, and pilot testing with a group of 45 postpartum mothers. The reliability assessment indicated satisfactory psychometric properties (all items $p < 0.05$; $r > 0.205$; Cronbach's $\alpha > 0.90$).

Data Collection and Data Analysis Procedures

Data were collected through structured questionnaires, guided interviews, and self-reports at both health centers. Before data collection, participants received explanations of the study objectives, procedures, confidentiality, and their rights, and signed informed consent. Data analysis was conducted utilizing SPSS version 27. Normality testing was deemed unnecessary because all variables were categorical; thus, nonparametric analysis was appropriate. Descriptive statistics provided summaries of respondent characteristics and the distributions of variables. The association between PPD risk and bonding quality was examined using the Chi-Square test. Assumption checks indicated that over 80% of expected cell frequencies were greater than five, thereby justifying the application of Pearson's Chi-Square. A significance threshold of $p < 0.05$ was established. Odds Ratios (OR) and 95% Confidence Intervals (CI) were generated automatically by SPSS to assess the strength of the association.

Etichal Consideration

Ethical approval was obtained from the Health Research Ethics Committee of Dr. Moewardi Hospital (Ethics No. 1.801/VIII/HREC/2025). Participation was voluntary, and respondents could withdraw at any time without consequence to their access to health services. Confidentiality was ensured, and data were used only for research purposes.

RESULT

Table 1. Characteristics of Respondents (N=92)

Characteristics	Category	n		%
		Group 1	Group 2	
Age (years)	<20	1	3	4.4
	20-35	43	36	85.7
	>35	3	6	9.9
Education	Elementary-middle school	13	16	31.5
	High school	29	22	55.5
	University	5	7	13.0
Occupation	Housewife	40	0	43.5
	Private/ Civil servant	3	9	13.0
	Self-employed	2	0	2.2
	Laborer	2	36	41.3
Parity	Primipara	18	24	45.7
	Multipara	31	21	54.3
Postpartum period	≤4 weeks	46	45	98.9
	>4 weeks	1	0	1.1

Source: Primary Data 2025

Table 1 showed that most respondents were aged 20–35 years (85.7%), which is within the optimal reproductive age range for emotional and physical readiness. The majority had primary to secondary education (55.5%) and worked as housewives (43.5%) or laborers (41.3%). More than half of the respondents were mothers who had given birth more than once (54.3%), and almost all were in the postpartum period of less than 4 weeks (98.9%).

Table 2. Results of Instrument Reliability Test

Instrument	Number of items	Cronbach's Alpha	Description
EPDS	10	0.911	Reliable
PBQ	25	0.913	Reliable

Source: Primary Data 2025

Reliability assessment for the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Bonding Questionnaire (PBQ) was conducted utilizing Cronbach's Alpha in SPSS version 27. The EPDS exhibited a reliability coefficient of 0.911, whereas the PBQ revealed a coefficient of 0.913. Both coefficients surpass the minimum acceptable standard of 0.70.

Table 3. Distribution of Postpartum Depression Risk and Bonding Attachment (N=92)

Variable	Category	n	%
Risk of Postpartum Depression	Normal	63	68.5
	Risk for Depression	29	31.5
Bonding Attachment Quality	Normal	67	72.8
	Mild Disturbance	8	8.7
	Severe Impairment	17	18.5

Source: Primary Data 2025

Table 3 illustrates that while the majority of mothers did not show signs of postpartum depression, a significant number displayed an increased risk, indicating a substantial psychological vulnerability during the postpartum phase. The quality of bonding was typically within the normal range; however, some mothers faced mild issues characterized by initial challenges in emotional connection, whereas others experienced severe impairments, as evidenced by reduced responsiveness and warmth. These trends suggest that although bonding disruptions are less common, they pose considerable relational difficulties for the mothers affected. In summary, the findings highlight a crucial link between the risk of depression and the quality of bonding, emphasizing the necessity for early detection and supportive mental health interventions in postpartum care.

The crosstabulation shows a clear pattern indicating that mothers with normal depression risk predominantly exhibit normal bonding, whereas those at risk of depression experience higher levels of bonding disruption. Among the normal-risk group, more than 94% reported normal bonding, whereas severe disruption was rare. In contrast, the depression-risk group showed a high proportion of severe bonding disruption, reaching nearly 70% within EPDS and over 94% within PBQ. These findings suggest that increased depression risk is closely associated with worsening bonding outcomes. The chi-square results confirm this relationship, with all tests showing statistically significant associations ($p < 0.001$). The strong chi-square values indicate that bonding disruption increases in tandem with higher depression risk. Overall, the results highlight the need for early identification of depressive symptoms to prevent adverse effects on mother–infant bonding.

DISCUSSION

Risk of Postpartum Depression

The findings show that 31.5% of mothers are at risk of postpartum depression, as indicated by an EPDS score of 13 or higher, exceeding the international average of 17-19% (Wang et al., 2021). This high prevalence is influenced by socioeconomic factors, limited access to psychological services, and cultural norms that suppress emotional expression. These findings are consistent with research in Indonesia, which reports a prevalence of 22%, with urban areas at 5.7% and the rural regions at 2.9% (Putri et al., 2023). Internationally, studies conducted in Korea and the United States also report a prevalence of 19-26% (Seif et al., 2020; Seo Young Kang, Young-Ho Khang, 2022). Therefore, early detection through EPDS screening in primary health facilities is crucial. Educational approaches and community-based social support have been proven effective in reducing postpartum depression symptoms (Norazman & Lee, 2024). In addition to social influences, physiological and endocrine changes substantially contribute to the development of PPD. After childbirth, estrogen and progesterone levels drop dramatically, disrupting the stability of neurotransmitters such as serotonin and dopamine,

which help regulate mood (Hutcherson et al., 2020). This imbalance can increase susceptibility to stress and cause symptoms of depression, especially when accompanied by physical fatigue and a lack of emotional support. Therefore, postpartum depression must be treated multidimensionally by combining biological, psychological, and social aspects so that the mother's recovery process can proceed more optimally.

Bonding Attachment

The findings revealed that 72.8% of mothers exhibited normal bonding, whereas 27.2% faced bonding disturbances. This ratio aligns with global estimates that suggest bonding disturbances occur in 30–38% of postpartum mothers (Hildingsson & Rubertsson, 2022). Postpartum mood disturbances, spanning from mild affective instability to clinically significant depression, are notably prevalent, impacting 70–80% of women. These emotional variations can significantly hinder maternal responsiveness and the initial bonding process. Consequently, maternal emotional readiness, social support, and psychological well-being are essential factors influencing the quality of bonding (Rahayuningsih, 2023). Maternal emotional readiness, social support systems, and psychological well-being significantly affect bonding. Attachment theory posits that sensitive and responsive caregiving fosters secure bonding, whereas emotional withdrawal stemming from stress or depressive symptoms can impair bonding (Hailemeskel, 2022). Previous studies have indicated that disrupted bonding may affect children's socioemotional growth, leading to heightened anxiety and difficulties in emotional regulation (Ana Luisa et al., 2019). Therefore, although most exhibited typical bonding, the presence of bonding issues among a portion of mothers implies significant clinical consequences that necessitate prompt recognition and support.

Relationship Between Risk of Postpartum Depression and Bonding Attachment

The main aim of this research was to investigate the correlation between the risk of postpartum depression (PPD) and the bonding between mother and infant. A statistically significant association was identified ($p < 0.001$), indicating that mothers at risk for PPD are almost seven times more likely to suffer from bonding difficulties (OR = 109.0). This aligns with the results presented by (Febriani et al., 2024), which indicated that symptoms of depression reduce maternal sensitivity, emotional involvement, and responsiveness to infant cues. From a mechanistic perspective, depressive conditions hinder motivation, emotional regulation, and cognitive processing, thereby obstructing mothers' capacity to recognize and react to infant signals (Ana Luisa et al., 2019). Discrepancies in results when compared to global reports may indicate contextual variations, including access to mental health services, cultural norms surrounding maternal responsibilities, and differences in social support systems. These contextual elements may also be confounding variables. For example, insufficient social support, variations in parity, reduced socioeconomic status, and troubled marital relationships may increase the likelihood of postpartum depression (PPD) while concurrently hindering maternal bonding.

Nursing and Public Health Implications

The results underscore the importance of incorporating PPD screening through the EPDS into standard maternal care practices at community health centers. Timely detection would allow for immediate intervention and referral. It is crucial to strengthen family-oriented bonding interventions, increase husbands' involvement, and expand home-care follow-up for mothers at risk. Community health nurses are pivotal in providing psychoeducation, aiding in coping strategies, and activating social support networks. Given the impact of contextual and confounding factors, a comprehensive approach that integrates biological, psychological, and social factors is essential to enhance maternal-infant relational outcomes.

Study Limitation

Several limitations should be acknowledged. Initially, the cross-sectional design hinders the ability to establish causality, permitting only the identification of associations between postpartum depression and bonding impairment. Furthermore, potential bias may arise from the administration of the EPDS and PBQ via interviewer-assisted self-report, which could heighten social desirability and recall bias. Additionally, the study failed to account for confounding variables such as previous psychological conditions, social support, parity, or socioeconomic status, all of which may affect both the risk of depression and the quality of bonding. Moreover, data were collected from only two community health

centers, which limits the generalizability of the results. Notwithstanding these limitations, the study offers significant insights into postpartum mental health in the Indonesian context and highlights the need for future longitudinal, multi-site investigations.

CONCLUSION

This research illustrates that the risk of postpartum depression is notably linked to disrupted mother–infant bonding. Mothers who are recognized as being at risk for postpartum depression tend to encounter bonding issues, suggesting that maternal mood symptoms affect the quality of early attachment. These results emphasize the necessity of incorporating regular PPD screening and early psychosocial support into postpartum healthcare services to enhance maternal–infant bonding. Additional studies employing longitudinal designs are required to elucidate temporal relationships and to improve targeted interventions.

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