



RISK AND PROTECTIVE FACTORS OF POSTPARTUM DEPRESSION USING THE EDINBURGH POSTNATAL DEPRESSION SCALE (EPDS)

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ABSTRACT

Mental health remains a major global concern, as many physical and emotional health problems stem from unrecognized psychological disturbances. Postpartum depression (PPD) is among the most common mental health conditions affecting women after childbirth, with a global prevalence of depression and anxiety estimated at 15.6% during pregnancy and 19.8% during the postpartum period. This study aimed to identify the risk and protective factors associated with postpartum depression using the Edinburgh Postnatal Depression Scale (EPDS). A cross-sectional study was conducted among 58 postpartum mothers in the Gerokgak II Health Centre working area, Buleleng, Bali. Data were collected using a validated EPDS questionnaire consisting of 10 items assessing depressive symptoms over the past two weeks. The sampling technique used was total sampling, considering the limited number of postpartum mothers in the study area. Data were analyzed using logistic regression to determine significant predictors of postpartum depression. The findings revealed that 7 mothers (12.7%) experienced postpartum depression. Maternal age was identified as a significant risk factor ($p = 0.02$, $OR = 1.52$), indicating that older mothers were more likely to develop postpartum depression. Conversely, the number of children (parity) acted as a protective factor ($p = 0.04$, $OR = 0.032$), suggesting that mothers with more children were less likely to experience depressive symptoms. Other variables such as age at marriage, reproductive age category, domicile, and employment status were not significantly associated ($p > 0.05$). Postpartum depression should not be regarded as a minor issue, as it can significantly affect maternal and infant well-being. Strengthening family and community support is essential to ensure early detection and effective prevention of postpartum depression.

Keywords: EPDS; maternal age; mental health; parity; postpartum depression; risk factors

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INTRODUCTION

Mental health remains a significant issue in today's society, as many physical and emotional health problems often stem from unrecognized mental health disturbances. This condition can affect the well-being of mothers, infants, and families. Early detection of postpartum depression is essential to ensure timely and appropriate interventions. One of the most widely used tools for identifying postpartum depression is the Edinburgh Postnatal Depression Scale (EPDS), a questionnaire specifically designed to detect depressive symptoms among mothers after childbirth.

In Denpasar City, the proportion of postpartum depression identified using the EPDS score was 9 mothers (20.5%), with 4 mothers (9.1%) requiring additional monitoring. The risk factors identified in this study included low maternal education, primiparity, age, history of child death, and unwanted pregnancy (Ariguna Dira & Wahyuni, 2016). Postpartum depression not only has a profound impact on the mother's condition but also on the child. Difficulties in mother-child interaction during maternal depression increase the risk of behavioral and cognitive disorders in children and can even endanger the child's well-being (Ariguna Dira & Wahyuni, 2016).

According to data from the Basic Health Research (Riskesdas) 2018, the proportion of maternal mental disorders such as depression and anxiety was approximately 15.6% during pregnancy and 19.8% during the postpartum period. Anxiety after childbirth affected 22.4% of Indonesia's 14

million postpartum women, while the incidence of postpartum blues ranged between 50–70% (Ministry of Health RI, 2018). This high prevalence of postpartum blues can lead to postpartum depression, with an estimated rate of 10–15% (Ministry of Health RI, 2018). Maternal mental health during pregnancy and the postpartum period is therefore a crucial aspect, as it has long-term implications for the child, partner, and the mother's overall quality of life (Castro et al., 2023; Rogers et al., 2020).

Midwives, as the frontline of maternal health services, play a pivotal role during the postpartum period. Their role is essential in the early detection of depressive symptoms in postpartum mothers and in providing continuous communication, information, and education (CIE) support. The prevalence of postpartum depression has been reported at 25.4%, with significant risk factors including family type, infant nutrition, and family support. Meanwhile, factors such as maternal age, education, occupation, family income, parity, pregnancy status, delivery complications, and infant gender were not found to have a significant relationship. Among these, infant nutrition was identified as the strongest factor associated with postpartum depression (Lindayani & Marhaeni, 2019). Therefore, this study aims to identify the risk and protective factors associated with postpartum depression among mothers using the Edinburgh Postnatal Depression Scale (EPDS). The findings are expected to support early detection efforts and strengthen preventive strategies through family and community-based interventions.

METHOD

This study employed a comparative analytic design with a cross-sectional approach using primary data. This design was chosen to analyze the level of postpartum depression among mothers within a specific period, serving as a baseline to identify risk and protective factors. A cross-sectional design emphasizes a single measurement of both independent and dependent variables at one point in time, allowing descriptive and associative analysis (Setia, 2016). The study was conducted in the working area of Gerokgak II Health Centre, Buleleng Regency, involving 58 postpartum mothers selected using total sampling, as all eligible postpartum mothers during the data collection period were included. Inclusion criteria were mothers who were within 6 weeks postpartum, able to communicate well, and willing to participate voluntarily. Primary data were collected using a structured questionnaire distributed through Google Form. The instrument consisted of two main parts: sociodemographic data, including respondent's name (initials), age, age at first marriage, education, occupation, number of children, place of residence, and delivery location; and the postpartum depression level, assessed using the Edinburgh Postnatal Depression Scale (EPDS). The EPDS is a standardized self-report instrument developed by Cox et al. (1987) and widely used to measure depressive symptoms in postpartum women. It consists of 10 items, each rated on a 4-point Likert scale (0–3), with a total score ranging from 0 to 30. A higher score indicates a greater likelihood of depression, and a cut-off point of ≥ 13 was used to identify potential postpartum depression following the Indonesian adaptation (Ardiyanti et al., 2019).

The EPDS has been validated internationally and translated into Indonesian with good psychometric properties. The Indonesian version of EPDS demonstrates a Cronbach's alpha of 0.82–0.88, indicating high internal consistency (Sihombing et al., 2020). The content validity index (CVI) was confirmed by experts in maternal mental health, and the construct validity showed significant correlations between items and the total score ($p < 0.05$). In this study, prior to data collection, the instrument was retested on 10 postpartum mothers within the same population, showing a Cronbach's alpha of 0.84, confirming reliability. Data were processed and analyzed using Stata 17. Univariate analysis was used to describe respondents' characteristics and the distribution of postpartum depression levels. Bivariate analysis (Chi-square test) identified potential associations between sociodemographic factors and depression level, while multivariate logistic regression was performed to identify risk and protective factors influencing postpartum depression. Model fit was evaluated using the Likelihood Ratio Test, HosmerLemeshow Goodness-of-Fit Test, and the Area

Under the Curve (AUC) to assess predictive accuracy. The study was conducted in Gerokgak II Health Centre, Buleleng Regency, from June to August 2024. The EPDS has been validated internationally and translated into Indonesian with good psychometric properties. The Indonesian version of EPDS demonstrates a Cronbach's alpha of 0.82–0.88, indicating high internal consistency (Sihombing et al., 2020). The content validity index (CVI) was confirmed by experts in maternal mental health, and the construct validity showed significant correlations between items and the total score ($p < 0.05$). In this study, prior to data collection, the instrument was retested on 10 postpartum mothers within the same population, showing a Cronbach's alpha of 0.84, confirming reliability.

Data were processed and analyzed using Stata 17. Univariate analysis was used to describe respondents' characteristics and the distribution of postpartum depression levels. Bivariate analysis (Chi-square test) identified potential associations between sociodemographic factors and depression level, while multivariate logistic regression was performed to identify risk and protective factors influencing postpartum depression. Model fit was evaluated using the Likelihood Ratio Test, Hosmer–Lemeshow Goodness of Fit Test, and the Area Under the Curve (AUC) to assess predictive accuracy. The study was conducted in Gerokgak II Health Centre, Buleleng Regency, from June to August 2024.

RESULT

Respondent Characteristic

Tabel 1.

Characteristics of Postpartum Mothers (n=58)

Characteristics	f	%
Risk of Postpartum Depression		
Not at risk of depression	51	87.93
At risk of depression	7	12.07
Number of Children		
1–4 children	57	98.28
>4 children	1	1.72
Living Arrangement		
Living independently	31	53.45
Living with in-laws	19	32.76
Living with in-laws and siblings-in-law	8	13.79
Place of Delivery		
Private midwife practice (PMB)	29	50
Hospital/Clinic/Health Centre	29	50
Occupation		
Unemployed	38	65.52
Employed	20	34.48
	Mean	CI
<i>Edinburgh Postnatal Depression Scale total Score</i>	3.68	2.54 - 4.87
Maternal age (years)	27.02	25.59 - 28.43
Age at first marriage (years)	20.75	20.18 - 21.33
Number of children	2	1.68 - 2.18

Table 1, it can be seen that among 58 respondents, the mean EPDS score was 3.8, with most mothers (87.93%) not at risk of postpartum depression. The majority of mothers (98.28%) had 1–4 children, with an average of two children. More than half (53.45%) lived independently, while an equal number of mothers delivered either at private midwife practices (50%) or hospitals/clinics (50%). The majority were unemployed (65.52%), with an average maternal age of 27 years and an average age at first marriage of 20.75 years.

Identification of Risk and Protective Factors of Postpartum Depression

Table 2.

Risk and Protective Factors of Postpartum Depression (n=58)

<i>Variable</i>	No Risk of Depression (%)	Risk of Depression (%)	OR.	p-value (95% CI)
Reproductive Age				
Healthy (20–35 years)	43 (84.31)	5 (71.43)	0.57	0.71 (0.03-10.1)
Unhealthy (<20 or >35 years)	8 (15.69)	2 (28.57)		
Place of Delivery				
PMB	25 (49.02)	4 (57.14)	0.82	0.82 (0.13-4.88)
Hospital/Clinic/Health Centre	26 (50.98)	3 (42.86)		
Number of Children	-	-	0.032	0.04 (0.01-0.852)*
Maternal Age	-	-	1.52	0.02 (1.05 - 2.20)*
Age at Marriage	-	-	0.59	0.09 (0.31-1.088)
Living Arrangement				
Living independently	27 (52.94)	4 (57.14)	2.21	0.29 (0.51-8.69)
Living with in-laws	18 (35.29)	1 (14.29)		
Living with in-laws and siblings-in-law	6 (11.76)	2 (28.57)		
Employment Status				
Unemployed	33 (64.71)	5 (71.43)	0.1	0.7 (0.37-1.06)
Employed	18 (35.29)	2 (28.57)		

Table 2, logistic regression analysis showed that the number of children was significantly associated with postpartum depression ($p = 0.040$). The odds ratio (OR) of 0.032 indicated that a higher number of children served as a protective factor against postpartum depression. Meanwhile, maternal age was a significant risk factor ($p = 0.02$, $OR = 1.52$), meaning that older mothers were more likely to experience postpartum depression. Other variables such as age at marriage, reproductive age category, living arrangement, and employment status showed no significant association with postpartum depression ($p > 0.05$).

Model Testing Result

The logistic regression model was tested using the Likelihood Ratio Test, Hosmer–Lemeshow Goodness-of-Fit Test, and Area Under the Curve (AUC), as shown below:

Coefficients and Odds Ratios for Model 1 (Three Variables)

Model 1 included *number of children*, *age at first marriage*, and *maternal age*.

Table 3.

Logistic Regression Model 1 Results

Variable	Coefficient (β)	Odds Ratio (OR)	p-value	95% Confidence Interval
Number of Children	-3.43	0.0325	0.040*	0.0012–0.853
Maternal Age	0.42	1.52	0.028*	1.04–2.20
Age at First Marriage	-0.54	0.58	0.090	0.31–1.09
Constant (Intercept)	3.82	45.65	0.472	0.0014–1,529,633

Maternal age showed a significant positive association with postpartum depression ($p = 0.028$), indicating that each additional year of maternal age increased the likelihood of depression by 1.52 times. The number of children had a significant negative effect, suggesting that mothers with more children were less likely to experience postpartum depression..

Model 2 (Two Variables)

Model 2 included only *number of children* and *age at first marriage* and showed no good fit, as described below:

Table 4.

Logistic Regression Model 2 Results

Variable	Koefisien (β)	Odds Ratio (OR)	p-value	[95% Confidence Interval]
Number of Children	-0.60	0.55	0.270	0.23 – 1.47
Age at First Marriage	-0.07	0.93	0.728	0.65 – 1.36
Constant (Intercept)	0.44	1.55	0.917	-7.84 – 8.71

Comparassion Model

The Likelihood Ratio Test (LR) showed that Model 1 fit significantly better than Model 2 (LR $\chi^2(1) = 6.16$, $p = 0.0131$), indicating that adding *maternal age* significantly improved the model's predictive ability. Thus, Model 1 was the preferred model for further interpretation.

Model Fit (Hosmer-Lemeshow)

The Hosmer–Lemeshow test yielded $\chi^2 = 6.28$ and $p = 0.5076$, indicating a good model fit, with no significant difference between predicted and observed values. Therefore, the logistic model adequately represents the observed data.

Area Under the Curve (AUC)

The AUC value of 0.6359 indicated a moderate discriminative ability of the model in distinguishing between mothers at risk and not at risk of postpartum depression. This means the model correctly classified 63.5% of cases.

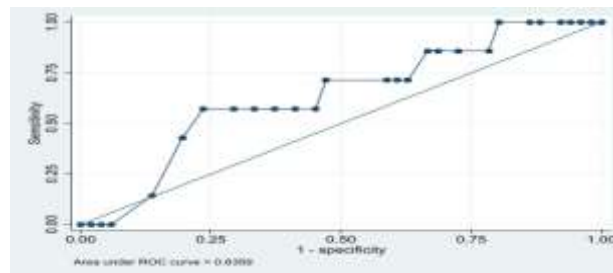


Figure 1. ROC Curve of the Logistic Regression Model

Based on the logistic regression analysis, maternal age and number of children were significant predictors of postpartum depression. The model demonstrated a good fit but could be improved with additional variables or a more complex design. Overall, Model 1 was found to be well-fitted and suitable for further predictive and interpretive analysis.

DISCUSSION

Characteristics of Respondents

In this study, data were collected from 58 respondents. Based on the results, the average EPDS (Edinburgh Postnatal Depression Scale) score among respondents was 3.8, with the majority 51 mothers (87.93%) classified as not at risk for postpartum depression. Most respondents had between one and four children (57 respondents, 98.28%), with an average of two children. A total of 31 mothers (53.45%) lived independently, while 29 mothers (50%) delivered their babies at private midwives (PMB) and hospitals, respectively. The majority of mothers were unemployed (38 respondents, 65.52%). The mean age of the mothers was 27 years, and the average age at first marriage was 20.75 years. This univariate analysis describes the characteristics of postpartum mothers in the working area of Gerokgak II Health Centre.

Proportion of Postpartum Depression

The proportion of mothers at risk for postpartum depression reached 12.07% (7 out of 58 mothers) in Banyupoh Village. These findings indicate that the potential or risk of depression among postpartum mothers remains present and requires early detection and intervention. The proportion of 12.7% suggests that postpartum depression continues to be a common issue faced by mothers during the puerperium period. Previous research reported a 6-month postpartum depression rate of approximately 4.0%. Globally, postpartum depression (PPD) affects 10–15% of mothers and is one of the most prevalent psychological health problems among women worldwide (Syamantha Putri et al., 2023).

Numerous studies on postpartum depression have been conducted in Indonesia, both during and after the COVID-19 pandemic. The findings revealed that the prevalence of postpartum depression is higher in urban areas (5.7%) than in rural areas (2.9%) (Ariasih et al., 2023; Harahap et al., 2024; Syamantha Putri et al., 2023). Young mothers in urban and rural areas show different risk factors. In urban settings, living without a husband (OR = 3.82; 95% CI = 1.24–11.76), premature birth (OR =

4.67; 95% CI = 1.50–14.50), pregnancy complications (OR = 3.03; 95% CI = 1.20–7.66), and postpartum complications (OR = 5.23; 95% CI = 1.98–13.80) were associated with higher PPD risk. Meanwhile, in rural areas, smaller household size (OR = 3.22; 95% CI = 1.00–10.38), unwanted pregnancy (OR = 4.40; 95% CI = 1.15–16.86), and pregnancy complications (OR = 3.41; 95% CI = 1.31–8.88) were significantly related to PPD (Syamantha Putri et al., 2023).

Depression is one of the most frequent mental health disorders characterized by persistent sadness or mood disturbance (Kusumawati et al., 2021). Postpartum depression (PPD) is a serious and common mental health condition during pregnancy and after childbirth. A meta-analysis covering 80 countries estimated a global prevalence of 17.22% (95% CI = 16.00–18.51), with lower rates in high-income countries compared to low- and middle-income nations (Wang et al., 2021). The highest percentage of PPD occurs among first-time mothers and those with a family history of mood disorders. The incidence rate of postpartum depression is estimated at 1–2 per 1000 births, with approximately 50–60% of affected mothers being primiparous and about 50% reporting a family history of mood disorders (Indah Lestari, Noer Saudah, & Ika Ainur Rofi'ah, 2023). In the present study conducted in Banyupoh Village, the proportion of mothers at risk for depression based on EPDS was 12.7% (7 out of 58), with total scores ranging from 10 to 17. According to EPDS categorization, scores ≥ 10 indicate a high risk of depression (Harahap et al., 2024; Novinaldi et al., 2020). These findings highlight the importance of continuous monitoring and screening by midwives, especially for mothers who exhibit early signs of potential depression.

Identifying Risk and Protective Factors for Postpartum Depression

Maternal age showed a significant relationship with postpartum depression, with a p-value of 0.02 and an odds ratio (OR) of 1.52, indicating that older mothers were more likely to experience postpartum depression. This finding aligns with previous studies reporting that advancing maternal age increases the likelihood of PPD (Amna & Khairani, 2024; Sinaga & Jober, 2023). Each additional year of maternal age was associated with a higher probability of depressive symptoms postpartum. Several studies have confirmed that mothers aged > 35 years have a higher risk of PPD compared to younger mothers. A cohort study by Silverman et al. (2017) using Swedish population data found that older mothers were more likely to experience emotional distress, anxiety related to child-rearing, and heightened social expectations of motherhood, all of which contribute to depression. Similarly, research by Putnick et al. (2020) in the United States reported that older mothers tend to face greater physical and psychological fatigue, as well as career-related and marital pressures, which exacerbate emotional stress. Biologically, advanced maternal age is linked to pregnancy and delivery complications—such as preterm birth or cesarean section—which may indirectly increase PPD risk (Dennis & Falah-Hassani, 2018). A South Korean study by Park et al. (2022) found that women aged > 35 years had twice the risk of developing PPD compared to those aged 20–30 years, even after adjusting for socioeconomic factors. The World Health Organization (2022) also emphasizes that older mothers should be prioritized in mental health monitoring due to distinct psychosocial challenges.

This study also revealed that a higher number of children served as a protective factor against PPD. Statistical analysis showed a significant association ($p = 0.040$; OR = 0.032), suggesting that mothers with more children were less likely to experience depression. This may be due to greater maternal experience, increased parenting self-efficacy, and established family support. Matsumura et al. (2016) found that multiparous mothers had lower depression levels than primiparous mothers due to higher confidence and coping capacity. Norhayati et al. (2020) and Zhou et al. (2021) similarly found that multiparous women experience lower stress because they have more realistic expectations of motherhood. However, in some contexts, having more children can also act as a stressor if social or financial support is inadequate (Parsons et al., 2022). Therefore, contextual and community-based approaches are crucial in evaluating risk and protective factors for PPD. Dol et al. (2021) in Canada also reported that primiparous women had significantly lower maternal self-efficacy ($p = 0.004$) and higher postpartum anxiety ($p < 0.001$) compared to multiparous women.

These findings support the notion that parenting experience reduces the risk of depression. Residence type was another factor examined. Postpartum mothers living with in-laws or extended family had a 2.2-fold higher risk of PPD compared to those living independently, though this result was not statistically significant ($p = 0.57$; $CI = 0.19\text{--}0.95$). Prior studies have shown that living with parents or in-laws can increase the likelihood of “baby blues” or depression due to pressure and unsolicited advice that may cause discomfort, whereas living with a spouse allows better emotional adaptation (Wulandari & Yumni, 2019; Amna & Khairani, 2024).

In this study, although not statistically significant, the odds ratio indicated that living with in-laws increased depression risk by 2.21 times compared to living independently. This contrasts with other research suggesting that family support, including from in-laws, may protect against depression (Amna & Khairani, 2024; Ariguna Dira & Wahyuni, 2016; Fitriani et al., 2019; Harahap et al., 2024). Cultural context may explain this discrepancy. In Bali’s patriarchal culture, married women often bear multiple roles—as wife, mother, and daughter-in-law—which increases psychological burden. Balinese women often face higher expectations and responsibilities, both domestic and cultural. However, this study did not explore participants’ cultural or ethnic backgrounds, which limits interpretation. These findings highlight the need for further research examining the influence of local wisdom and cultural dynamics on postpartum mental health.

CONCLUSION

The conclusion drawn from the characteristics of respondents in this study shows that the proportion of postpartum mothers at risk of depression was 7 individuals (12.7%) out of a total of 58 respondents. Based on the logistic regression model, it can be concluded that the number of children and maternal age are significant factors influencing the level of postpartum depression. The greater the number of children, the lower the likelihood of experiencing postpartum depression, whereas the older the mother’s age, the higher the likelihood of experiencing postpartum depression. Although the age at first marriage showed a tendency to be associated with postpartum depression, the effect was not statistically significant. Statistically, the number of children demonstrated a significant association with a reduced risk of postpartum depression, which is likely related to increased maternal experience, psychological readiness, and stronger support networks as the number of children increases. Variables such as age at first marriage, reproductive age category, place of residence, and employment status did not show a significant influence on postpartum depression ($p\text{-value} > 0.05$).

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