Clinical and Experimental Obstetrics & Gynecology

*Clin. Exp. Obstet. Gynecol.* **2025**; 52(12): 44173
https://doi.org/10.31083/CEOG44173

*Original Research*

# Understanding Postpartum Mental Health in Vietnam: Impacts of Reproductive and Social Determinants

Thi Phuong Minh Dinh[1], Minh Tam Le[2,*], Nguyen Thanh Xuan[1], Duong Le Dinh[3], Le Viet Nguyen Sa[1], Nguyen Vu Quoc Huy[2]

[1]Center for Obstetrics and Gynecology, Hue Central Hospital, 49120 Hue, Vietnam
[2]Department of Obstetrics and Gynecology, Hue University of Medicine and Pharmacy, Hue University, 49120 Hue, Vietnam
[3]Department of Public Health, Hue University of Medicine and Pharmacy, Hue University, 49120 Hue, Vietnam
*Correspondence: leminhtam@hueuni.edu.vn; leminhtam@huemed-univ.edu.vn (Minh Tam Le)

Academic Editor: Michael H. Dahan
Submitted: 24 June 2025 Revised: 6 September 2025 Accepted: 11 September 2025 Published: 24 December 2025

**Abstract**

**Background**: Postpartum depression (PPD) is a common maternal mental health disorder with serious consequences for both mothers and infants, especially in low- and middle-income countries. This study aimed to assess the prevalence of PPD and identify associated risk factors among postpartum women in central Vietnam. **Methods**: A cross-sectional study was conducted on 906 women who delivered at Hue Central Hospital from May 2022 to May 2023. Participants were recruited during the third trimester and screened for depressive symptoms using the Edinburgh Postnatal Depression Scale (EPDS), with a cut-off score of $\geq$10. Multivariable logistic regression identified independent predictors of PPD. **Results**: The mean participant age was 28.4 $\pm$ 5.4 years. PPD prevalence was 17.1%. Significant predictors included being unmarried (adjusted Odds Ratio [aOR] = 4.55, 95% CI: 1.80–11.52), unintended pregnancy (aOR = 1.72, 95% CI: 1.05–2.83), emotionally abusive husband (aOR = 3.71, 95% CI: 2.30–5.96), no babysitters (aOR = 3.95, 95% CI: 2.45–6.36), no husband's support in childcare (aOR = 2.42, 95% CI: 1.60–3.67). **Conclusions**: Nearly one in six women in this Vietnamese cohort experienced PPD. Key risk factors were social and reproductive, highlighting the importance of addressing marital status, pregnancy planning, partner violence, and familial support. These findings support integrating targeted mental health screening and support services into routine postpartum care.

**Keywords:** postpartum depression; Vietnam; Edinburgh; Edinburgh Postnatal Depression Scale; perinatal depression

## 1. Introduction

Postpartum depression (PPD) is a common and often underdiagnosed mood disorder affecting women during the first weeks or months following childbirth. Clinically, it is characterized by persistent sadness, emotional withdrawal, fatigue, sleep disturbances, appetite changes, impaired concentration, feelings of guilt or worthlessness, and, in severe cases, suicidal ideation [1,2]. While transient mood disturbances such as "baby blues" are experienced by up to 80% of women, PPD is more severe and prolonged, requiring clinical attention [3].

The global prevalence of PPD varies considerably depending on the region and population studied, with reported rates ranging from 10% to 20% in high-income countries and significantly higher in low- and middle-income settings [4,5]. Beyond the maternal psychological burden, PPD negatively affects mother-infant bonding, breastfeeding practices, child development, and long-term family functioning [6,7].

A growing body of literature has identified numerous psychosocial, obstetric, and demographic risk factors associated with PPD. These include a personal or family history of depression, antenatal anxiety or depression, lack of social or partner support, unintended pregnancy, socioeconomic adversity, and intimate partner violence [4,8–10]. Additionally, sleep disturbances, cesarean section, gestational diabetes, vitamin D deficiency, and maternal age have also been implicated [11–13].

The Edinburgh Postnatal Depression Scale (EPDS) has emerged as one of the most widely used and validated tools for PPD screening across diverse cultural contexts. With strong sensitivity and specificity, it allows early identification of women at risk, though some limitations exist in its cross-cultural applicability [14].

Despite its global relevance, PPD remains an underresearched public health issue in Vietnam. Existing studies are limited in scope, often conducted on small samples or single-center populations, which constrains the generalizability of findings and impedes the development of targeted mental health interventions [15,16]. In particular, there is a paucity of data from tertiary hospitals serving large and diverse populations, which could offer insights into the broader epidemiological patterns of PPD in resource-constrained settings.

Hue Central Hospital, a tertiary referral center established in 1894, serves as a major healthcare provider for the Central and Central Highlands regions of Vietnam, covering 19 provinces. With more than 4500 inpatient beds and

comprehensive obstetric services, it offers a unique platform to investigate maternal mental health concerns, including PPD, in a diverse clinical population. Importantly, the hospital has integrated routine mental health screening into its perinatal care, reflecting a commitment to holistic maternal well-being.

Given the pressing need to better understand postpartum mental health in Vietnam, this study aimed to estimate the prevalence of PPD and explore its associated risk factors among women giving birth at a major tertiary hospital. By identifying modifiable and contextual determinants, our findings seek to inform screening strategies and psychosocial interventions tailored to postpartum women in low-resource settings.

## 2. Methods and Methods

### *2.1 Participants and Design*

This cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Hue Central Hospital, Vietnam, from May 2022 to May 2023. All pregnant women who delivered a live neonate at the hospital during this period, with gestational ages ranging from 28 to 41 weeks, were eligible for inclusion. Participants were required to provide complete medical records for follow-up, including delivery and contact information. Informed consent was obtained from all eligible women for participation in the EPDS assessment.

Exclusion criteria included women who were unable to respond to the questionnaire, those who did not understand Vietnamese, and those diagnosed with mental health disorders—particularly depression—by a psychiatrist prior to delivery. We excluded women with known pre-existing psychiatric disorders to focus specifically on incident cases of PPD and to minimize potential confounding factors. Participants with incomplete EPDS scores or missing key demographic or clinical variables were excluded from the final analysis. Data validation was conducted by cross-checking medical records and verifying logical consistency across variables.

The required sample size (n) was calculated using the formula:

$$\mathrm{n} = \mathrm{Z}^2_{\left(1-\frac{\alpha}{2}\right)} \times \frac{\mathrm{p}(1-\mathrm{p})}{\mathrm{d}^2}$$

where $\alpha = 0.05$, $\mathrm{Z}\alpha/2 = 1.96$, and $\mathrm{d} = 0.03$ (margin of error). Based on an estimated prevalence of PPD of 21.6% [9], the minimum calculated sample size was 723. Ultimately, 906 women were enrolled in this study.

Data on demographic and socioeconomic variables were collected, including maternal age, place of residence (urban or rural), education level, occupation, marital status, and current living arrangements (e.g., cohabitation with spouse or extended family).

Clinical and obstetric data were recorded, such as gestational age at birth, birth weight, delivery method (vaginal or cesarean section), postpartum maternal and neonatal health status, complications, and any neonatal diseases.

Depressive symptoms were assessed based on ICD-10 diagnostic criteria. EPDS was used as a validated screening instrument to identify women with probable PPD. A clinical diagnosis was not made in this study. The EPDS [12] was administered in two stages: (1) during the first postpartum week and (2) between four and six weeks postpartum. Participants could complete the questionnaire either during routine postpartum checkups at the hospital or via in-person or telephone interviews. A cut-off score of $\geq$10 on the EPDS was used to define PPD [12].

Additional variables analyzed included sociodemographic and cultural factors, maternal medical and obstetric history, delivery characteristics (mode of labor, gestational age, postpartum complications, birth outcomes), interpersonal relationships with the husband (including emotional, physical, or sexual abuse and controlling behaviors), postnatal support from the partner and family, as well as child care and feeding practices (exclusive breastfeeding, mixed feeding, or formula feeding).

"Emotional abuse" and "daily argument" were assessed explicitly by self-reported inquiries, formulated based on prior research in Vietnam regarding domestic violence and marital dynamics.

The degree of "support from husband" was evaluated using a condensed version of the Multidimensional Scale of Perceived Social Support [17].

### *2.2 Data Analysis*

Descriptive statistics were used to summarize the demographic, obstetric, and clinical characteristics of participants. Means and standard deviations were reported for continuous variables, and frequencies with percentages for categorical variables. The Shapiro-Wilk test was used to assess the normality of continuous variables. Univariate associations between categorical variables and PPD were examined using the chi-square test or Fisher's exact test, as appropriate. Variables with a $p$-value $< 0.10$ in univariate analysis were considered candidates for the multivariable logistic regression model. For the multivariable model, a stepwise backward elimination procedure was applied to identify independent predictors of PPD while controlling for potential confounders. Multicollinearity among independent variables was assessed using variance inflation factors (VIFs); values $<2$ indicated that multicollinearity was not a concern. Model performance was evaluated in terms of discrimination and calibration. Discrimination was assessed using the area under the curve (AUC), with values $>0.70$ considered acceptable. Calibration was examined using the Hosmer-Lemeshow goodness-of-fit test, where a non-significant $p$-value indicated adequate model fit. All analyses were performed using SPSS version 20.0 (SPSS

**Table 1. Association between demographic characteristics and PPD.**

| Demographic characteristics | | PPD (N = 155) n (%) | No PPD (N = 751) n (%) | *p*-value |
|---|---|---|---|---|
| Age (years) | <25 | 34 (21.9%) | 190 (25.3%) | 0.012[a] |
| | 25–34 | 87 (56.2%) | 465 (61.9%) | |
| | ≥35 | 34 (21.9%) | 96 (12.8%) | |
| Educational level | ≤High school | 133 (85.8%) | 642 (85.5%) | 0.918[a] |
| | Others | 22 (14.2%) | 109 (14.5%) | |
| Occupation | Officers | 21 (13.5%) | 86 (11.5%) | 0.461[a] |
| | Others | 134 (86.5%) | 665 (88.5%) | |
| Marital status | Married | 145 (93.5%) | 737 (98.1%) | 0.001[b] |
| | Single | 10 (6.5%) | 14 (1.9%) | |
| Current living situation | Living with parents | 139 (89.7%) | 689 (91.7%) | 0.404[a] |
| | Living with husband/partner | 16 (10.3%) | 62 (8.3%) | |

N, number of samples; n, number of samples in the specific subgroup; PPD, postpartum depression; $p^a$: chi-squared test; $p^b$: Fisher's exact test. Column percentages are presented.

**Table 2. Association between maternal history and PPD.**

| Maternal history | | PPD (N = 155) n (%) | No PPD (N = 751) n (%) | *p*-value |
|---|---|---|---|---|
| Age at first birth (years) | <20 | 14 (9.0%) | 54 (7.2%) | 0.017[a] |
| | 20–29 | 119 (76.8%) | 640 (85.2%) | |
| | ≥30 | 22 (14.2%) | 57 (7.6%) | |
| Gravity | 1 time | 56 (36.1%) | 288 (38.3%) | 0.605[a] |
| | 2 times | 54 (34.8%) | 274 (36.5%) | |
| | ≥3 times | 45 (29.0%) | 189 (25.2%) | |
| History of pregnancy loss | Yes | 39 (25.2%) | 132 (17.6%) | 0.028[a] |
| | No | 116 (74.8%) | 619 (82.4%) | |
| History of low birth weight birth | Yes | 15 (9.7%) | 36 (4.8%) | 0.016[a] |
| | No | 140 (90.3%) | 715 (95.2%) | |
| History of premature birth | Yes | 16 (10.3%) | 44 (5.9%) | 0.042[a] |
| | No | 139 (89.7%) | 707 (94.1%) | |
| History of multiple births | Yes | 4 (2.6%) | 6 (0.8%) | 0.075[b] |
| | No | 151 (97.4%) | 745 (99.2%) | |
| Maternal medical history | Yes | 28 (18.1%) | 88 (11.7%) | 0.025[a] |
| | No | 127 (81.9%) | 663 (88.3%) | |

History of pregnancy loss includes miscarriage, stillbirth, and neonatal death; $p^a$: chi-square test; $p^b$: Fisher's exact test. Column percentages are presented.

Inc., Chicago, IL, USA). A two-sided *p*-value $< 0.05$ was considered statistically significant.

## 3. Results

A total of 906 postpartum women meeting the inclusion criteria were enrolled in the study. The prevalence of PPD, defined by an EPDS score ≥10, was 17.1% (155/906).

Maternal age was significantly associated with PPD ($p = 0.012$). Women aged ≥35 years showed the highest prevalence of PPD at 26.2%, compared to 15.2% in those aged <25 years. Maternal age of 35 years or older was associated with a significantly elevated incidence of PPD (21.9% vs. 12.8%; $p = 0.012$). Single moms comprised 6.5% of the PPD group, compared to 1.9% in the non-PPD group ($p = 0.001$).

No significant differences were found in relation to educational level, occupation, or current living arrangement (living with spouse's parents vs. independently) (Table 1).

The rate of PPD was 14.2% among mothers who gave birth to their first child after the age of 30, which was higher than the non-PPD group (7.6%; $p = 0.017$). A history of pregnancy loss was also associated with PPD in women (25.2% vs. 17.6%, $p = 0.028$). Low birth weight (<2500 g), preterm birth (<37 weeks), and a medical history in mothers were more prevalent in the PPD group, the difference was statistically significant ($p < 0.05$) (Table 2).

Unexpected pregnancies accounted for 20% of the PPD cohort, in comparison to 12.8% of the non-PPD cohort ($p = 0.018$). Low birth weight (10.3% vs. 4.7%, $p = 0.005$), preterm delivery (9.8% vs. 3.9%, $p = 0.002$), and neonatal morbidity (7.1% vs. 2.5%, $p = 0.004$) demonstrated significant associations with PPD.

**Table 3. Association between characteristics of this birth and PPD.**

| Birth' characteristics | | PPD (N = 155) n (%) | No PPD (N = 751) n (%) | *p*-value |
|---|---|---|---|---|
| Pregnancy as intended | Yes | 124 (80.0%) | 655 (87.2%) | 0.018[a] |
| | No | 31 (20.0%) | 96 (12.8%) | |
| Birth weight | <2500 gram | 16 (10.3%) | 35 (4.7%) | 0.005[a] |
| | ≥2500 gram | 139 (89.7%) | 716 (95.3%) | |
| Newborn gender | Male | 77 (49.7%) | 401 (53.4%) | 0.399[a] |
| | Female | 78 (50.3%) | 350 (46.6%) | |
| Baby gender as the husband's wish | No | 9 (5.8%) | 23 (3.9%) | 0.092[a] |
| | Yes | 146 (94.2%) | 728 (96.9%) | |
| Gestational age at birth | <37 weeks | 15 (9.8%) | 29 (3.9%) | 0.002[a] |
| | ≥37 weeks | 140 (90.3%) | 722 (96.2%) | |
| Delivery mode | Vaginal birth | 69 (44.5%) | 386 (51.4%) | 0.119[a] |
| | Cesarean section | 86 (55.5%) | 365 (48.6%) | |
| Neonatal diseases | Yes | 11 (7.1%) | 19 (2.5%) | 0.004[a] |
| | No | 144 (92.9%) | 732 (97.5%) | |
| Postpartum complications | No | 150 (96.8%) | 725 (96.5%) | 0.883[a] |
| | Yes | 5 (3.2%) | 26 (3.5%) | |

$p^a$: chi-square test. Column percentages are presented.

No significant association was observed between PPD and delivery mode, newborn sex, or postpartum maternal complications (Table 3).

PPD was significantly more prevalent among women reporting negative relationship dynamics, including controlling behaviors from their husbands (54.2% *vs.* 41.7%, $p = 0.004$), emotional abuse (33.5% *vs.* 9.2%, $p < 0.001$), sexual violence (45.8% *vs.* 25.2%, $p < 0.001$), and frequent daily arguments (47.1% *vs.* 25.0%, $p < 0.001$). In contrast, women who received emotional support—such as sharing their feelings (49.0% *vs.* 58.6%, $p = 0.029$) or their husband's feelings (42.6% *vs.* 57.9%, $p < 0.001$)—had significantly lower rates of PPD.

Likewise, practical support played a crucial role: women who received help with infant care (67.1% *vs.* 90.8%, $p < 0.001$), had regular support from a babysitter (13.0% *vs.* 42.7%, $p < 0.001$), or received consistent daily assistance from their husbands (58.7% *vs.* 80.6%, $p < 0.001$) were significantly less likely to develop PPD (Table 4).

Furthermore, insufficient breast milk and formula feeding were significantly associated with PPD ($p < 0.007$ and $p = 0.002$).

As shown in Table 5, multivariable logistic regression identified six independent predictors of PPD: maternal age >35 years (adjusted Odds Ratio [aOR] = 1.635; 95% CI: 1.000–2.674; $p = 0.050$), unintended pregnancy (aOR = 1.722; 95% CI: 1.048–2.829; $p = 0.032$), unmarried status (aOR = 4.55; 95% CI: 1.798–11.517; $p = 0.001$), emotionally abusive husband (aOR = 3.706; 95% CI: 2.302–5.964; $p < 0.001$), absence of a babysitter (aOR = 3.949; 95% CI: 2.452–6.361; $p < 0.001$), and lack of husband's support in childcare (aOR = 2.422; 95% CI: 1.597–3.673; $p < 0.001$). Gestational age <37 weeks was associated with an increased risk but did not reach statistical significance (aOR = 2.089; 95% CI: 0.955–4.571; $p = 0.065$). Model diagnostics showed no multicollinearity (all VIF <2), good calibration (non-significant Hosmer-Lemeshow test), and acceptable discrimination (AUC = 0.72, 95% CI: 0.64–0.77).

## 4. Discussion

PPD remains a significant global public health concern, with profound implications for both maternal and neonatal health. In our study, the overall prevalence of PPD was 17.1% (155/906), aligning with global estimates, where Arifin SRM *et al.* [11] (2018) reported PPD rates ranging from 10% to 15% across various studies.

Our findings align with those documented in low- and middle-income countries (e.g., Ethiopia, Nepal) [18, 19], however, surpass those observed in developed nations [20]. This illustrates disparities in mental health care systems, societal obligations, and familial patterns. A recent meta-analysis of data from the coronavirus disease 2019 (COVID-19) pandemic indicated an average PPD rate of up to 29.3% [21].

In Asian countries, the prevalence has been shown to vary widely, from 3.5% to 63.3% [13]. Our findings are consistent with previous studies, including those by Viguera A (2023) [14] and Nguyen HTT *et al.* [16]. For instance, Murray L *et al.* [15] (2015) reported a prevalence of 18.1% in Thua Thien Hue Province, and Van Vo T *et al.* [22] (2017) reported a rate of 19.3% in Da Nang. Higher rates have also been documented, such as 24.3% in Kang SY *et al.* [23] (2022) and 21.3% by Xayyabouapha A *et al.* [24] (2022). In Vietnam, Do TKL *et al.* [3] (2018) observed a PPD prevalence of 27.6% within the first postpartum year. These variations may be attributed to cultural differences, timing of assessment, diagnostic criteria, and the heterogeneity of study populations.

**Table 4. Association between PPD and spousal relationship, family support, and feeding practices.**

| Characteristics | | PPD (N = 155) n (%) | No PPD (N = 751) n (%) | *p*-value |
|---|---|---|---|---|
| Controls wife anytime, anywhere | Yes | 84 (54.2%) | 313 (41.7%) | 0.004[a] |
| | No | 71 (45.8%) | 438 (58.3%) | |
| Doubts wife's fidelity | No | 136 (87.7%) | 634 (84.4%) | 0.292[a] |
| | Yes | 19 (12.3%) | 117 (15.6%) | |
| Mental abuse | No | 103 (66.5%) | 682 (90.8%) | <0.001[a] |
| | Yes | 52 (33.5%) | 69 (9.2%) | |
| Sexual violence | No | 84 (54.2%) | 562 (74.8%) | <0.001[a] |
| | Yes | 71 (45.8%) | 189 (25.2%) | |
| Helps wife's work | No | 65 (41.9%) | 274 (36.5%) | 0.202[a] |
| | Yes | 90 (58.1%) | 477 (63.5%) | |
| Shares husband's worries and feelings | No | 89 (57.4%) | 316 (42.1%) | <0.001[a] |
| | Yes | 66 (42.6%) | 435 (57.9%) | |
| Shares wife's worries and feelings | No | 79 (51.0%) | 311 (41.4%) | 0.029[a] |
| | Yes | 76 (49.0%) | 440 (58.6%) | |
| Daily arguments | No | 82 (52.9%) | 563 (75.0%) | <0.001[a] |
| | Yes | 73 (47.1%) | 188 (25.0%) | |
| Cares for the baby | No | 51 (32.9%) | 69 (9.2%) | <0.001[a] |
| | Yes | 104 (67.1%) | 682 (90.8%) | |
| Share worries and thoughts with someone | No | 53 (34.2%) | 71 (9.5%) | <0.001[a] |
| | Yes | 102 (65.8%) | 680 (90.5%) | |
| Daily support | No | 16 (10.3%) | 71 (9.5%) | 0.738[a] |
| | Yes | 139 (89.7%) | 680 (90.5%) | |
| Husband's support in childcare | No | 64 (41.3%) | 146 (19.4%) | <0.001[a] |
| | Yes | 91 (58.7%) | 605 (80.6%) | |
| Adequate breast milk supply | No | 135 (87.1%) | 581 (77.4%) | 0.007[a] |
| | Yes | 20 (12.9%) | 170 (22.6%) | |
| Feeding methods | Breast milk | 32 (20.6%) | 232 (30.9%) | 0.002[a] |
| | Formula milk | 5 (3.2%) | 6 (0.8%) | |
| | Combination | 118 (76.1%) | 513 (68.3%) | |

Column percentages are presented. $p^a$: chi-square test.

Our data demonstrated a statistically significant association between maternal age and PPD, with the highest prevalence observed in women aged ≥35 years ($p = 0.012$). However, no significant associations were found with educational attainment, employment status, or living arrangements. This observation is consistent with Doke PP *et al.* [25] (2021), who also reported no significant association between PPD and education or occupation. Interestingly, Do TKL *et al.* [3] (2018) even found that women with lower educational attainment were at reduced risk of PPD.

Women with a history of adverse obstetric outcomes—such as miscarriage, stillbirth, neonatal death, low birth weight, or preterm birth—were more likely to experience PPD. Xayyabouapha A *et al.* [24] (2022) also indicated an increased risk of PPD among mothers with multiple children. Our study found that women with a history of medical illness had significantly higher PPD prevalence (18.1% *vs.* 11.7%, $p = 0.031$), though no pre-existing mental health conditions were reported. This finding contrasts with Xayyabouapha A *et al.* [24] (2022), who reported that antenatal mental health issues increased the risk of PPD by 3.3 times.

Unplanned pregnancies were significantly associated with higher rates of PPD in our study, corroborating findings by Abebe A *et al.* [26] (2019), who reported an aOR of 1.86 (95% CI: 1.02–3.41). However, Phukuta NSJ and Omole OB [27] suggested that unplanned pregnancies due to contraceptive failure did not increase PPD risk significantly ($p = 0.242$).

Low birth weight (<2500 g) was significantly associated with elevated PPD prevalence (10.3%, $p = 0.005$), consistent with findings by January J and Chimbari MJ [28] (2018). Although Sun L *et al.* [29] (2021) noted an increased risk of mild PPD following cesarean sections, particularly emergency procedures, our study found no significant association between delivery method and PPD. Similarly, while Ye Z *et al.* [30] (2022) suggested that delivering a daughter could increase PPD risk, we found no significant relationship between PPD and infant sex ($p = 0.399$). Doke PP *et al.* [25] (2021) also reported no such association.

A particularly protective factor identified in our study was emotional sharing and support from the spouse. Women who openly communicated with their husbands reported significantly lower PPD rates, a finding echoed in studies by Do TKL *et al.* [3] (2018) and January J Chim-

**Table 5. Multivariable logistic regression model of factors associated with PPD.**

| Variable | Coefficients | OR | 95% CI | | *p*-value |
|---|---|---|---|---|---|
| | | | Lower | Upper | |
| Maternal age (>35 years) | 0.491 | 1.635 | 1.000 | 2.674 | 0.050 |
| Unintended pregnancy | 0.543 | 1.722 | 1.048 | 2.829 | 0.032 |
| Unmarried status | 1.515 | 4.550 | 1.798 | 11.517 | 0.001 |
| Emotionally abusive husband | 1.310 | 3.706 | 2.302 | 5.964 | 0.000 |
| No babysitters | 1.373 | 3.949 | 2.452 | 6.361 | 0.000 |
| No husband's support in childcare | 0.885 | 2.422 | 1.597 | 3.673 | 0.000 |
| Gestational age at birth (less than 37 weeks) | 0.737 | 2.089 | 0.955 | 4.571 | 0.065 |
| Model summary | Collinearity statistics: All VIF values <2; AUC = 0.72, 95% CI (0.644–0.767); Hosmer and Lemeshow test is not significant. | | | | |

OR, odds ratio; AUC, area under the curve; VIF, variance inflation factor.

bari MJ [28] (2018). Conversely, emotional abuse, controlling behaviors, and intimate partner violence were strongly associated with PPD. Our findings are supported by multivariate analysis and corroborated by Xayyabouapha A *et al.* [24] (2022), who found that intimate partner violence increased PPD risk by 2.6 times. Van Vo T *et al.* [22] (2017) emphasized that gender inequality and modern lifestyle stressors in Vietnam contribute to the PPD burden.

The role of family support, particularly in childcare, emerged as another key factor. Our analysis revealed that support from husbands in child-rearing was associated with lower PPD risk. This is consistent with findings from Mohamad Yusuff AS *et al.* [31], Kang SY *et al.* (2022) [23], Xayyabouapha A *et al.* (2022) [24] , and Abebe A *et al.* (2019) [26] , all of whom emphasized the mitigating role of family support on PPD incidence. Lack of family support, as well as low-income family relationships, has consistently been identified as a strong predictor of PPD [6,8]. Numerous worldwide studies have consistently revealed certain protective variables, including support from a partner [32]. Our findings contribute to the expanding evidence that enhanced social support, especially from a partner, may significantly aid in the prevention and mitigation of PPD.

Our findings also highlight the importance of breastfeeding practices. Figueiredo B *et al.* [33] reported that breastfeeding is protective against PPD. Our study similarly found that women with inadequate milk supply or those relying on formula feeding had significantly higher PPD rates. Syam A *et al.* [34] (2021) noted that depressive symptoms were associated with earlier cessation of breastfeeding.

The multivariable logistic regression model included key sociodemographic factors such as maternal age, education, occupation, household income, marital status, parity, partner support, and intimate partner violence. Multivariate analysis identified unmarried status (OR = 4.19), unplanned pregnancy (OR = 1.78, $p = 0.023$), and maternal age at first childbirth >30 years (OR = 2.08, $p = 0.050$) as significant risk factors. The association between maternal age at first birth and PPD was 'marginally significant'. Although preterm birth (<37 weeks) was associated with higher PPD prevalence in univariate analysis ($p = 0.002$), the association was not statistically significant after adjustment (aOR = 2.04, 95% CI: 0.93–4.47; $p > 0.05$). This result is consistent with the findings of Abenova M *et al.* (2022) [35].

The Vietnamese maternal and child health system has significantly advanced in antenatal care and safe delivery; however, postpartum mental health remains underaddressed in national policy. Mental health services for perinatal women are not yet integrated into routine care, and the current national mental health program prioritizes psychoses over mood disorders. Community-based mental health integration remains fragmented. Our findings highlight the need to incorporate PPD screening into national maternal health protocols, especially at the primary care level, along with World Health Organization (WHO) guidelines for the integration of mental health into maternity and child services in low- and middle-income nations, which constitutes a significant strength of the study.

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design precludes the establishment of causal relationships between risk factors and PPD. While associations were identified, temporal sequencing cannot be confirmed. However, the design was appropriate for assessing the prevalence of PPD and identifying associated risk factors in a large population during routine follow-up. Second, the use of the EPDS, though validated, does not replace clinical diagnosis. The absence of structured psychiatric interviews or diagnostic confirmation may result in under- or over-estimation of actual PPD prevalence. This limitation restricts differentiation between transient postpartum mood disturbances and clinically significant depression. Consequently, subsequent research should integrate formal psychological evaluations alongside EPDS screening to enhance diagnostic precision. Third, despite being administered at a major hospital, the final tier of the

Vietnamese healthcare system, this facility accommodates all pregnant women from all provinces and cities nationwide, encompassing mountainous, rural, and urban regions. Consequently, the study sample exhibits greater diversity. Nonetheless, we recognize that this data cannot comprehensively represent all women in Vietnam. Lastly, the follow-up period was limited to 6 weeks postpartum; hence, cases of delayed-onset PPD may not have been captured. Future research should employ longitudinal designs to better understand the temporal relationship and causality between identified risk factors and PPD. Incorporating clinical psychiatric evaluations alongside EPDS screening would enhance diagnostic accuracy. There is a need to integrate routine PPD screening into postpartum care protocols in Vietnam, particularly at primary and secondary healthcare levels.

Although this study was conducted at a single tertiary hospital, the patient population was socio-demographically diverse. Nonetheless, the findings may not be fully generalizable to the national level. The follow-up period in our study was limited to six weeks postpartum. Future research should include longitudinal follow-up to assess delayed-onset PPD and monitor changes over time. Incorporating clinical psychiatric evaluations alongside EPDS screening would further strengthen diagnostic accuracy.

## 5. Conclusions

The prevalence of PPD in our cohort was 17.1%, with key risk factors including maternal age over 30 at first childbirth, unplanned pregnancy, lack of emotional and practical support from the spouse, and exposure to intimate partner violence. In contrast, protective factors included planned pregnancy, spousal support in childcare, emotional sharing, and exclusive breastfeeding. These findings underscore the importance of a family-centered and psychosocially supportive postpartum care approach, especially in resource-limited settings such as central Vietnam. Multicenter research across all primary healthcare tiers in Vietnam with extended follow-up durations is essential for formulating more significant and precise recommendations. This study recommends integrating PPD screening into national maternal healthcare programs and developing culturally appropriate early intervention strategies, especially in resource-limited settings such as Vietnam.

## Availability of Data and Materials

The dataset used and analyzed during the current study is available from the corresponding author upon reasonable request.

## Author Contributions

TPMD, MTL, NTX, and DLD designed the research study. TPMD and MTL performed the research. TPMD, MTL, LVNS, NVQH, and DLD analyzed the data. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

## Ethics Approval and Consent to Participate

The study was carried out in accordance with the guidelines of the Declaration of Helsinki. Authors confirm that this work was approved by the Hue University of Medicine and Pharmacy Ethics Committee (Approval No. H2022/339). Patients all agree to participate with a consent form.


## Acknowledgment

The authors would like to express their sincere gratitude to the University of Medicine and Pharmacy, Hue University, for approving the study protocol. We also gratefully acknowledge Hue Central Hospital for allowing the study to be conducted at the Obstetrics and Gynecology Centre. Finally, we thank all the participants and medical staff who contributed to the successful implementation of this study.

## Funding

This study was partially supported by Hue University under the Core Research Program (Research Group on Reproductive Medicine, Grant No. NCTB.DHH.2025.07).


## Conflict of Interest

The authors declare no conflict of interest.

## References


[1] Batt MM, Duffy KA, Novick AM, Metcalf CA, Epperson CN. Is Postpartum Depression Different From Depression Occurring Outside of the Perinatal Period? A Review of the Evidence. Focus (American Psychiatric Publishing). 2020; 18: 106–119. https://doi.org/10.1176/appi.focus.20190045.

[2] World Health Organization. The ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines. World Health Organization: Geneva. 1993.

[3] Do TKL, Nguyen TTH, Pham TTH. Postpartum Depression and Risk Factors among Vietnamese Women. BioMed Research International. 2018; 2018: 4028913. https://doi.org/10.1155/2018/4028913.

[4] Hutchens BF, Kearney J. Risk Factors for Postpartum Depression: An Umbrella Review. Journal of Midwifery & Women's Health. 2020; 65: 96–108. https://doi.org/10.1111/jmwh.13067.

[5] Qi W, Zhao F, Liu Y, Li Q, Hu J. Psychosocial risk factors for postpartum depression in Chinese women: a meta-analysis. BMC Pregnancy and Childbirth. 2021; 21: 174. https://doi.org/10.1186/s12884-021-03657-0.

[6] Alshikh Ahmad H, Alkhatib A, Luo J. Prevalence and risk factors of postpartum depression in the Middle East: a systematic review and meta-analysis. BMC Pregnancy and Childbirth. 2021; 21: 542. https://doi.org/10.1186/s12884-021-04016-9.

[7] Zhao XH, Zhang ZH. Risk factors for postpartum depression: An evidence-based systematic review of systematic reviews and meta-analyses. Asian Journal of Psychiatry. 2020; 53: 102353. https://doi.org/10.1016/j.ajp.2020.102353.

[8] American College of Obstetricians and Gynecologists. ACOG Committee Opinion No. 757: Screening for Perinatal Depres-

sion. Obstetrics and Gynecology. 2018; 132: e208–e212. https://doi.org/10.1097/AOG.0000000000002927.

[9] Do HP, Baker PR, Van Vo T, Luong-Thanh BY, Nguyen LH, Valdebenito S, *et al*. Brief screening for maternal mental health in Vietnam: Measures of positive wellbeing and perceived stress predict prenatal and postnatal depression. Journal of Affective Disorders Reports. 2021; 3: 100047. https://doi.org/10.1016/j.jadr.2020.100047.

[10] Zubaran C, Schumacher M, Roxo MR, Foresti K. Screening tools for postpartum depression: validity and cultural dimensions. African Journal of Psychiatry. 2010; 13: 357–365. https://doi.org/10.4314/ajpsy.v13i5.63101.

[11] Arifin SRM, Cheyne H, Maxwell M. Review of the prevalence of postnatal depression across cultures. AIMS Public Health. 2018; 5: 260–295. https://doi.org/10.3934/publichealth.2018.3.260.

[12] Department of Health, Government of Western Australia. Edinburgh Postnatal Depression Scale (EPDS): translated versions – validated. State Perinatal Mental Health Reference Group: Perth. 2006.

[13] Klainin P, Arthur DG. Postpartum depression in Asian cultures: a literature review. International Journal of Nursing Studies. 2009; 46: 1355–1373. https://doi.org/10.1016/j.ijnurstu.2009.02.012.

[14] Viguera A. Postpartum unipolar major depression: Epidemiology, clinical features, assessment, and diagnosis. UpToDate. 2023. Available at: https://www.uptodate.com/contents/postpartum-unipolar-major-depression-epidemiology-clinical-features-assessment-and-diagnosis/print?zarsrc=30&utm_source=zalo&utm_medium=zalo&utm_campaign=zalo (Accessed: 11 September 2023).

[15] Murray L, Dunne MP, Van Vo T, Anh PNT, Khawaja NG, Cao TN. Postnatal depressive symptoms amongst women in Central Vietnam: a cross-sectional study investigating prevalence and associations with social, cultural and infant factors. BMC Pregnancy and Childbirth. 2015; 15: 234. https://doi.org/10.1186/s12884-015-0662-5.

[16] Nguyen HTT, Hoang AP, Do LTK, Schiffer S, Nguyen HTH. The Rate and Risk Factors of Postpartum Depression in Vietnam From 2010 to 2020: A Literature Review. Frontiers in Psychology. 2021; 12: 731306. https://doi.org/10.3389/fpsyg.2021.731306.

[17] Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. Journal of Personality Assessment. 1990; 55: 610–617. https://doi.org/10.1080/00223891.1990.9674095.

[18] Giri RK, Khatri RB, Mishra SR, Khanal V, Sharma VD, Gartoula RP. Prevalence and factors associated with depressive symptoms among post-partum mothers in Nepal. BMC Research Notes. 2015; 8: 111. https://doi.org/10.1186/s13104-015-1074-3.

[19] Tesfaye M, Hanlon C, Wondimagegn D, Alem A. Detecting postnatal common mental disorders in Addis Ababa, Ethiopia: Validation of the Edinburgh Postnatal Depression Scale and Kessler Scales. Journal of Affective Disorders. 2010; 122: 102–108. https://doi.org/10.1016/j.jad.2009.06.020.

[20] O'Hara MW, McCabe JE. Postpartum depression: current status and future directions. Annual Review of Clinical Psychology. 2013; 9: 379–407. https://doi.org/10.1146/annurev-clinpsy-050212-185612.

[21] Coca KP, Chien LY, Lee EY, Souza ACP, Hong SA, Chang YS. Factors associated with postpartum depression symptoms among postpartum women in five countries during the COVID-19 pandemic: an online cross-sectional study. BMC Psychiatry. 2023; 23: 171. https://doi.org/10.1186/s12888-023-04607-0.

[22] Van Vo T, Hoa TKD, Hoang TD. Postpartum Depressive Symptoms and Associated Factors in Married Women: A Cross-sectional Study in Danang City, Vietnam. Frontiers in Public Health. 2017; 5: 93. https://doi.org/10.3389/fpubh.2017.00093.

[23] Kang SY, Khang YH, June KJ, Cho SH, Lee JY, Kim YM, *et al*. Prevalence and risk factors of maternal depression among women who participated in a home visitation program in South Korea. Social Psychiatry and Psychiatric Epidemiology. 2022; 57: 1167–1178. https://doi.org/10.1007/s00127-022-02226-w.

[24] Xayyabouapha A, Sychareun V, Quyen BTT, Thikeo M, Durham J. Prevalence and Risk Factors Associated With Postpartum Depressive Symptoms Among Women in Vientiane Capital, Lao PDR. Frontiers in Public Health. 2022; 10: 791385. https://doi.org/10.3389/fpubh.2022.791385.

[25] Doke PP, Vaidya VM, Narula APS, Datar MC, Patil AV, Panchanadikar TM, *et al*. Assessment of difference in postpartum depression among caesarean and vaginally delivered women at 6-week follow-up in hospitals in Pune District, India: an observational cohort study. BMJ Open. 2021; 11: e052008. https://doi.org/10.1136/bmjopen-2021-052008.

[26] Abebe A, Tesfaw G, Mulat H, Hibdye G, Yohannes K. Postpartum depression and associated factors among mothers in Bahir Dar Town, Northwest Ethiopia. Annals of General Psychiatry. 2019; 18: 19. https://doi.org/10.1186/s12991-019-0244-4.

[27] Phukuta NSJ, Omole OB. Prevalence and risk factors associated with postnatal depression in a South African primary care facility. African Journal of Primary Health Care & Family Medicine. 2020; 12: e1–e6. https://doi.org/10.4102/phcfm.v12i1.2538.

[28] January J, Chimbari MJ. Prevalence and factors associated with postnatal depression among women in two rural districts of Manicaland, Zimbabwe. The South African Journal of Psychiatry: SAJP : The Journal of the Society of Psychiatrists of South Africa. 2018; 24: 1176. https://doi.org/10.4102/sajpsychiatry.v24i0.1176.

[29] Sun L, Wang S, Li X. Association between mode of delivery and postpartum depression: a systematic review and network meta-analysis. Australian & New Zealand Journal of Psychiatry. 2021; 55: 588–601. https://doi.org/10.1177/0004867420954284.

[30] Ye Z, Wang L, Yang T, Chen LZ, Wang T, Chen L, *et al*. Gender of infant and risk of postpartum depression: a meta-analysis based on cohort and case-control studies. The Journal of Maternal-fetal & Neonatal Medicine: the Official Journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians. 2022; 35: 2581–2590. https://doi.org/10.1080/14767058.2020.1786809.

[31] Mohamad Yusuff AS, Tang L, Binns CW, Lee AH. Prevalence and risk factors for postnatal depression in Sabah, Malaysia: a cohort study. Women and Birth: Journal of the Australian College of Midwives. 2015; 28: 25–29. https://doi.org/10.1016/j.wombi.2014.11.002.

[32] Dennis CL, Dowswell T. Psychosocial and psychological interventions for preventing postpartum depression. The Cochrane Database of Systematic Reviews. 2013; 2013: CD001134. https://doi.org/10.1002/14651858.CD001134.pub3.

[33] Figueiredo B, Canário C, Field T. Breastfeeding is negatively affected by prenatal depression and reduces postpartum depression. Psychological Medicine. 2014; 44: 927–936. https://doi.org/10.1017/S0033291713001530.

[34] Syam A, Iskandar I, Hendrarti W, Salam A. Prenatal depression and successful lactation. Medicina Clínica Práctica. 2021; 4: 100234. https://doi.org/10.1016/j.mcpsp.2021.100234.

[35] Abenova M, Myssayev A, Kania L, Turliuc MN, Jamedinova U. Prevalence of postpartum depression and its associated factors within a year after birth in Semey, Kazakhstan: A cross-sectional study. Clinical Epidemiology and Global Health. 2022; 16: 101103. https://doi.org/10.1016/j.cegh.2022.101103.