



Postpartum-Specific Anxiety and Inadequate Breast-Milk Flow Among Indonesian Mothers: A Cross-Sectional Study of Prevalence and Determinants

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ABSTRACT

Postpartum-specific anxiety is an increasingly recognized perinatal mental-health disorder that may impair lactation by inhibiting the oxytocin-mediated let-down reflex, yet evidence from Indonesian primary care using validated childbearing-specific instruments is scarce. This study estimated the prevalence of postpartum-specific anxiety, examined its association with breast-milk flow, and evaluated the screening performance of the Postpartum-Specific Anxiety Scale (PSAS). An analytical cross-sectional study enrolled 40 mothers on days 2-4 postpartum at a midwife-led primary-care practice in South Kalimantan, Indonesia (December 2025-January 2026) using purposive sampling. Anxiety was measured with the 51-item PSAS and lactation adequacy with a validated 8-item breast-milk-flow questionnaire. Prevalence with 95% confidence intervals (CI), chi-square tests, odds ratios (OR), multivariable logistic regression, correlation and receiver-operating-characteristic (ROC) analyses were performed ($\alpha=0.05$). Any anxiety was present in 72.5% of mothers (95% CI 58.7-86.3; mild 40.0%, moderate 32.5%) and inadequate breast-milk flow in 47.5% (95% CI 32.0-63.0). Higher PSAS scores correlated strongly with poorer lactation (Spearman $\rho=-0.685$, $p<0.001$; Cohen $d=1.36$). Moderate anxiety substantially increased the odds of inadequate lactation (crude OR 10.55, 95% CI 2.16-51.61, $p=0.001$; adjusted OR 40.80, $p=0.006$), and the overall anxiety-lactation association was significant (chi-square=11.61, $df=2$, $p=0.003$). The PSAS predicted inadequate lactation with an AUC of 0.83 (95% CI 0.70-0.96; optimal cut-off ≥ 80 , sensitivity 84.2%, specificity 71.4%). Postpartum-specific anxiety was common and independently associated with inadequate lactation; routine PSAS-based screening in maternal care may identify at-risk mothers and protect breastfeeding in low-resource Indonesian settings.

1. Introduction

Maternal mental-health disorders, particularly perinatal anxiety and depression, are now recognized among the most common complications of childbearing and a global public-health priority. A systematic review and meta-analysis estimated postnatal anxiety symptoms at approximately 15% of mothers, with higher figures across Asian and low- and middle-income settings.¹ Indeed, anxiety has recently been identified as the single most frequent complication of the first postpartum year, exceeding

both depression and hypertension,² and community studies in Asian populations report that stress and anxiety affect a substantial proportion of postpartum women.³ Importantly, the development of childbearing-specific instruments such as the Postpartum-Specific Anxiety Scale (PSAS) revealed that generic measures systematically underestimate the burden, because much postpartum anxiety is organised around infant-safety and role-adjustment concerns rather than free-floating worry.⁴⁻⁵

The early puerperium is a period of pronounced psychoneuroendocrine vulnerability, and several psychosocial factors shape both anxiety and breastfeeding confidence. Parity, social support, maternal age, education and employment are consistently implicated; multiparous and well-supported mothers report higher breastfeeding self-efficacy and lower anxiety,⁶⁻⁷ whereas primiparity, weak partner or family support, and—paradoxically—higher maternal education have been linked to greater postpartum anxiety, the last through heightened health vigilance and information-seeking.⁸⁻⁹

Maternal anxiety is not merely a subjective experience; it has measurable consequences for lactation and the mother-infant dyad. Maternal psychological stress alters the concentrations of cortisol and prolactin in human milk,¹⁰ and sympathetic activation with catecholamine release inhibits the oxytocin-dependent let-down reflex, so that milk is produced but not effectively ejected. Consistent with this, anxious mothers more often experience impaired breastfeeding initiation, shorter duration and lower exclusivity,¹¹⁻¹² as well as poorer mother-infant bonding.¹³

Because breastfeeding is a cornerstone of early-childhood nutrition and because unresolved postpartum anxiety frequently progresses to postpartum depression,⁹ the early puerperium represents a high-yield window in which detecting and treating anxiety may simultaneously protect maternal mental health and infant feeding—a dual return rarely captured when lactation difficulty is managed as a purely obstetric problem.

In Indonesia, these mechanisms operate within a distinctive cultural and health-system context. Care during the puerperium is predominantly delivered by midwives in community and primary-care practices; traditional postpartum dietary restrictions imposed by elder relatives are common and may constrain maternal nutrition during a period of high metabolic demand; and although mothers usually live within extended families, the quality of practical and paternal support varies considerably and is itself linked to

anxiety and breastfeeding outcomes.¹⁴ Coverage of perinatal mental-health services under the national health-insurance scheme remains uneven, and screening for perinatal anxiety is not yet a routine component of maternal care. South Kalimantan, the setting of this study, records comparatively high mental-health service utilisation alongside persistently sub-optimal exclusive-breastfeeding coverage, making it an informative locale for examining the intersection of maternal mental health and lactation.

Despite a growing body of evidence, important gaps remain. Most prior studies relied on generic anxiety scales, assessed lactation by unstandardised observation, and reported chi-square associations without effect sizes, confidence intervals, multivariable adjustment, or any evaluation of the screening tool's predictive performance; reviews have repeatedly highlighted the low methodological quality of this literature.^{11,15} Consequently, the magnitude of the association, its independence from confounders, and the practical threshold at which anxiety screening should trigger lactation support are unknown for primary midwifery care in this region.

The purpose of this study was therefore to estimate the prevalence of postpartum-specific anxiety, to quantify its association with inadequate breast-milk flow using effect sizes and multivariable adjustment, and to evaluate the diagnostic performance of the PSAS for identifying mothers at risk of inadequate lactation, among women in the early puerperium attending a midwife-led primary-care practice in South Kalimantan, Indonesia.

2. Methods

Study design and setting

This was a quantitative, analytical cross-sectional study reported in accordance with the STROBE recommendations for observational research. It was conducted at a midwife-led primary-care practice (*Praktik Mandiri Bidan*) in South Kalimantan, Indonesia, over December 2025-January 2026,

following a preliminary survey in November 2025. To preserve confidentiality, the specific facility, its proprietor and its address are not identified and results are reported only at province level.

Participants and sampling

Participants were postpartum mothers between the second and fourth day after delivery who were breastfeeding. Inclusion criteria were: postpartum day 2-4 during the study period; ability to communicate in Bahasa Indonesia; and provision of written informed consent. Exclusion criteria were a history of severe mental illness or other active psychiatric disorder that could compromise PSAS validity, severe postpartum medical complications, infant loss, significant cognitive/communication/language impairment, and withdrawal of consent. Forty mothers meeting these criteria were enrolled by purposive (non-probability) sampling, consistent with the conventional minimum of ≥ 30 participants for stable distributions in correlational research; the resulting precision and power are addressed in the limitations.

Psychiatric assessment

Postpartum-specific anxiety was assessed with the 51-item PSAS, which captures childbearing-specific anxiety across four domains: general postpartum anxiety, infant safety and welfare, practical infant-care concerns, and maternal role adjustment.⁴ Each item is rated on a four-point Likert scale (1 = never to 4 = almost always), yielding a total score from 51 to 204; established cut-offs classify 51-70 as no anxiety, 71-90 mild, 91-111 moderate and ≥ 112 severe. The instrument has a reported sensitivity of 0.75 and has been validated cross-culturally, including short-form translations for use during global crises.⁴⁻⁵ As the PSAS is a previously validated instrument, no further item-level validity testing was undertaken. Lactation adequacy was assessed with a structured 8-item breast-milk-flow questionnaire (yes/no items; Cronbach alpha 0.930 in prior local validation), scored 0-8, with totals >4 defined as adequate (lancar) and ≤ 4 as inadequate (tidak lancar).

Variables and data management

The independent variable was postpartum-specific anxiety (PSAS total score and severity category); the dependent variable was lactation adequacy. Maternal age, parity, education and employment were treated as candidate confounders. After eligibility screening and consent, participants completed the demographic section, the PSAS and the lactation questionnaire with interviewer support; forms were checked for completeness (editing), coded, tabulated and verified before analysis (data entry), with no missing data.

Statistical analysis

Analyses used a significance threshold of $\alpha = 0.05$ (two-tailed) in SPSS-equivalent procedures. Distributions were summarised as frequencies/percentages or mean \pm standard deviation, with normality assessed by the Shapiro-Wilk test. Prevalence estimates carried 95% confidence intervals. The anxiety-lactation association was tested with the Pearson chi-square test, complemented by the likelihood-ratio statistic and Cramer V effect size. Bivariate odds ratios with 95% CIs (Haldane-Anscombe continuity correction where required) and exact p-values were computed for anxiety and each candidate risk factor. A multivariable binary logistic-regression model (outcome: inadequate lactation) included moderate anxiety, advanced maternal age, primiparity and employment; performance was summarised by Nagelkerke R-squared, the overall likelihood-ratio test and the Hosmer-Lemeshow goodness-of-fit test. The PSAS-lactation relationship was quantified with Spearman, Pearson and point-biserial correlations, the standardised mean difference (Cohen d) and the Mann-Whitney U test. Finally, receiver-operating-characteristic (ROC) analysis evaluated the PSAS as a screening test, reporting the area under the curve (AUC) with 95% CI (Hanley-McNeil) and the Youden-optimal cut-off with sensitivity and specificity.

Ethical considerations

Ethical approval was obtained from the Research Ethics Committee, Universitas Sari Mulia,

Banjarmasin (Ethical Clearance No. 078/KEP-UNISM/I/2026, 19 January 2026). Written informed consent was obtained from all participants; data were analyzed and reported only in aggregate, upholding confidentiality, beneficence and justice.

3. Results

All 40 enrolled mothers completed both questionnaires (response rate 100%). As detailed in

Table 1, most participants were of healthy reproductive age (20-35 years, 75.0%), multiparous (65.0%), educated to senior-secondary level (67.5%) and were homemakers (72.5%). The PSAS total score was approximately normally distributed (Shapiro-Wilk $p = 0.511$; mean 82.2 ± 15.5 , median 81, range 51-110), whereas the lactation score was non-normal ($p < 0.001$; mean 4.2 ± 1.6), supporting the use of non-parametric correlations.

Table 1. Demographic and obstetric characteristics of participants (n = 40).

| Characteristic | n | % |
|------------------------------|----|-------|
| Maternal age (years) | | |
| <20 | 1 | 2.5 |
| 20-35 | 30 | 75.0 |
| >35 | 9 | 22.5 |
| Parity | | |
| Primiparous | 14 | 35.0 |
| Multiparous | 26 | 65.0 |
| Education | | |
| Junior secondary | 7 | 17.5 |
| Senior secondary | 27 | 67.5 |
| Higher education | 6 | 15.0 |
| Employment | | |
| Homemaker | 29 | 72.5 |
| Self-employed | 6 | 15.0 |
| Private employee | 1 | 2.5 |
| Civil servant | 4 | 10.0 |
| Postpartum day at assessment | | |
| Day 2-4 (all participants) | 40 | 100.0 |

Postpartum-specific anxiety was common. As shown in Figure 1, 11 mothers (27.5%, 95% CI 13.7-41.3) had no anxiety, 16 (40.0%, 95% CI 24.8-55.2) had mild anxiety and 13 (32.5%, 95% CI 18.0-47.0) had moderate anxiety; no mother reached the severe threshold. Any clinically relevant anxiety (PSAS ≥ 71) was therefore present in 29 mothers (72.5%, 95% CI 58.7-86.3).

Inadequate breast-milk flow was identified in 19 mothers (47.5%, 95% CI 32.0-63.0) and adequate flow in 21 (52.5%). The anxiety-lactation cross-tabulation showed a clear gradient: among mothers without anxiety only 2 of 11 (18.2%) had inadequate flow, rising to 6 of 16 (37.5%) with mild anxiety and 11 of 13 (84.6%) with moderate anxiety. The overall association was statistically significant (Pearson chi-square = 11.61, $df = 2$, $p = 0.003$; likelihood-ratio G-

squared = 12.59, p = 0.002; Cramer V = 0.539; minimum expected count 5.22, satisfying chi-square assumptions).

Bivariate analysis, summarised in Table 2, confirmed anxiety as the dominant correlate of inadequate lactation. Any anxiety raised the odds of inadequate flow more than fivefold (OR 5.32, 95% CI 1.11-25.60, p = 0.022, Cramer V = 0.362), and

moderate anxiety more than tenfold (OR 10.55, 95% CI 2.16-51.61, p = 0.001, Cramer V = 0.516). By contrast, advanced maternal age (OR 2.54, 95% CI 0.58-11.14, p = 0.191), primiparity (OR 0.76, p = 0.666), employment (OR 0.56, p = 0.385) and junior-secondary education (OR 1.53, p = 0.574) were not significantly associated with lactation adequacy.

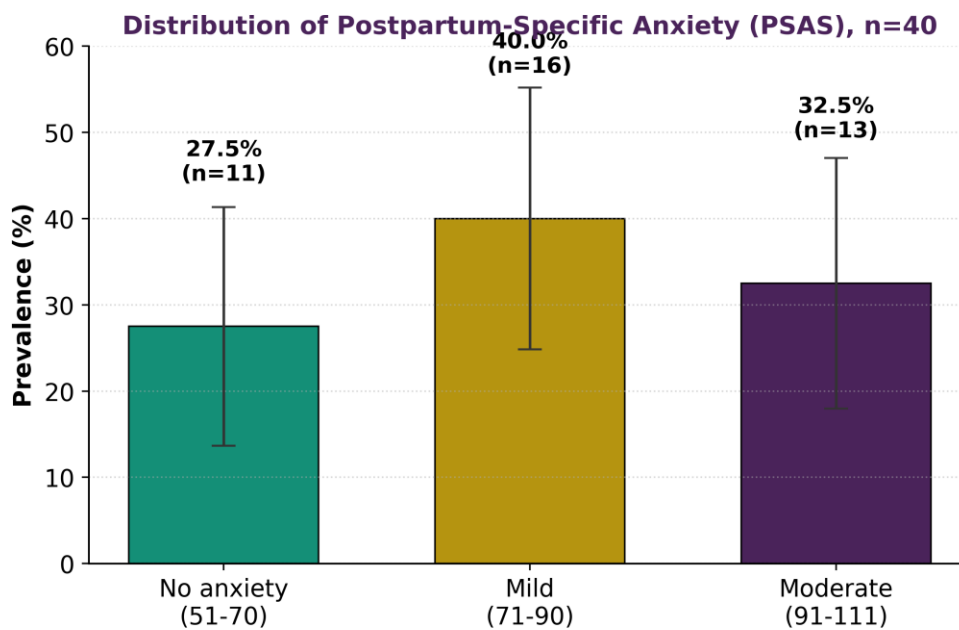


Figure 1. Prevalence of postpartum-specific anxiety severity categories (PSAS), with 95% confidence intervals.

Table 2. Prevalence and bivariate analysis of risk factors for inadequate breast-milk flow.

| Risk factor | Inadequate / adequate (n) | OR (95% CI) | p-value | Cramer V |
|--------------------------------------|---------------------------|--------------------|---------|----------|
| Any anxiety (PSAS \geq 71) vs none | 17 / 12 | 5.32 (1.11-25.60) | 0.022 | 0.362 |
| Moderate anxiety vs none/mild | 11 / 2 | 10.55 (2.16-51.61) | 0.001 | 0.516 |
| Advanced maternal age (>35 y) | 6 / 3 | 2.54 (0.58-11.14) | 0.191 | 0.207 |
| Primiparity | 6 / 8 | 0.76 (0.21-2.72) | 0.666 | 0.068 |
| Maternal employment | 4 / 7 | 0.56 (0.14-2.21) | 0.385 | 0.137 |
| Junior-secondary education | 4 / 3 | 1.53 (0.33-7.24) | 0.574 | 0.089 |

In the multivariable logistic-regression model presented in Table 3 and visualised in Figure 2, moderate anxiety remained independently and strongly associated with inadequate lactation after

adjustment (adjusted OR 40.80, 95% CI 2.88-577.85, p = 0.006). Maternal employment was associated with lower odds of inadequate flow (adjusted OR 0.06, 95% CI 0.004-0.93, p = 0.044), whereas advanced maternal

age (adjusted OR 10.01, $p = 0.095$) and primiparity (adjusted OR 1.12, $p = 0.896$) did not reach significance. The model explained a substantial proportion of variance (Nagelkerke R-squared = 0.49; overall likelihood-ratio chi-square = 18.40, $df = 4$, $p =$

0.001) and fitted the data adequately (Hosmer-Lemeshow chi-square = 4.12, $p = 0.128$). As shown in Figure 2, the very wide confidence interval for the adjusted anxiety estimate reflects the modest sample and sparse cells and is interpreted cautiously.

Table 3. Multivariable logistic regression for inadequate breast-milk flow.

| Predictor | Adjusted OR (95% CI) | p-value |
|-------------------------------|----------------------|---------|
| Moderate postpartum anxiety | 40.80 (2.88-577.85) | 0.006 |
| Advanced maternal age (>35 y) | 10.01 (0.67-149.41) | 0.095 |
| Primiparity | 1.12 (0.19-6.53) | 0.896 |
| Maternal employment | 0.06 (0.004-0.93) | 0.044 |

Notes: Nagelkerke R-squared = 0.49; exploratory model (events-per-variable approximately 4.75).

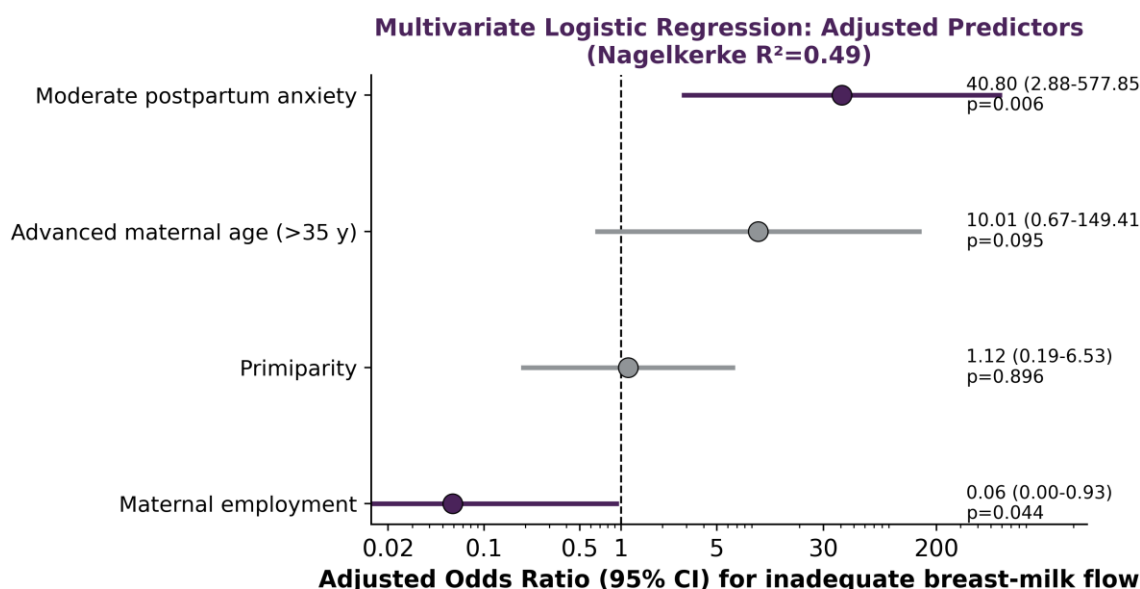


Figure 2. Forest plot of adjusted odds ratios from the multivariable logistic-regression model (purple = statistically significant; reference line at OR = 1).

Descriptive subgroup patterns were consistent with these findings. Anxiety severity tended to rise with maternal age: among mothers aged 20-35 years ($n = 30$) the distribution was 8 with no anxiety, 13 mild and 9 moderate, whereas among those older than 35 years ($n = 9$) moderate anxiety predominated (2 no anxiety, 3 mild, 4 moderate). Inadequate lactation was correspondingly more frequent in the older group (6 of 9, 66.7%) than in the 20-35 group (13 of 30, 43.3%),

although the age association did not reach significance after adjustment. Overall, the gradient of inadequate lactation tracked anxiety severity far more closely than any demographic characteristic.

Considered as a continuous measure, the PSAS score was strongly and inversely correlated with the lactation score (Spearman rho = -0.685, $p < 0.001$; Pearson $r = -0.684$, $p < 0.001$), and the point-biserial correlation with inadequate lactation was moderate-

to-strong ($r = 0.571$, $p < 0.001$). Mothers with inadequate flow had markedly higher PSAS scores than those with adequate flow (91.3 +/- 12.7 vs 73.9 +/- 13.0; Cohen $d = 1.36$, a large effect; Mann-Whitney U $p < 0.001$).

As displayed in Figure 3, ROC analysis indicated good discrimination of the PSAS for inadequate lactation, with an AUC of 0.83 (95% CI 0.70-0.96). The Youden-optimal cut-off was a PSAS total of ≥ 80 , yielding a sensitivity of 84.2% and a specificity of 71.4% for identifying mothers with inadequate breast-milk flow.

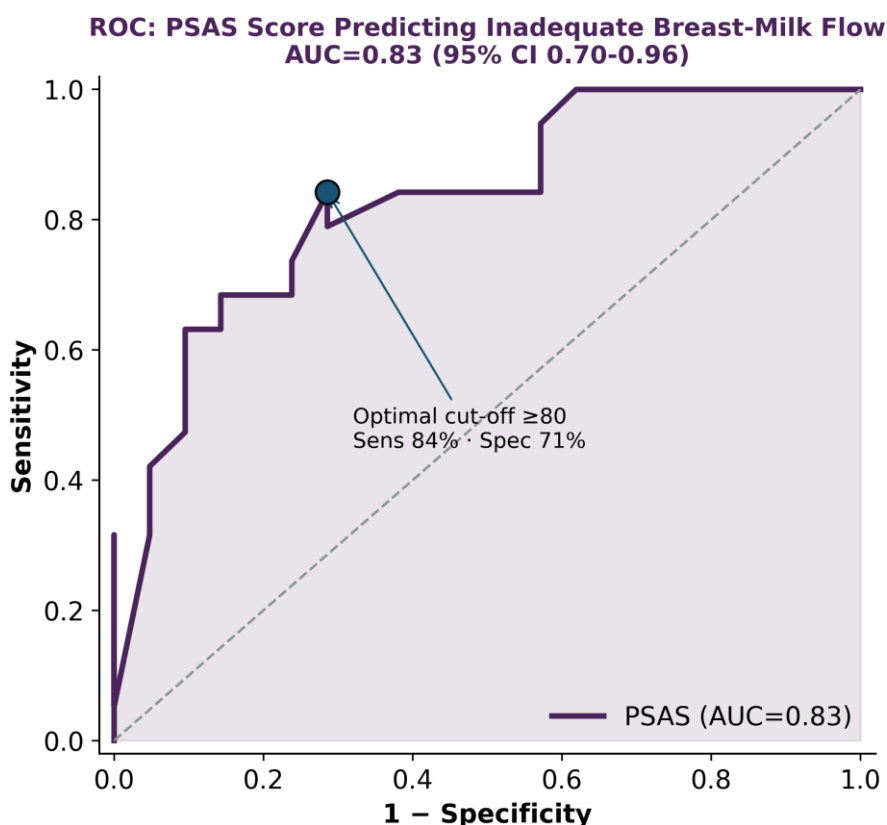


Figure 3. Receiver-operating-characteristic curve for the PSAS predicting inadequate breast-milk flow (AUC = 0.83; optimal cut-off ≥ 80).

4. Discussion

In this cross-sectional study of mothers in the early puerperium attending primary midwifery care in South Kalimantan, postpartum-specific anxiety was highly prevalent (any anxiety 72.5%; moderate 32.5%) and was the dominant correlate of inadequate breast-milk flow, which affected nearly half of the sample (47.5%). The association was robust across complementary analyses: a significant categorical relationship (chi-square = 11.61, $p = 0.003$; Table 2), a strong inverse dose-response correlation (Spearman

$\rho = -0.69$), a large standardised group difference (Cohen $d = 1.36$), substantial bivariate and adjusted odds ratios (Tables 2 and 3), and good screening discrimination (AUC = 0.83; Figure 3). Together these findings reposition a lactation problem as, in large part, a maternal mental-health problem.

Our prevalence of clinically relevant anxiety is consistent with, though at the upper end of, the international and regional literature; pooled postnatal anxiety estimates sit near 15% with higher rates in Asian and low- and middle-income settings,^{1,3} and

anxiety is now recognized as the most frequent complication of the first postpartum year.² The higher figure observed here is expected because the PSAS detects infant-focused and role-adjustment anxieties missed by generic scales,⁴⁻⁵ and because sampling targeted the acutely stressful days 2-4 postpartum, when secretory activation and maternal-role acquisition coincide.

The magnitude of the anxiety-lactation association aligns with prior work. A community study in South India found that lactational failure was strongly correlated with maternal stress, anxiety and depression,³ and systematic and prospective evidence links anxiety to poorer breastfeeding initiation, duration and exclusivity and to lower breastfeeding self-efficacy.^{7,11-12} Our crude OR of 10.55 for moderate anxiety and the strong correlation extend these reports by quantifying effect sizes and a graded relationship. The adjusted OR of 40.80 should be read qualitatively rather than as a precise point estimate: its very wide confidence interval reflects the small sample, low events-per-variable and sparse cells, indicating that the association persists after adjustment rather than a literal forty-fold risk.

An unexpected finding was that maternal employment was associated with lower odds of inadequate lactation in the adjusted model. This is most plausibly residual confounding by socioeconomic resources, health literacy and access to support among employed mothers, or chance given the small numbers, and is therefore hypothesis-generating; it accords with reviews identifying low education and weak support, rather than employment per se, as the operative risk factors for postpartum complications.^{8,16} The non-significant associations for parity and age contrast with some literature in which primiparity predicts anxiety and feeding difficulty,⁶ and likely reflect limited power rather than a true absence of effect.

The findings are biologically coherent. In the dual-control model of lactation, prolactin drives milk synthesis while oxytocin mediates ejection through contraction of alveolar myoepithelial cells; oxytocin

release is exquisitely sensitive to emotional state, so anxiety-driven sympathoadrenal and hypothalamic-pituitary-adrenal activation raises catecholamines and cortisol that inhibit oxytocin pulsatility and blunt the prolactin response to suckling.¹⁰ Within a cognitive-appraisal framework, mothers who appraise breastfeeding as threatening experience heightened anxiety that feeds back onto this neuroendocrine pathway, consistent with evidence that low self-efficacy and weak support amplify perinatal anxiety.⁷⁻⁸

The timing of assessment is mechanistically important. Days 2-4 postpartum coincide with secretory activation (lactogenesis II), a transition delayed by stress-related neuroendocrine disruption; elevated stress hormones can both delay activation and impair the acute let-down reflex,^{10,12} matching the very high proportion of inadequate flow (84.6%) seen among moderately anxious mothers in precisely this window. Capturing anxiety at this juncture may therefore identify mothers at the exact moment when intervention can still alter the breastfeeding trajectory, before perceived insufficient milk precipitates supplementation and a self-reinforcing cycle of reduced suckling, falling prolactin and further milk decline.

These results carry concrete clinical implications. Maternal care in the early puerperium should incorporate brief, routine anxiety screening rather than focusing solely on physical recovery and feeding technique. The PSAS performed well as a screening tool (AUC = 0.83; Figure 3), and the data-derived cut-off of ≥ 80 captured 84% of mothers who went on to have inadequate flow, suggesting that even mild childbearing-specific anxiety warrants attention.⁴⁻⁵ Mothers screening positive could be offered structured lactation support combined with anxiety-reducing interventions of demonstrated benefit, since behavioral and psychosocial interventions can concurrently lower anxiety and improve breastfeeding outcomes.^{7,15}

The screening threshold itself warrants comment. The Youden-optimal cut-off identified here (PSAS

>=80) sits just below the conventional boundary between no anxiety and mild anxiety, implying that, in this early-puerperium population, sub-threshold symptoms already carry clinically meaningful risk for lactation. This cut-off was, however, derived and evaluated in the same modest sample and is therefore optimistic; it should be regarded as a hypothesis for prospective validation rather than an established threshold, and services adopting the PSAS may reasonably prefer the instrument's pre-specified severity bands until an externally validated cut-off is available.⁴⁻⁵ Reporting sensitivity and specificity at several operating points, as done here, allows clinicians to choose a threshold matched to local resources and to the relative costs of missing an at-risk mother versus over-referral. Regardless of the exact cut-off, the high negative- and positive-gradient of inadequate flow across anxiety bands indicates that the PSAS conveys clinically useful information about lactation risk that generic distress measures do not.¹²

From a public-health perspective, the dual benefit of perinatal anxiety screening strengthens the case for integration into routine maternal-and-child-health services: a single brief instrument can flag a treatable mental-health condition and a modifiable threat to breastfeeding within one low-cost contact, and breastfeeding itself protects maternal mood through enhanced parenting self-efficacy.¹⁷ Because anxiety is the most frequent postpartum complication, such screening is likely to be high-yield,² and task-shifting the screen and first-line psychosocial support to midwives, with referral pathways for higher scores, is feasible where psychiatrists are scarce.¹⁵

These findings also sit within the broader perinatal mood-disorder continuum, in which anxiety and depression co-occur, share psychosocial determinants and reinforce one another,⁹ and in which maternal distress predicts poorer mother-infant bonding¹³ while social support buffers maternal affect through improved role adaptation.¹⁸ Mothers flagged by anxiety screening are therefore likely to be at elevated risk across several perinatal outcomes simultaneously, reinforcing the value of a single early screening contact

rather than siloed assessments.

The Indonesian context shapes interpretation and application. Care is predominantly midwife-led and community-based, postpartum dietary restrictions imposed by elders may compromise maternal nutrition, and paternal involvement—itsself associated with anxiety and breastfeeding outcomes—varies widely.¹⁴ Embedding a brief PSAS-based screen into existing midwifery workflows, framed as breastfeeding support to reduce mental-illness stigma, is a pragmatic route to closing this gap and improving the region's low exclusive-breastfeeding coverage.

A practical corollary concerns the clinical pathway that screening should trigger. A mother who screens positive is, on this evidence, simultaneously at risk of a treatable anxiety state and of a faltering milk supply; an integrated response—reassurance and psychoeducation that normalise early feeding difficulty, attention to latch and feeding frequency, mobilisation of partner and family support, and brief anxiety-reduction techniques—addresses both at once and may interrupt the perceived-insufficient-milk cycle before early supplementation becomes entrenched. Where anxiety is moderate or accompanied by depressive symptoms, referral to perinatal mental-health services is warranted, and a duty-of-care protocol for mothers reporting severe distress should accompany any screening programme. Embedding such a stepped-care pathway within the existing schedule of postnatal visits would convert a screening number into an actionable clinical decision.¹⁵

This study has several strengths: a validated, childbearing-specific psychiatric instrument and a standardised lactation questionnaire rather than ad-hoc observation; complete data with no missingness; and an upgraded analytic pipeline—prevalence with confidence intervals, effect sizes, multivariable adjustment and ROC analysis—that moves substantially beyond the chi-square-only approach typical of the prior local literature.

Several limitations must be acknowledged. First, the cross-sectional design precludes causal inference;

reverse or bidirectional causation (difficult feeding heightening anxiety) is plausible. Second, the modest purposive sample ($n = 40$, 19 events) limited power, widened confidence intervals—most strikingly for the adjusted anxiety estimate—and risks overfitting; the multivariable model should be regarded as exploratory, and penalised or Bayesian estimation in a larger sample would yield more stable estimates. Third, both exposure and outcome were self-reported at one sitting, raising the possibility of common-method and perception bias, and lactation adequacy was assessed by questionnaire rather than by test-weighing. Fourth, single-time-point assessment cannot capture the trajectory of anxiety, which may decline as the puerperium progresses. Fifth, several plausible confounders—socioeconomic status, mode of delivery, infant birth weight and gestational age, prior breastfeeding experience and postpartum pain—were not measured, so residual confounding cannot be excluded and the protective employment estimate in particular should not be interpreted causally. Finally, single-site recruitment from one midwife-led practice limits generalisability beyond comparable community settings, and the findings should be confirmed in larger, multi-centre samples before they inform policy.

Beyond the statistical findings, field observations during data collection enriched interpretation. Several mothers showed visible distress—tense expression and overt worry that their milk would be insufficient for the infant—when discussing breastfeeding. On brief interview, many reported that although they lived with a partner, paternal involvement in infant care was limited, leaving them fatigued and more anxious; that elder relatives advised avoiding particular foods during the puerperium, potentially restricting maternal nutrition; and that sleep was fragmented because infants woke frequently to feed while being difficult to rouse for the recommended two-hourly daytime feeds, so that feeding intervals lengthened and stimulation of milk production fell. These observations are consistent with the measured association and with evidence that poor sleep and weak social support undermine breastfeeding self-efficacy.¹⁹⁻²⁰ Although not formally

quantified, they point to concrete, modifiable targets for intervention—paternal engagement, culturally sensitive nutritional counselling, and realistic feeding-and-rest guidance—and illustrate how the statistical association is expressed in everyday maternal experience.

The internal consistency of the effect estimates also merits emphasis: the categorical association (Cramer $V = 0.539$), the continuous correlation ($\rho = -0.685$), the standardised group difference (Cohen $d = 1.36$) and the screening discrimination (AUC = 0.83) all fall in the large range and point in the same direction despite resting on different distributional assumptions, and the close agreement between parametric and non-parametric tests indicates the result is not an artifact of a single analytic choice. Even after conservative interpretation of the unstable adjusted odds ratio, the weight of evidence consistently identifies postpartum-specific anxiety as the principal correlate of inadequate early lactation. Replication in adequately powered, multi-site Indonesian cohorts—incorporating standardised translation and cross-cultural validation of the PSAS5—would establish whether the magnitude observed here generalises.

Future research should employ prospective cohort designs with repeated PSAS measurement across the first six postpartum weeks, larger multi-site samples powered for multivariable and subgroup analysis, objective lactation outcomes such as test-weighing, and randomised evaluation of anxiety-targeted interventions delivered within routine midwifery care. Incorporating biological markers (salivary cortisol, serum prolactin and milk hormone concentrations) would allow the proposed neuroendocrine pathway to be tested directly,¹⁰ and small-sample-appropriate analytic approaches (penalised, exact or Bayesian estimation) would yield more stable adjusted estimates than the maximum-likelihood model presented here.

5. Conclusion

Postpartum-specific anxiety was highly prevalent among mothers in the early puerperium (any anxiety

72.5%) and was significantly and independently associated with inadequate breast-milk flow (47.5%), with a strong dose-response relationship (Spearman rho = -0.69) and good screening discrimination (AUC = 0.83; optimal cut-off ≥ 80). Routine, brief screening for postpartum-specific anxiety within maternal care—coupled with combined lactation and psychological support—is recommended to identify at-risk mothers and protect breastfeeding in Indonesian primary-care settings. Embedding such screening within existing midwifery workflows, supported by clear referral pathways to perinatal mental-health services, offers a pragmatic and potentially cost-effective route to safeguarding both maternal wellbeing and infant nutrition. Larger prospective, multi-site studies are warranted to confirm causality, validate the proposed cut-off and evaluate targeted interventions.

6. References

- Dennis CL, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *Br J Psychiatry*. 2017;210(5):315-323. doi:10.1192/bjp.bp.116.187179
- Ke JXC, Bilan K, Vidler M, et al. Frequency and timing of complications within the first postpartum year in the United States and Canada: a systematic review and meta-analysis. *Am J Obstet Gynecol*. 2025;233(5):396-427. doi:10.1016/j.ajog.2025.04.060
- Kumari S, Koppad R, Singh A, et al. Prevalence of cognitive dysfunction and associated behavioral changes, lactational failure, and their determinants among postpartum women in South India: a community-based study. *Int J Gynaecol Obstet*. 2025;170(2):703-716. doi:10.1002/ijgo.70062
- Fallon V, Halford JCG, Bennett KM, et al. The Postpartum Specific Anxiety Scale: development and preliminary validation. *Arch Womens Ment Health*. 2016;19(6):1079-1090. doi:10.1007/s00737-016-0658-9
- Silverio SA, Davies SM, Christiansen P, et al. A validation of the Postpartum Specific Anxiety Scale 12-item research short-form for use during global crises with five translations. *BMC Pregnancy Childbirth*. 2021;21(1):112. doi:10.1186/s12884-021-03597-9
- Dol J, Richardson B, Grant A, et al. Influence of parity and infant age on maternal self-efficacy, social support, postpartum anxiety, and postpartum depression in the first six months in the Maritime Provinces, Canada. *Birth*. 2021;48(3):438-447. doi:10.1111/birt.12553
- Melo LCO, Bonelli MCP, Lima RVA, et al. Anxiety and its influence on maternal breastfeeding self-efficacy. *Rev Lat Am Enfermagem*. 2021;29:e3485. doi:10.1590/1518-8345.5104.3485
- van der Zee-van den Berg AI, Boere-Boonekamp MM, et al. Postpartum depression and anxiety: a community-based study on risk factors before, during and after pregnancy. *J Affect Disord*. 2021;286:158-165. doi:10.1016/j.jad.2021.02.062
- Yang K, Wu J, Chen X. Risk factors of perinatal depression in women: a systematic review and meta-analysis. *BMC Psychiatry*. 2022;22(1):63. doi:10.1186/s12888-021-03684-3
- Matyas M, Apanasewicz A, Krzystek-Korpacka M, et al. The association between maternal stress and human milk concentrations of cortisol and prolactin. *Sci Rep*. 2024;14(1):28115. doi:10.1038/s41598-024-75307-2
- Hoff CE, Movva N, Rosen Vollmar AK, et al. Impact of maternal anxiety on breastfeeding outcomes: a systematic review. *Adv Nutr*. 2019;10(5):816-826. doi:10.1093/advances/nmy132
- Fallon V, Halford JCG, Bennett KM, et al. Postpartum-specific anxiety as a predictor of infant-feeding outcomes and perceptions of infant-feeding behaviours: new evidence for childbearing specific measures of mood. *Arch Womens Ment Health*. 2018;21(2):181-191. doi:10.1007/s00737-017-0775-0

13. O'Dea GA, Youssef GJ, Hagg LJ, et al. Associations between maternal psychological distress and mother-infant bonding: a systematic review and meta-analysis. *Arch Womens Ment Health*. 2023;26(4):441-452.
doi:10.1007/s00737-023-01332-1
14. Huda MH, Rustina Y, Waluyanti FT, et al. Psychometric evaluation of the Indonesian version of paternal breastfeeding self-efficacy scale-short form: a confirmatory factor analysis. *Midwifery*. 2024;139:104182.
doi:10.1016/j.midw.2024.104182
15. Pezley L, Cares K, Duffecy J, et al. Efficacy of behavioral interventions to improve maternal mental health and breastfeeding outcomes: a systematic review. *Int Breastfeed J*. 2022;17(1):67. doi:10.1186/s13006-022-00501-9
16. Ulfiana E, Rahayu T, Wijayanti Y, et al. Factors associated with postpartum complications: a systematic review to inform early detection strategies. *F1000Res*. 2025;14:649.
doi:10.12688/f1000research.166397.2
17. Zhu Y, Xie Y, Yin X, et al. Feeding patterns and postpartum depressive symptoms: the mediating role of parenting self-efficacy. *Depress Anxiety*. 2025;2025:2748707. doi:10.1155/da/2748707
18. He S, Chen Y, Li Y. The predictive effect of social support on new Chinese mothers' positive affect levels: does the postpartum time period matter? *J Psychiatr Res*. 2025;183:39-46.
doi:10.1016/j.jpsychires.2025.02.002
19. Li S, Hao X, Wang Y, et al. Multidimensional sleep health and breastfeeding self-efficacy: a cross-sectional study. *Midwifery*. 2025;150:104618.
doi:10.1016/j.midw.2025.104618
20. Nayebinia AS, Faroughi F, Asadi G, Fathnezhad-Kazemi A. Factors affecting breastfeeding self-efficacy among mothers with preterm infants. *Womens Health (Lond)*. 2024;20:17455057241305297.
doi:10.1177/17455057241305297