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Determinants of Exclusive Breastfeeding Among Mothers in Buleleng Regency : A Cross-Sectional Study

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ABSTRACT

Background: Breastfeeding exclusively for the first six months is recognized as a key strategy for promoting infant wellbeing and healthy development. Nevertheless, the proportion of mothers achieving exclusive breastfeeding remains below public health expectations in many Indonesian regions. Understanding factors associated with breastfeeding continuation is important for designing effective maternal and child health interventions. Therefore, this study examined determinants of exclusive breastfeeding among mothers living in Buleleng Regency, Bali.

Methods: An analytical cross-sectional survey was conducted from June to July 2025 in community health service settings. The study included 144 mothers with children aged 6–24 months who met the eligibility criteria. Participants were recruited purposively through local health service networks. Data were obtained using interviewer-administered questionnaires, and independent predictors of exclusive breastfeeding were identified using multivariable logistic regression analysis.

Results: Exclusive breastfeeding during the first six months of life was reported by 43.1% of respondents. Multivariable analysis showed that mothers from households with lower economic status had a reduced likelihood of practicing exclusive breastfeeding compared with mothers from more affluent households (AOR=0.20; 95%CI: 0.07–0.60; p=0.005). Mothers who received breastfeeding information after delivery demonstrated substantially higher odds of maintaining exclusive breastfeeding (AOR=23.82; 95%CI: 3.10–182.94; p=0.001). Furthermore, delivery by cesarean section was independently associated with exclusive breastfeeding when compared with vaginal birth (AOR=4.50; 95%CI: 1.39–15.12; p=0.012).

Conclusions: The coverage of exclusive breastfeeding in Buleleng Regency remains suboptimal. Maternal economic circumstances, mode of delivery, and breastfeeding education provided after childbirth were independently associated with breastfeeding continuation. Strengthening postpartum breastfeeding support may help improve exclusive breastfeeding achievement within community populations.

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INTRODUCTION

Breastfeeding exclusively during the first six months of life is widely recognized as one of the most effective strategies for promoting infant health and survival. Breast milk supplies all nutrients required by infants during early life while also providing immunological protection and supporting optimal cognitive and physical development. Numerous studies have reported that exclusively breastfed infants tend to experience fewer infectious illnesses and demonstrate more favorable developmental outcomes than infants who are partially breastfed or formula-fed (Boy et al., 2023; Martin et al., 2016). Despite these advantages, maintaining exclusive breastfeeding for the recommended duration remains a significant challenge in many countries.

Over recent decades, governments and international health organizations have implemented various programs to encourage breastfeeding practices. However, exclusive breastfeeding rates continue to vary considerably among communities and regions. Maternal feeding decisions are influenced by multiple interacting factors, including personal circumstances, family environments, healthcare experiences, and socioeconomic conditions. Mothers often face barriers such as work-related responsibilities, economic pressures, insufficient breastfeeding knowledge, cultural influences, lack of professional guidance, and postpartum difficulties. These factors frequently increase the likelihood of introducing formula milk or complementary foods before infants reach six months of age (Chang et al., 2021; Gutierrez-de-Terán-Moreno et al., 2022; Witten et al., 2020).

In Indonesia, breastfeeding promotion has become an important component of maternal and child health services, encompassing antenatal care, postnatal care, and community-based health programs. Even so, the achievement of exclusive breastfeeding targets remains inconsistent across provinces and districts. Differences observed between regions suggest that breastfeeding practices are strongly shaped by local conditions. Economic circumstances, sociocultural values, family support systems, and accessibility of health services may all contribute to variations in breastfeeding outcomes, emphasizing the importance of generating evidence that reflects local contexts (Gayatri, 2021; Andhiny et al., 2026; Meher & Zaluchu, 2024).

Previous studies have documented numerous factors associated with successful exclusive breastfeeding. Maternal educational attainment, employment status, economic background, mode of delivery, breastfeeding knowledge, and family support have repeatedly been identified as influential determinants of breastfeeding behavior (Kalhor et al., 2025; Laksono et al., 2021; Hermawati et al., 2025). Nevertheless, the magnitude and direction of these associations may differ across settings because breastfeeding decisions are embedded within specific social, cultural, and healthcare contexts.

The postpartum period deserves particular attention because many breastfeeding challenges emerge after childbirth rather than during pregnancy. Although breastfeeding education is frequently provided during antenatal visits, mothers often encounter practical concerns once infant feeding begins. Issues such as uncertainty regarding milk production, nipple pain, ineffective infant latching, physical exhaustion, and emotional strain may reduce breastfeeding persistence when adequate assistance is unavailable (Mahurin-Smith, 2023; Yuen et al., 2022). Therefore, the period during which breastfeeding information is delivered may play a critical role in influencing breastfeeding outcomes.

A growing body of literature has shown that postpartum interventions, including counseling services, peer-support initiatives, and structured breastfeeding assistance programs, can improve maternal confidence and increase breastfeeding success (Aktürk & Kolcu, 2023; Chipojola et al., 2020; Rodríguez-Gallego et al., 2024; Tseng et al., 2020). Nevertheless, limited evidence is available

regarding whether information and support provided after delivery contribute more substantially to exclusive breastfeeding practices than education received solely during pregnancy, particularly within Indonesian community-based settings.

Buleleng Regency offers an important context for investigating breastfeeding practices because of its demographic diversity and sociocultural heterogeneity. Breastfeeding promotion activities are routinely conducted through local healthcare facilities; however, research examining determinants of exclusive breastfeeding in this region remains limited. Most Indonesian studies have concentrated on maternal demographic characteristics, while relatively few have explored the influence of postpartum support and the timing of breastfeeding education. Consequently, locally generated evidence is needed to support the development of interventions that are aligned with community-specific circumstances.

Based on these considerations, the present study sought to examine factors associated with exclusive breastfeeding among mothers residing in Buleleng Regency, Bali. Particular attention was given to socioeconomic characteristics, childbirth-related factors, breastfeeding information exposure, and support mechanisms that may affect breastfeeding continuation during the first six months postpartum. The findings are expected to contribute to the improvement of breastfeeding promotion strategies and strengthen postpartum support services within both community and healthcare settings.

METHODS

Study Design and Setting

This investigation used an observational analytical approach with a cross-sectional framework and was carried out in Buleleng Regency, Bali, Indonesia, during mid-2025. Information was collected from mothers attending primary maternal and child health services available within the community, including local health centers and village-based health posts. Participants were requested to recall feeding practices experienced by their infants during the first half-year of life.

Population and Sample

Eligible participants were mothers raising children between 6 and 24 months of age who were living in Buleleng Regency at the time of the survey. Sample size determination was based on the formula commonly applied for prevalence studies, using a confidence level of 95% and an estimated exclusive breastfeeding prevalence derived from previous national research (Gayatri, 2021). The calculation produced a minimum requirement of 138 respondents. To ensure an adequate number of observations, 144 mothers meeting the eligibility criteria were included in the final dataset. Respondents were recruited from community health service networks through purposive selection. Mothers were considered eligible if they had a child aged 6–24 months, resided in the study area, and voluntarily agreed to participate. Mothers were not included when their infants had medical conditions that could substantially influence feeding practices or when recall of breastfeeding experiences during the early postnatal period was considered unreliable.

Variables and Measurement

The primary outcome variable was exclusive breastfeeding practice. Following the definition established by the World Health Organization, infants were categorized as exclusively breastfed when breast milk was the sole source of nutrition during the first six months of life, except for medications, vitamins, or mineral supplements when medically indicated. For analysis purposes, breastfeeding behavior was classified into two categories: exclusive breastfeeding and non-exclusive breastfeeding.

Independent variables included maternal age, education level, occupational status, family income, type of delivery, timing of breastfeeding information, support from husbands, support from family members, and support from healthcare professionals. Perceived support was assessed through Likert-scale questions adapted from previously validated breastfeeding-related instruments. Aggregate scores were then grouped into two categories representing lower support (poor/moderate) and higher support (good).

Instrument and Data Collection

Information for this study was obtained using a researcher-administered questionnaire adapted from previously validated instruments related to breastfeeding practices. Before field implementation, the instrument underwent a review process to ensure the relevance of its content, ease of understanding, and appropriateness of language. The consistency of questionnaire items was evaluated prior to data collection, and all support-related scales demonstrated satisfactory reliability with coefficient values exceeding the recommended minimum standard of 0.70. To promote consistency across interviews, data collectors completed preparatory training covering study procedures, participant recruitment, and interviewing techniques. Mothers who fulfilled the eligibility criteria were informed about the objectives of the research, study procedures, potential benefits, and participant rights before consent was obtained. Data were then gathered through interviewer-guided surveys conducted directly with participants. The average duration of each interview ranged from 20 to 30 minutes. Throughout the data collection period, monitoring activities and periodic reviews of completed questionnaires were undertaken to minimize missing information and maintain data quality.

Data Analysis

The analytical process began with an examination of the distribution of study variables and participant characteristics. Frequencies, percentages, and other descriptive measures were generated to provide an overview of the sample. Relationships between candidate predictors and breastfeeding outcomes were subsequently evaluated through bivariate analyses. Variables demonstrating a probability value below 0.25 at the bivariate stage were entered into the multivariable model for further assessment. Logistic regression analysis was then employed to identify independent predictors of exclusive breastfeeding while controlling for potential confounding influences. The magnitude of association was expressed using adjusted odds ratios accompanied by 95% confidence limits. Statistical evidence of association was considered present when the probability value was less than 0.05.

Ethical Considerations

The study protocol received ethical clearance from the Ethics Committee of the Faculty of Medicine, Udayana University, Bali, Indonesia (Reference No. 1393/UN14.2.2.VII.14/LT/2023). Participation was voluntary, and confidentiality of all respondent information was maintained throughout the research process.

RESULTS AND DISCUSSION

Results

Participant Characteristics

A total of 144 eligible mothers participated in the study. As presented in Table 1, the mean maternal age was 28.5 ± 5.2 years, with most respondents belonging to the 25–34-year age group (58.3%). Senior high school was the most frequently reported educational attainment (45.8%), while 31.3% of participants had completed higher education. Homemakers accounted for nearly two-thirds of the sample (62.5%), and 55.6% of households reported incomes below the regional minimum wage. Vaginal delivery was reported by 68.8% of mothers, whereas 31.2% had undergone cesarean section.

The proportion of mothers who practiced exclusive breastfeeding for the first six months was 43.1% (62/144). Among mothers who did not maintain exclusive breastfeeding, perceived insufficient milk supply emerged as the leading reason (38.5%), followed by work-related commitments (24.4%), early introduction of complementary foods (18.8%), and formula feeding before six months of age (18.3%).

Table 1. Characteristics of Participants (n=144)

Variables	Category	n	%
Maternal age	<25 years	32	22.2
	25–34 years	84	58.3
	≥35 years	28	19.5
Education level	Junior high school	33	22.9
	Senior high school	66	45.8
	Higher education	45	31.3
Occupation	Homemaker	90	62.5
	Employed	54	37.5
Household income	≥ Regional minimum wage	64	44.4
	< Regional minimum wage	80	55.6
Delivery type	Vaginal delivery	99	68.8
	Cesarean section	45	31.2
Exclusive breastfeeding	Yes	62	43.1
	No	82	56.9

Factors Associated with Exclusive Breastfeeding

Table 2. Bivariate Analysis of Factors Associated with Exclusive Breastfeeding Practice

Variables	Category	Exclusive Breastfeeding n (%)	Non-Exclusive Breastfeeding n (%)	cOR	95% CI	p-value
Household income	≥ Regional minimum wage	38 (59.4)	26 (40.6)	Ref		
	< Regional minimum wage	24 (30.0)	56 (70.0)	0.29	0.14–0.58	0.001
Delivery type	Vaginal delivery	37 (37.4)	62 (62.6)	Ref		
	Cesarean section	25 (55.6)	20 (44.4)	2.09	1.01–4.34	0.046
Timing of breastfeeding information	During pregnancy	19 (24.4)	59 (75.6)	Ref		
	During postpartum period	43 (65.2)	23 (34.8)	5.80	2.78–12.09	<0.001
Husband support	Poor/Moderate	20 (31.7)	43 (68.3)	Ref		
	Good	42 (51.9)	39 (48.1)	2.32	1.16–4.64	0.017
Family support	Poor/Moderate	23 (35.4)	42 (64.6)	Ref		
	Good	39 (49.4)	40 (50.6)	1.78	0.90–3.50	0.096
Healthcare worker support	Poor/Moderate	21 (32.8)	43 (67.2)	Ref		

	Good	41 (51.2)	39 (48.8)	2.15	1.08–4.28	0.028
Maternal occupation	Homemaker	43 (47.8)	47 (52.2)	Ref		
	Employed	19 (35.2)	35 (64.8)	0.59	0.29–1.21	0.151
Education level	Junior/Senior high school	39 (39.4)	60 (60.6)	Ref		
	Higher education	23 (51.1)	22 (48.9)	1.61	0.79–3.28	0.190

Several variables demonstrated meaningful associations with breastfeeding continuation in the initial analysis. Mothers from households earning below the regional minimum wage showed lower odds of maintaining exclusive breastfeeding compared with mothers from higher-income households (cOR=0.29; 95%CI: 0.14–0.58; p=0.001). In contrast, receiving breastfeeding information during the postpartum period was associated with substantially greater odds of exclusive breastfeeding than receiving information only during pregnancy (cOR=5.80; 95%CI: 2.78–12.09; p<0.001). Delivery through cesarean section was also positively associated with exclusive breastfeeding practice (cOR=2.09; 95%CI: 1.01–4.34; p=0.046).

Variables with p-values below 0.25 in the initial analysis were entered into the multivariable logistic regression model. These variables included household income, delivery type, timing of breastfeeding information, husband support, family support, healthcare worker support, maternal occupation, and educational level. After adjustment for potential confounding variables, household income, delivery type, and timing of breastfeeding information continued to demonstrate significant associations with exclusive breastfeeding in the final model (Table 3).

Table 3. Factors Associated with Exclusive Breastfeeding Practice

Variables	Category	AOR	95% CI	p-value
Household income	≥ Regional minimum wage	Ref		
	< Regional minimum wage	0.20	0.07–0.60	0.005
Delivery type	Vaginal delivery	Ref		
	Cesarean section	4.50	1.39–15.12	0.012
Timing of breastfeeding information	During pregnancy	Ref		
	During postpartum period	23.82	3.10–182.94	0.001
Husband support	Poor/Moderate	Ref		
	Good	1.45	0.68–3.09	0.331
Family support	Poor/Moderate	Ref		
	Good	1.22	0.57–2.61	0.602
Healthcare worker support	Poor/Moderate	Ref		
	Good	1.89	0.81–4.39	0.140
Maternal occupation	Homemaker	Ref		
	Employed	0.74	0.31–1.79	0.504
Education level	Junior/Senior high school	Ref		
	Higher education	1.36	0.58–3.17	0.478

The multivariable logistic regression model demonstrated acceptable goodness of fit based on the Hosmer Lemeshow test (p=0.721). Multicollinearity assessment showed acceptable VIF values (<2.5) for all independent variables. Household income, delivery type, and timing of breastfeeding information remained significantly associated with exclusive breastfeeding practice after adjustment for potential confounding variables. However, the wide confidence intervals observed for several variables, particularly postpartum breastfeeding information, suggest limited estimate precision and possible model instability; therefore, these findings should be interpreted cautiously.

Discussion:

The present study demonstrated that the proportion of mothers practicing exclusive breastfeeding in Buleleng Regency remains relatively low and has not yet achieved the breastfeeding targets promoted by national and global health authorities. Fewer than half of the respondents reported providing breast milk exclusively during the first six months of their infants' lives. This finding indicates that breastfeeding behavior is still shaped by a range of interacting influences, including socioeconomic circumstances, maternal characteristics, and healthcare-related factors. Similar situations have been documented in various low- and middle-income countries where breastfeeding campaigns are widely available but exclusive breastfeeding rates remain suboptimal (Gayatri, 2021; WHO, 2025).

Economic status was identified as one of the factors associated with breastfeeding behavior. Mothers living in households with lower income levels were less likely to sustain exclusive breastfeeding compared with those from more economically advantaged families. Limited financial resources may create conditions that indirectly affect breastfeeding practices, such as increased household stress, reduced access to health information, and competing domestic responsibilities. In addition, families with constrained economic resources may encounter difficulties accessing breastfeeding counseling or other supportive postpartum services. These findings align with previous studies reporting that socioeconomic vulnerability contributes to reduced breastfeeding duration and lower rates of exclusive breastfeeding (Chang et al., 2021; Ekholuenetale et al., 2021; Mohammed et al., 2023; Nazari et al., 2021).

Mode of delivery was also significantly associated with exclusive breastfeeding. Interestingly, mothers who underwent cesarean delivery demonstrated a greater likelihood of maintaining exclusive breastfeeding than mothers who delivered vaginally. This observation contrasts with many earlier reports suggesting that cesarean birth can hinder breastfeeding because of postoperative discomfort, delayed skin-to-skin contact, and recovery-related challenges that interfere with breastfeeding initiation (Li et al., 2021; Peng et al., 2024; Zhang et al., 2019). One possible explanation is that mothers recovering from cesarean delivery may receive closer clinical supervision, more frequent lactation assistance, and additional breastfeeding counseling during hospitalization. Such support could facilitate breastfeeding continuation beyond the immediate postpartum period. Similar findings have been described among mothers who received structured breastfeeding support following cesarean birth (He et al., 2025). Nevertheless, the relatively broad confidence interval observed in the current analysis suggests that the estimate should be interpreted carefully and verified through studies involving larger populations.

A particularly important finding concerns the timing of breastfeeding education. Mothers who obtained breastfeeding information after childbirth were substantially more likely to practice exclusive breastfeeding than those who received information only during pregnancy. This result suggests that educational interventions may be most effective when provided at the point when mothers are actively facing breastfeeding challenges. Information delivered during the postpartum period can be directly applied to practical situations, thereby increasing its relevance and usefulness. Consequently, the effectiveness of breastfeeding education may depend not only on its content but also on the timing of its delivery.

The early postpartum period often presents numerous difficulties for mothers. Fatigue, breast discomfort, nipple pain, concerns regarding milk sufficiency, and infant latching problems are commonly reported and may negatively affect breastfeeding continuation. When these challenges are not adequately addressed, mothers may lose confidence and become more likely to

introduce formula feeding or complementary foods earlier than recommended (Mahurin-Smith, 2023; Yuen et al., 2022). Therefore, postpartum breastfeeding support should be considered an essential component of maternal care rather than merely an educational activity. By strengthening maternal confidence and self-efficacy, effective support programs may improve breastfeeding persistence. Previous investigations have demonstrated that counseling services, peer-support initiatives, and individualized lactation guidance contribute positively to breastfeeding continuation and exclusive breastfeeding achievement (Aktürk & Kolcu, 2023; Chipojola et al., 2020; Rodríguez-Gallego et al., 2024; Saniel et al., 2021; Tseng et al., 2020).

Although husband support, family support, and healthcare worker support were associated with exclusive breastfeeding in the initial analyses, these relationships were no longer statistically significant after controlling for potential confounders. This finding does not necessarily imply that social support lacks importance. Instead, social support may exert its influence indirectly through pathways such as enhanced maternal confidence, improved emotional wellbeing, increased access to breastfeeding information, and greater resilience when facing postpartum challenges. Numerous studies have emphasized the importance of family engagement and professional support in creating positive breastfeeding experiences and encouraging breastfeeding continuation (Abbass-Dick et al., 2015; Amoo et al., 2022; Bueno-Gutiérrez et al., 2021). The absence of significance in the adjusted model may therefore be attributable to limited statistical power or overlapping effects among explanatory variables.

The findings underscore the importance of adopting a comprehensive approach to breastfeeding promotion. Efforts focused solely on increasing maternal knowledge may not be sufficient to improve breastfeeding outcomes. Broader strategies that address social, economic, and healthcare-related barriers are equally important. Strengthening postpartum support services, expanding access to breastfeeding counseling, and facilitating community-based support programs may enhance mothers' ability to maintain exclusive breastfeeding during the first six months of infant life. Similar recommendations have been supported by previous studies highlighting the benefits of continuous breastfeeding assistance and peer-support interventions for sustaining breastfeeding practices (Kim et al., 2018; Saniel et al., 2021).

Taken together, the results indicate that exclusive breastfeeding is influenced by a multifaceted interaction between socioeconomic conditions, childbirth experiences, and postpartum support. Interventions aimed at strengthening breastfeeding assistance after delivery and improving equitable access to breastfeeding education may represent practical approaches to increasing exclusive breastfeeding coverage in Buleleng Regency and other settings with comparable characteristics. Additional research involving larger and more diverse populations is required to better understand the pathways through which these determinants affect breastfeeding behavior.

Implications

Several implications arise from the present findings. First, breastfeeding promotion efforts should prioritize mothers from economically disadvantaged households, as they may encounter greater challenges in maintaining exclusive breastfeeding. Programs that reduce financial stress and enhance social support may indirectly facilitate breastfeeding continuation. Second, breastfeeding interventions should extend beyond antenatal education and provide sustained assistance during the postpartum period. Home-based support, peer counseling initiatives, and mobile health interventions may help mothers manage breastfeeding difficulties and maintain breastfeeding practices during the first six months after birth. Previous evidence has shown that peer-support

approaches and breastfeeding counseling programs can improve exclusive breastfeeding outcomes (Saniel et al., 2021).

Healthcare institutions also have an important role in strengthening breastfeeding support. Lactation counseling and individualized breastfeeding assistance should be routinely provided before mothers are discharged from healthcare facilities. Furthermore, breastfeeding interventions should actively involve husbands and other family members to foster a supportive home environment. At a broader policy level, workplace regulations that facilitate breastfeeding including adequate maternity leave, designated lactation spaces, and flexible breastfeeding breaks remain essential for supporting breastfeeding continuation among employed mothers.

Limitations:

This study has several limitations that should be acknowledged when interpreting the findings. Because the analysis was based on cross-sectional observational data, the identified relationships cannot be interpreted as causal associations. Information regarding breastfeeding practices and social support was obtained through maternal self-report, which may have been affected by memory inaccuracies or the tendency to provide socially acceptable responses. In addition, the relatively wide confidence intervals observed for several variables suggest limited estimate precision and indicate the need for further studies involving larger populations. The study also did not include qualitative exploration; therefore, deeper sociocultural and personal experiences related to breastfeeding behavior within the Balinese context could not be fully explored.

CONCLUSION

Exclusive breastfeeding coverage among mothers in Buleleng Regency remains below recommended public health targets. The findings of this study indicate that household economic status, delivery type, and timing of breastfeeding information were associated with breastfeeding continuation during the first six months after childbirth. Mothers who received breastfeeding education during the postpartum period demonstrated a greater likelihood of maintaining exclusive breastfeeding compared with mothers who received information only during pregnancy.These findings emphasize the importance of strengthening postpartum breastfeeding support through healthcare services and community-based interventions. Continuous counseling, family involvement, and accessible breastfeeding assistance may help mothers overcome breastfeeding difficulties during the postpartum period. Further studies involving larger populations and broader sociocultural exploration are recommended to better understand contextual factors influencing breastfeeding behavior in Indonesia.

AUTHOR CONTRIBUTION STATEMENT

LM, LNA, and RTH designed and planned the study. LM, LNA, RTH, and INK collected the data, while INK and LM analyzed the data and interpreted the findings. Both LM and INK wrote the draft. Following their assessment of the results, LM, LNA, RTH, and INK approved the final draft.

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