



Original Research Paper

Determinants of Early Initiation of Breastfeeding Among Neonates in Primary Healthcare Facilities: A Cross-Sectional Study

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Creative Commons Attribution-ShareAlike 4.0 International License**Abstract**

Background: Early initiation of breastfeeding (EIBF) is an essential newborn care practice, yet timely initiation remains inconsistent because of maternal, clinical, family, and service related barriers. **Objective:** To identify factors independently associated with EIBF among neonates receiving delivery and immediate postpartum care in primary healthcare. **Methods:** An analytical cross sectional study was conducted at Puskesmas Kecamatan Kebayoran Baru, South Jakarta, from January to April 2026. A consecutive sample of 320 mother-neonate pairs was assessed using a structured maternal and neonatal form. EIBF was defined as breastfeeding within one hour after birth. Chi square analysis and multivariable logistic regression were performed. **Results:** EIBF occurred in 222 neonates (69.4%). Positive independent associations were found for immediate skin to skin contact (aOR 4.19; 95% CI 2.04-8.59), health-worker support (aOR 2.44; 95% CI 1.37-4.35), breastfeeding counselling (aOR 2.17; 95% CI 1.18-3.96), and at least four antenatal visits (aOR 1.98; 95% CI 1.06-3.71). Caesarean section (aOR 0.27; 95% CI 0.15-0.49) and maternal/neonatal complications (aOR 0.36; 95% CI 0.20-0.65) reduced EIBF odds. Family support, maternal knowledge, preterm birth, and low birth weight were not significant. **Conclusion:** Strengthening skin to skin contact, counselling, health worker support, and antenatal preparation may improve EIBF implementation in primary care.

Keywords: Early initiation of breastfeeding; Neonates; Primary healthcare; Skin to skin contact; Breastfeeding counselling.

Introduction

Early initiation of breastfeeding (EIBF), defined as putting the newborn to the breast within the first hour after birth, is a high impact component of essential newborn care. Timely initiation supports thermoregulation, maternal infant bonding, early colostrum intake, and continued breastfeeding, and delayed initiation has been associated with adverse neonatal outcomes^{1,2,3,4,5}.

Despite strong international recommendations, EIBF coverage remains uneven across countries and healthcare settings. Reported barriers include caesarean

delivery, delayed mother-infant contact, maternal fatigue, neonatal complications, insufficient counselling, cultural practices, and limited provider support^{6,7,8,9}. In Indonesia, breastfeeding promotion is incorporated into maternal and child health services, but implementation continues to vary according to service readiness, access to antenatal care, provider practices, and family support^{10,11,12,13}.

Previous studies have linked timely breastfeeding initiation with antenatal-care utilization, maternal education and readiness, place and mode of delivery, newborn condition, and support during childbirth^{14,15,16,17,18}.

Indonesian evidence also indicates that breastfeeding practices are shaped by maternal, family, and health service factors. Studies published in *Healthy Tadulako Journal* have highlighted determinants of exclusive breastfeeding, the role of maternal education and service factors, husband support and maternal knowledge, and the value of antenatal education for maternal preparation^{19,20,21,22,23}.

Primary healthcare facilities provide repeated opportunities to improve EIBF through antenatal counselling, standardized immediate skin to skin contact, skilled breastfeeding assistance, and supportive workflows after delivery. Evidence from Baby Friendly Hospital Initiative implementation and breastfeeding promotion interventions supports the importance of integrating these practices into routine maternal and newborn care^{24,25,26,27}.

This study aimed to identify maternal, neonatal, family, and service related factors independently associated with EIBF among neonates at Puskesmas Kecamatan Kebayoran Baru, South Jakarta. The analysis focused on estimating adjusted associations and identifying modifiable service practices relevant to primary healthcare quality improvement.

Materials and Methods

Study Design and Setting

This analytical cross-sectional study was conducted at Puskesmas Kecamatan Kebayoran Baru, South Jakarta, Indonesia, from January to April 2026. The study evaluated EIBF and potential associated factors measured during the same maternal neonatal care episode. Reporting was structured in accordance with recommendations for observational studies.

Participants and Sampling

The analytic sample comprised 320 mother neonate pairs recruited by consecutive sampling during the study period. Eligible participants were mothers with a live birth who received delivery or immediate postpartum care at the study facility and had information on breastfeeding initiation. The model included 10 prespecified maternal, neonatal, family, and service related predictors; with 98 non-EIBF outcomes, this corresponded to 9.8 non event outcomes per predictor. Participants with missing EIBF outcome information were not included in the analysis. Because the study was conducted at a single primary healthcare facility, clustering by health facility was not applicable^{28, 29,30}.

Data Collection and Variables

Data were collected using a structured maternal and neonatal assessment form covering maternal education, parity, antenatal care attendance, mode of delivery, neonatal gestational status and birth weight, maternal or neonatal complications, breastfeeding counselling, immediate skin to skin contact, health-worker support, husband/family support, maternal knowledge, and EIBF status. EIBF was defined as initiation of breastfeeding within one hour after birth. Maternal knowledge was assessed with a structured score and categorized as adequate at a score of at least 75. Low birth weight was defined as birth weight below 2500 g, and preterm birth as birth before 37 completed weeks of gestation.

Statistical Analysis

Data were analyzed using Python. Categorical variables are presented as frequencies and percentages, while continuous variables are summarized using means and standard deviations. Bivariate comparisons used cross tabulation and chi square tests. The multivariable analysis was specified as an

explanatory logistic regression model: all clinically prespecified predictors shown in Table 3 were entered simultaneously rather than selected solely on the basis of univariable p-values. Binary predictors were coded with the clinically unexposed or standard category as the reference (no exposure/support, vaginal delivery, term birth, birth weight at least 2500 g, and no maternal/neonatal complication). Main effects were estimated without automated stepwise selection. Results are reported as adjusted odds ratios (aORs), 95% confidence intervals (CIs), and exact p-values; $p < 0.05$ was considered statistically significant, and values below 0.001 are reported as $p < 0.001^{28,29}$.

Ethical Consideration

The study protocol was reviewed and approved before data collection by the Health Research Ethics Committee, Faculty of Medicine, Universitas Tadulako (Approval No. 5502/UN28.10/KL/2026; Palu, January 6, 2026). Participation was voluntary and informed consent was obtained from participating mothers before data collection. Confidentiality was maintained by limiting access to study records and using de identified data for analysis and reporting.

Results

Among 320 mother neonate pairs, EIBF was achieved by 222 neonates (69.4%), while 98 (30.6%) did not initiate breastfeeding within the first hour. The mean maternal age was 28.0 ± 5.7 years, mean birth weight was 3038 ± 439 g, and mean maternal knowledge score was 74.2 ± 12.6 . Most mothers had secondary education, were multiparous, had at least four antenatal care visits, and delivered vaginally. Table 1 summarizes maternal, neonatal, family, and service-related characteristics.

In bivariate analysis, EIBF was significantly more frequent among mothers with at least four antenatal care visits, neonates

receiving immediate skin to skin contact, mothers receiving breastfeeding counselling, and mothers receiving health-worker support. EIBF was significantly less frequent after caesarean delivery, in the presence of maternal/neonatal complications, and among preterm births. Differences according to maternal knowledge, husband/family support, and low birth weight were not statistically significant (Table 2).

Table 1. Characteristics of mothers, neonates, and service-related factors (n=320)

Variable	Category	n / Mean $\pm$ SD	%
Education	Higher	76	23.8
	Primary or lower	92	28.7
	Secondary	152	47.5
Parity	Multiparous	196	61.3
	Primiparous	124	38.8
ANC ≥ 4 visits	No	84	26.2
	Yes	236	73.8
Mode of delivery	Caesarean section	87	27.2
	Vaginal	233	72.8
Low birth weight	No	283	88.4
	Yes	37	11.6
Preterm birth	No	270	84.4
	Yes	50	15.6
Immediate skin-to-skin contact	No	49	15.3
	Yes	271	84.7
Breastfeeding counselling	No	116	36.2
	Yes	204	63.7
Husband/family support	No	96	30.0
	Yes	224	70.0
Maternal/neonatal complication	No	231	72.2
	Yes	89	27.8
Health-worker support	No	111	34.7
	Yes	209	65.3
Maternal age, mean $\pm$ SD		28.0 $\pm$ 5.7	
Birth weight, mean $\pm$ SD		3038 $\pm$ 439	
Knowledge score, mean $\pm$ SD		74.2 $\pm$ 12.6	

Source: primary data, 2026

In the adjusted model, immediate skin to skin contact showed the strongest positive independent association with EIBF (aOR 4.19; 95% CI 2.04-8.59; $p < 0.001$). Breastfeeding

counselling, health worker support, and at least four antenatal care visits also remained independently associated with higher odds of EIBF. Caesarean section and maternal/neonatal complications were independently associated with lower odds. Husband/family support, adequate maternal knowledge, preterm birth, and low birth weight were not statistically significant after simultaneous adjustment (Table 3).

Figure 1 presents the observed prevalence of EIBF across selected service and clinical characteristics. The largest descriptive contrasts were seen for immediate skin to skin contact and mode of delivery, while counselling and health worker support were also associated with higher observed EIBF prevalence. These comparisons are descriptive and should be interpreted together with the adjusted estimates in Table 3.

Table 2. Bivariate distribution of EIBF according to selected determinants

Variable	Category	EIBF Yes n (%)	EIBF No n (%)	p-value
ANC ≥4 visits	No	49 (58.3)	35 (41.7)	0.011
	Yes	173 (73.3)	63 (26.7)	
Immediate skin-to-skin contact	No	19 (38.8)	30 (61.2)	<0.001
	Yes	203 (74.9)	68 (25.1)	
Breastfeeding counselling	No	67 (57.8)	49 (42.2)	0.001
	Yes	155 (76.0)	49 (24.0)	
Health-worker support	No	64 (57.7)	47 (42.3)	0.001
	Yes	158 (75.6)	51 (24.4)	
Adequate knowledge	No	108 (65.1)	58 (34.9)	0.082
	Yes	114 (74.0)	40 (26.0)	
Husband/family support	No	60 (62.5)	36 (37.5)	0.081
	Yes	162 (72.3)	62 (27.7)	
Mode of delivery	Caesarean section	42 (48.3)	45 (51.7)	<0.001
	Vaginal	180 (77.3)	53 (22.7)	
	Maternal/neonatal complication	174 (75.3)	57 (24.7)	

Variable	Category	EIBF Yes n (%)	EIBF No n (%)	p-value
Preterm birth	Yes	48 (53.9)	41 (46.1)	0.026
	No	194 (71.9)	76 (28.1)	
Low birth weight	Yes	28 (56.0)	22 (44.0)	0.527
	No	198 (70.0)	85 (30.0)	
	Yes	24 (64.9)	13 (35.1)	

Source: primary data, 2026

Table 3. Multivariable logistic regression model for determinants of EIBF

Predictor	Adjusted OR	95% CI	p-value
Immediate skin-to-skin contact	4.19	2.04–8.59	<0.001
Breastfeeding counselling	2.17	1.18–3.96	0.012
Health-worker support	2.44	1.37–4.35	0.002
ANC ≥4 visits	1.98	1.06–3.71	0.032
Husband/family support	1.41	0.76–2.62	0.279
Adequate maternal knowledge	1.63	0.91–2.93	0.100
Caesarean section	0.27	0.15–0.49	<0.001
Maternal/neonatal complication	0.36	0.20–0.65	<0.001
Preterm birth	0.52	0.26–1.05	0.070
Low birth weight	1.11	0.48–2.59	0.808

Source: primary data, 2026

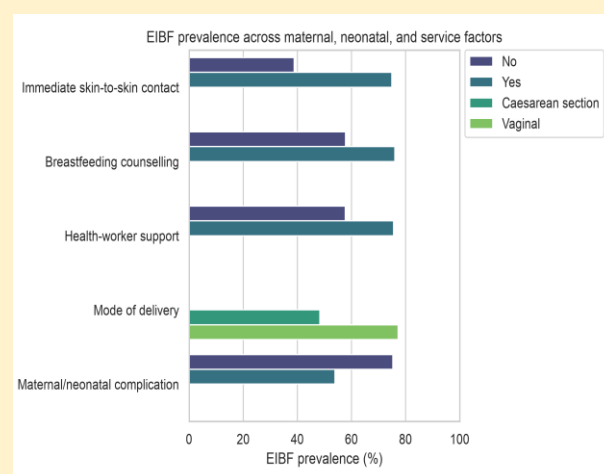


Figure 1. Prevalence of EIBF across selected maternal, neonatal, and service-related factors.

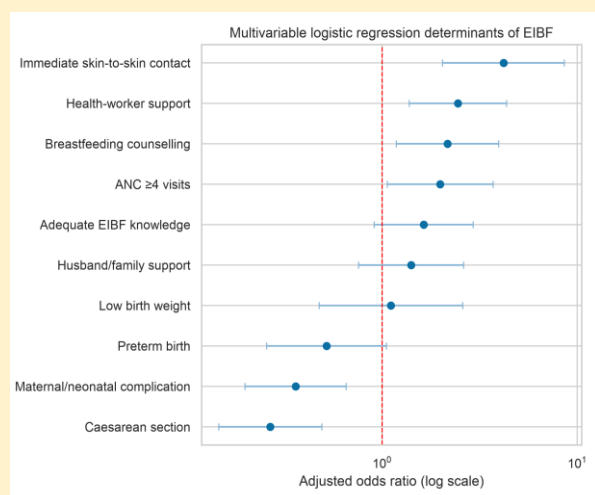


Figure 2. Adjusted odds ratios and 95% confidence intervals for factors associated with EIBF.

Figure 2 summarizes adjusted odds ratios and 95% CIs from the multivariable logistic regression. Estimates with CIs that do not cross an odds ratio of 1 represent statistically significant independent associations. The figure therefore distinguishes the six significant adjusted factors from variables whose adjusted estimates remained imprecise or non significant.

Discussion

This study found that 69.4% of neonates initiated breastfeeding within the first hour. Although this indicates that timely breastfeeding was implemented for most mother neonate pairs, nearly one third still experienced delayed initiation. This gap remains clinically relevant because evidence consistently links earlier breastfeeding initiation with improved breastfeeding continuity and neonatal outcomes^{31,32,33}.

Immediate skin to skin contact was the strongest independently associated factor (aOR 4.19). The direction and magnitude of this association are biologically and operationally plausible: skin to skin contact promotes neonatal thermal stability and feeding reflexes, supports maternal oxytocin release, and creates an immediate opportunity for skilled assistance with positioning and attachment^{1,4,24}. The

finding supports treating uninterrupted skin to skin contact as a routine clinical component of childbirth care whenever mother and newborn are stable.

Breastfeeding counselling remained independently associated with EIBF (aOR 2.17), and adequate antenatal care attendance was also significant (aOR 1.98). Antenatal contacts provide opportunities to explain the first-hour breastfeeding process, colostrum, positioning, and expected support after delivery. Indonesian primary care evidence similarly highlights maternal and service related factors in breastfeeding practice, while antenatal education can strengthen maternal preparation for pregnancy, birth, and early infant care^{19,20,22}. Maternal knowledge itself showed a positive but non significant adjusted estimate (aOR 1.63; 95% CI 0.91-2.93), suggesting that knowledge may be helpful but is not sufficient when immediate clinical routines and provider support are taken into account.

Health worker support was independently associated with higher odds of EIBF (aOR 2.44). This finding emphasizes the role of midwives and other primary-care staff in translating breastfeeding recommendations into practice. Counselling alone may not result in timely initiation if staff are unavailable, routine procedures separate mother and newborn, or practical assistance with latch and positioning is delayed. Structured breastfeeding support and facility-level promotion interventions have been shown to improve breastfeeding outcomes^{25,26,27}.

Caesarean section (aOR 0.27) and maternal/neonatal complications (aOR 0.36) were independently associated with substantially lower odds of EIBF. These conditions may delay maternal recovery, require stabilization, or interrupt early mother-infant contact^{6,8,34}. By contrast, preterm birth showed a lower point estimate but did not reach

statistical significance (aOR 0.52; $p=0.070$), and low birth weight was not independently associated with EIBF (aOR 1.11; $p=0.808$). These two variables should therefore not be described as independent determinants in the present study.

Husband/family support also had a positive but non significant adjusted association (aOR 1.41; 95% CI 0.76-2.62). This does not exclude a meaningful role for families in breastfeeding behaviour; rather, it indicates that the present data did not demonstrate an independent association after adjustment. A study from Pengawu in the Puskesmas Nosarara working area reported relationships of knowledge, attitude, and husband support with exclusive breastfeeding, providing useful contextual evidence for family focused counselling²¹. The distinction between contextual relevance and independent statistical significance is important when translating findings into recommendations.

The adjusted analysis also demonstrates why bivariate differences should not automatically be interpreted as independent determinants. Several variables showed differences in observed EIBF prevalence or effect estimates in the expected direction, but their confidence intervals crossed the null after simultaneous adjustment. Accordingly, the interpretation of this study is based primarily on adjusted odds ratios and 95% CIs rather than on direction of effect alone.

The analysis was intentionally interpreted as an explanatory association model rather than as a clinical prediction tool. The objective was to quantify independent associations relevant to service improvement, not to generate individual risk predictions. This distinction avoids overextending model performance claims beyond the cross sectional data and available sample.

From a programmatic perspective, the most actionable adjusted factors were skin to

skin contact, counselling, health worker support, and adequate antenatal care. These can be addressed through delivery room checklists, antenatal counselling protocols, refresher training, and supervision of first hour newborn care. Breastfeeding promotion interventions are most effective when counselling and practical support are consistently integrated across antenatal, delivery, and postpartum services^{25,26,27}.

The present findings are consistent with local breastfeeding literature without implying that all locally reported factors operate independently in every setting. Studies in *Healthy Tadulako Journal* have reported maternal and service related correlates of exclusive breastfeeding, associations involving husband support and maternal knowledge, and benefits of antenatal education^{19,20,21,22}. Together, these studies support a continuum of care approach in which antenatal preparation, family engagement, and high quality immediate postpartum practice complement one another.

Operationally, the study variables can be translated into routine quality indicators. Puskesmas teams can monitor the proportion of mothers who receive antenatal breastfeeding counselling, births followed by uninterrupted skin to skin contact, and mothers who receive practical breastfeeding assistance during the first hour. Monitoring caesarean and complicated births separately can identify whether women with greater clinical needs are receiving timely alternative lactation support.

The analytical workflow used reproducible computer based data management and multivariable regression, but software choice is secondary to transparent epidemiological specification. The clinically important interpretation is the adjusted association between each factor and EIBF, with effect size, precision, and statistical significance reported consistently. The reporting approach follows

established regression and observational-study principles^{28,29,35}.

Because the study was conducted in a single primary healthcare facility, the estimates primarily reflect the service context of Puskesmas Kecamatan Kebayoran Baru during the study period. Findings should therefore be generalized to other facilities cautiously, particularly where delivery pathways, staffing patterns, or referral systems differ.

The pattern of adjusted associations is also consistent with evidence from other low and middle income settings in which delivery related practices and the immediate care environment strongly influence timely breastfeeding initiation. Studies in Nepal, Ethiopia, and Bangladesh have reported associations involving antenatal preparation, mode of delivery, maternal or newborn condition, and support at birth^{16,17,18,33}. The present study extends this evidence by showing that, within a primary-care setting in South Jakarta, service factors occurring close to the time of birth - particularly skin to skin contact and direct health worker assistance - retained stronger adjusted associations than more distal factors such as knowledge or family support. This pattern does not prove a causal hierarchy, but it provides a practical basis for prioritizing care processes that can be changed directly within the facility.

The contrast between significant service factors and non significant maternal knowledge or family support is important for intervention design. Education and family engagement remain valuable components of breastfeeding promotion, as reflected in Indonesian primary-care studies^{20,21,22}, but the findings suggest that preparedness must be matched by an enabling clinical environment. A knowledgeable and well-supported mother may still experience delayed initiation if caesarean recovery, newborn stabilization, routine separation, or delayed staff assistance prevents early contact.

Conversely, standardized skin to skin care and active assistance may create opportunities for EIBF even when maternal confidence or family involvement is limited. Therefore, facility interventions should combine education with reliable first hour clinical processes rather than treating either approach as sufficient in isolation.

The non significant estimates for preterm birth and low birth weight also require careful interpretation. Preterm birth was associated with lower odds in direction, but the 95% CI included the null, while low birth weight showed no adjusted evidence of reduced EIBF. Clinically vulnerable newborns may still face breastfeeding challenges, and international evidence recognizes the importance of early lactation support when direct breastfeeding is delayed^{6,24,34}. In this dataset, however, the available number of preterm and low birth weight infants produced imprecise estimates. The appropriate conclusion is therefore not that these conditions are unimportant, but that they were not demonstrated as independent determinants after adjustment in this sample. Larger multicentre studies would provide greater precision for these neonatal subgroups.

EIBF should be treated as a measurable quality of care indicator in maternal and neonatal services. Delivery registers should document whether breastfeeding began within one hour, whether immediate skin to skin contact occurred, and whether practical breastfeeding assistance was provided. These indicators allow facility managers to identify delays in the first hour care pathway and target corrective action.

Counselling should begin during antenatal care and be reinforced around delivery. Antenatal education can prepare mothers for colostrum feeding, correct misconceptions about early milk production, and establish expectations about skin to skin contact and breastfeeding assistance after birth^{20,22}.

Repeated counselling is particularly useful because the immediate postpartum period may be physically and emotionally demanding.

Family involvement remains appropriate as a supportive strategy, but the present adjusted model did not establish husband/family support as an independent determinant. Health workers may still involve husbands or relatives during antenatal education to reinforce maternal preferences and reduce practical barriers, while avoiding claims that family support alone will ensure timely initiation.

Facilities should also establish pathways for caesarean and complicated births, the two clinical factors independently associated with lower EIBF. When direct breastfeeding in the first hour is temporarily not feasible, early lactation counselling, colostrum expression when appropriate, and mother infant contact as soon as clinically stable can help preserve breastfeeding opportunities.

For implementation, facility teams should prioritize modifiable processes rather than use the regression equation as an individual prediction score. The adjusted results identify service areas that warrant attention at the population and facility level, while clinical decisions for individual mothers and newborns should continue to follow maternal neonatal condition and established care protocols.

A practical response to these findings is a standardized first hour breastfeeding care bundle. Such a bundle can begin during antenatal care with a documented breastfeeding plan, continue in the delivery room with immediate skin to skin contact for clinically stable mother neonate pairs, and require direct observation or assistance with the first breastfeed before routine separation. For caesarean or complicated births, the bundle should specify who reassesses readiness for contact and breastfeeding, when lactation assistance is activated, and how delays are

documented. Facility teams can review these process indicators alongside EIBF coverage each month and use missed cases for focused quality-improvement review. This approach is consistent with evidence supporting integrated facility-based breastfeeding promotion rather than isolated educational activities^{24,25,26,27}.

Strengths and Limitations

Strengths of this study include the use of empirical field data from a defined primary care setting, consecutive recruitment, a clearly defined EIBF outcome, simultaneous multivariable adjustment, reporting of aORs with 95% CIs, and consistent distinction between statistically significant and non significant adjusted estimates. The analysis includes maternal, neonatal, family, and service related factors that are directly relevant to breastfeeding care.

Several limitations should be considered. The cross sectional design does not establish causality or temporal mechanisms beyond the documented delivery care sequence. Data from one Puskesmas may limit external generalizability, and consecutive sampling may not represent all births in South Jakarta. Some exposure variables, including counselling, support, and knowledge, may be affected by reporting or measurement error. Residual confounding from unmeasured clinical, sociocultural, or facility factors is also possible. The number of non-EIBF outcomes limited precision for weaker associations, as reflected by wide CIs for family support, maternal knowledge, preterm birth, and low birth weight. Future research should replicate the analysis across multiple Puskesmas and include facility level characteristics such as staffing, delivery volume, referral pathways, and implementation fidelity for skin to skin and breastfeeding protocols. Prospective designs could clarify the temporal sequence between counselling, support, clinical events, and EIBF, while larger

samples would improve precision for preterm and low birth weight subgroups. Multicentre data would also allow assessment of between facility variation and determine whether the adjusted associations observed in Kebayoran Baru remain stable across different primary care contexts. These extensions would strengthen the evidence base for scalable quality improvement strategies without converting the current explanatory model into an individual clinical prediction tool.

Recommendations

Primary healthcare facilities are encouraged to standardize immediate skin to skin contact, provide breastfeeding counselling throughout antenatal and delivery care, ensure prompt hands on assistance from trained health workers, and strengthen first hour care for caesarean or complicated births. Future multicentre studies should assess whether these associations are consistent across different Puskesmas settings and evaluate facility level implementation strategies prospectively.

Conclusion

EIBF was achieved by 69.4% of mother neonate pairs at Puskesmas Kecamatan Kebayoran Baru. Immediate skin to skin contact, breastfeeding counselling, health worker support, and at least four antenatal care visits were independently associated with higher odds of timely initiation, whereas caesarean section and maternal/neonatal complications were independently associated with lower odds. Husband/family support, adequate maternal knowledge, preterm birth, and low birth weight were not independently significant after adjustment. Strengthening modifiable service practices across antenatal, delivery, and immediate postpartum care may improve timely breastfeeding initiation in primary healthcare settings.

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Conflict of Interest Statement

The author(s) declare no commercial, financial, or personal conflicts of interest related to this research. All authors approved the final manuscript and consented to its publication in *Healthy Tadulako Journal*.

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