



# Birth Patterns and Delayed Breastfeeding Initiation in Indonesia

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**Objectives:** This study was conducted to examine the association between birth patterns (defined in terms of birth order and interval) with delayed breastfeeding initiation in Indonesia.

**Methods:** A cross-sectional study was carried out using data from the Indonesian Demographic and Health Survey 2017. The weighted number of respondents was 5693 women aged 15-49 years whose youngest living child was less than 2 years old. Multivariable logistic regression was conducted to evaluate associations between birth patterns and delayed breastfeeding initiation after adjusting for other covariates.

**Results:** This study found that 40.2% of newborns in Indonesia did not receive timely breastfeeding initiation. Birth patterns were significantly associated with delayed breastfeeding initiation. Firstborn children had 77% higher odds of experiencing delayed breastfeeding initiation (adjusted odds ratio, 1.77; 95% confidence interval, 1.02 to 3.04;  $p < 0.05$ ) than children with a birth order of 4 or higher and a birth interval  $\leq 2$  years after adjusting for other variables.

**Conclusions:** Firstborn children had higher odds of experiencing delayed breastfeeding initiation. Steps to provide a robust support system for mothers, especially first-time mothers, such as sufficient access to breastfeeding information, support from family and healthcare providers, and national policy enforcement, will be effective strategies to ensure better practices regarding breastfeeding initiation.

**Key words:** Breastfeeding, Birth order, Birth intervals, Newborn, Indonesia, Logistic models

## INTRODUCTION

Early breastfeeding initiation is a precious key to give newborns the best start in life, as well as allowing them to grow

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and develop optimally. Starting to breastfeed within the first hour of birth can reduce infants' risk of neonatal mortality and morbidity [1-3]. Prior studies have identified that delayed breastfeeding initiation (more than 24 hours after birth) doubles the risk of neonatal mortality, while putting the infant to the mother's breast within 2-23 hours after delivery increases the risk by 33% compared to infants who receive early breastfeeding initiation [4]. Early breastfeeding initiation ensures that the newborn will receive colostrum, which contains essential nutrients, antibodies, immunologic components, and growth factors that play a vital role in growth and development, as well as building the immune system of the infant [5].

Other benefits that are obtained from early breastfeeding initiation are strengthening the mother-infant bond, reducing the risk of postpartum bleeding, lowering the risk of obesity post-delivery, lengthening the birth spacing period, and reducing the risk of breast and ovarian cancer in the long run [2].

Although the World Health Organization (WHO) has recommended that mothers initiate breastfeeding within the first hour of birth, 3 out of 5 newborns worldwide have delayed breastfeeding initiation [5]. Rates of delayed breastfeeding initiation vary throughout the globe. The highest rate has been reported in East Asia and the Pacific (68%), while eastern and southern Africa have the lowest rate of delayed breastfeeding initiation (35%) [5]. Indonesia also faces a similar situation, and increasing early breastfeeding in Indonesia remains challenging. The 2012 Indonesian Demographic and Health Survey (IDHS) indicated that more than half of all newborns (50.7%) experienced delayed breastfeeding initiation [6].

Several factors have been identified as predictors of delayed breastfeeding initiation, including child-related characteristics, maternal characteristics, socioeconomic and demographic factors, family or household factors, utilization of healthcare, and cultural factors [4,7,8]. Birth order is a child-related factor for which inconsistent results have been found. Its association with delayed breastfeeding initiation shows no clear pattern. Some studies found that the odds of delayed breastfeeding initiation decreased with the birth order, such that firstborn children were more likely to experience delayed breastfeeding initiation than those with a higher birth order [9-11]. However, other studies reported the opposite pattern, according to which a higher birth order was associated with a greater risk of delayed breastfeeding initiation [12,13]. Previous studies conducted in South Asia did not find a significant association between birth order and delayed breastfeeding initiation [1,14]. As a related parameter, birth interval refers to the time gap between 2 consecutive live births. An optimal birth interval has been linked to better maternal and child health. Studies conducted in India and West Africa reported that the birth interval had a significant association with early breastfeeding initiation [9,15].

Previous studies have focused on identifying the relationship between birth order and delayed breastfeeding initiation, without considering the combined effect of birth order and birth interval. Evaluating the combination of birth order and birth interval can yield deeper insights into family structure. The associations of birth patterns (i.e., birth order and birth in-

terval) with delayed breastfeeding initiation have not been widely discussed in studies conducted in Indonesia. The birth rate among childbearing-age women in Indonesia is relatively stable, but the total fertility rate, at 2.4 births per woman, remains above the nation's target of a replacement fertility level (2.1 births per woman) [16]. This means that the average woman in Indonesia gives birth to more than 2 children during her life [16]. Furthermore, the birth interval in Indonesia varies widely, ranging from 7 months to more than 60 months [16]. Understanding patterns of delayed breastfeeding initiation based on birth order and interval is essential for determining suitable strategies to ensure the provision of early breastfeeding initiation to all newborns. Hence, this study was conducted to assess the associations of birth order and interval with delayed breastfeeding initiation in Indonesia.

## METHODS

### Data Source

This study used secondary data from the IDHS 2017. The IDHS 2017 is the eighth demographic survey in Indonesia conducted under the auspices of the Demographic and Health Survey program. This cross-sectional survey was completed in December 2017, and the "kids recode" dataset was used for this study.

### Sample Size and Sampling

The sample selection process of the IDHS 2017 was designed to represent the national population of the age group 15-49 years old. Two-stage stratified sampling was used as the sampling design. At the first stage, the sample frame from the latest Indonesian population census was used to select census blocks through the probability proportional to size technique. Systematic selection of households in each selected census block from the updated household record list was carried out as the next stage. The inclusion criteria for this study were women aged 15-49 years old whose youngest living child was less than 2 years old and living with her. The weighted number of respondents was 5693 mothers.

### Study Variables

Delayed breastfeeding initiation was the outcome variable of this study. This variable was measured by asking mothers how much time passed before she put her last child on the breast after delivery [16,17]. Delayed breastfeeding initiation

was defined as an interval of more than 1 hour before the mother placed the newborn on her chest [18].

The predictors in this study were birth order and birth interval. Birth order indicated the order in which children were born in the family [17]. Birth interval was calculated based on the difference between the date of birth of the last child and the previous child [17]. These variables were classified into 5 categories, as follows: second or third child (interval  $>2$  years), first birth, second or third child (interval  $\leq 2$  years), fourth or higher child (interval  $>2$  years), and fourth or higher child (interval  $\leq 2$  years) [9]. This combined variable was used to explore the relationship between birth patterns that described the family structure and the provision of early breastfeeding initiation.

Potential confounders were identified from previous studies, including child-related factors, parental factors, household factors, and factors related to access to healthcare [1,7,8,11,14,19]. Child-related factors consisted of the sex of the child (female or male) and size at birth (large, average, or small) [1,11]. The size of a child at birth was assessed subjectively by its mother [17].

Parental factors included maternal and paternal information. The age of mothers was grouped into 5-year intervals [20]. The mother's occupation was classified into 3 categories (not working, unskilled labor, and professional). Mothers were classified as engaging in unskilled labor if their occupations were self-employed farmer, grocery clerk, cleaner, sweeper, domestic worker, or unskilled manual, while the category of professional occupations included science and engineering professionals, health professionals, teaching professionals, business and administration professionals, and information and communications technology, legal, social and cultural professionals [17]. All husbands worked; therefore, their types of employment were classified into agricultural work (also including fishermen, foresters, and hunters) and non-agricultural work (professional, technical, managerial, clerical, industrial, and service jobs) [17]. Other factors were the husband's educational attainment (none/incomplete primary, complete primary or some secondary, and complete secondary or higher) and the age difference of the mother and father (mother is older, 0-4 years younger, 5-7 years younger, or  $>7$  years younger) [15,21]. The mother's knowledge level was a composite measure of the mother's educational level and exposure to mass media. It was classified into three categories (low, medium, and high) [21].

Household factors included household size ( $<4$  and  $\geq 4$  family members) [20], number of living children (1-2 and  $\geq 3$ ), the wealth index, and residence (rural and urban) [19]. The house-

hold wealth index was calculated based on assets owned by the household, type of housing, clean water access, and sanitation facilities [17]. The score was divided into 5 categories based on quintile (poorest, poor, middle, richer, and richest) [7,8]. Small and large cities, as well as towns, were classified as urban areas, while rural areas were in the countryside [17].

Factors related to access to healthcare included the place of delivery (health facility and non-health facility) [8], assistance during delivery (non-health professional and health professional), number of antenatal care visits ( $<4$  and  $\geq 4$ ), and control over the woman's healthcare (husband or others, joint decision, and mother) [21].

### Statistical Analysis

Data were analyzed using univariable, bivariable, and multivariable analysis. Associations between the independent and control variables with delayed breastfeeding initiation that were reported in the bivariable analysis were then examined using multivariable logistic regression to control for potential confounders. All variables with a  $p$ -value  $<0.25$  in the bivariable analysis were included in the initial multivariable model [22]. A backward elimination procedure was used to identify factors independently associated with delayed breastfeeding initiation. In the final model, variables with a  $p$ -value  $<0.05$  were considered statistically significant. Stata version 14 (StataCorp., College Station, TX, USA) was used to perform this analysis.

### Ethics Statement

All respondents provided written informed consent to participate in the IDHS 2017 before data collection. Ethical approval for the IDHS 2017 was granted by Inner City Fund (ICF) International and the Ministry of Health of Indonesia. Permission for dataset usage was obtained from ICF International.

## RESULTS

### Characteristics of Respondents

The proportion of delayed breastfeeding initiation among children in Indonesia was 40.2%. Most of the respondents were second or third children with a birth interval of more than 2 years after their previous siblings (51.5%). Table 1 also presents child-related, parental, and household characteristics, as well as factors related to access to healthcare. Slightly more than half of the children were male (51.2%) and had an average size at birth (57.7%). The highest proportion of children

**Table 1. Weighted characteristics of respondents (n=5693)**

Characteristics	n (%)
Delayed breastfeeding initiation	
Yes (delayed breastfeeding initiation)	2291 (40.2)
No (early breastfeeding initiation)	3403 (59.8)
Birth pattern (birth order and interval y)	
First birth	1847 (32.4)
Second or third child, >2	2933 (51.5)
Second or third child, ≤2	236 (4.2)
Fourth or higher child, >2	588 (10.3)
Fourth or higher child, ≤2	89 (1.6)
Child-related factors	
Sex of child	
Female	2780 (48.8)
Male	2913 (51.2)
Size of child at birth	
Large	1785 (31.4)
Average	3286 (57.7)
Small	623 (10.9)
Parental factors	
Mother's age (y)	
15-19	223 (3.9)
20-24	1129 (19.8)
25-29	1537 (27.0)
30-34	1477 (26.0)
35-39	969 (17.0)
40-44	315 (5.5)
45-49	44 (0.8)
Mother's knowledge level	
Low	94 (1.7)
Medium	3879 (68.1)
High	1720 (30.2)
Mother's occupation	
Not working	3222 (56.6)
Unskilled labor	2026 (35.6)
Professional	446 (7.8)
Husband/partner's occupation	
Agricultural	2797 (49.1)
Non-agricultural	2897 (50.9)
Husband/partner's educational attainment	
None/incomplete primary education	363 (6.4)
Complete primary or some secondary	2481 (43.6)
Complete secondary or higher	2849 (50.0)
Age difference between mother and father (y)	
Mother is older than husband	1086 (19.1)
0-4	2301 (40.4)
5-7	1190 (20.9)
>7	1117 (19.6)

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**Table 1. Continued from the previous**

Characteristics	n (%)
Household factors	
Household wealth index	
Poorest	1057 (18.6)
Poorer	1154 (20.3)
Middle	1154 (20.3)
Richer	1214 (21.3)
Richest	1114 (19.6)
Household size (n)	
<4	505 (8.9)
≥4	5188 (91.1)
No. of living children	
1-2	4019 (70.6)
≥3	1674 (29.4)
Residence	
Urban	2809 (49.3)
Rural	2884 (50.7)
Factors related to access to healthcare	
Place of delivery	
Non-health facility	821 (14.4)
Health facility	4873 (85.6)
Assistance during delivery	
Non-health professional	308 (5.4)
Health professional	5386 (94.6)
No. of antenatal care visits	
<4	380 (6.7)
≥4	5313 (93.3)
Control over woman's healthcare	
Husband or others	616 (10.8)
Joint decision	2511 (44.3)
Mother	2555 (44.9)

had mothers in the age group of 25-29 years (27.0%). Most of the mothers had medium knowledge levels (68.1%) and were unemployed (56.6%). Half of the fathers worked in the non-agricultural sector (50.9%) and had completed secondary or tertiary education (50.0%). The largest proportion of children (40.4%) had parents with an age difference of 0-4 years.

Most of the respondents were in the middle to upper socio-economic status groups (61.2%), consisting of the middle class (20.3%), richer (21.3%), and richest (19.6%). The majority (91.1%) lived with several (≥4) family members in the same house and had 1 or 2 living children (70.6%). The proportion living in rural (50.7%) and urban (49.3%) settings was almost the same.

Respondents had good access to healthcare, especially related to pregnancy and childbirth services. Almost 85.6% of

**Table 2.** Distribution of birth patterns by delayed breastfeeding initiation

Variables	n	Delayed breastfeeding initiation		$\chi^2$	p-value
		Yes	No		
Birth pattern (birth order and interval y)				44.43	<0.001
First birth	1847	46.2 (43.3, 49.1)	53.8 (50.9, 56.7)		
Second or third child, >2	2933	37.0 (34.8, 39.3)	63.0 (60.7, 65.2)		
Second or third child, ≤2	236	38.3 (31.7, 45.4)	61.7 (54.6, 68.3)		
Fourth or higher child, >2	588	39.7 (35.4, 44.2)	60.3 (55.8, 64.6)		
Fourth or higher child, ≤2	89	30.8 (21.1, 42.5)	69.2 (57.5, 78.9)		

Values are presented as % (95% confidence interval).

**Table 3.** Associations between birth patterns and delayed breastfeeding initiation

Variables	Univariable		Multivariable	
	OR (95% CI)	p-value	aOR (95% CI) <sup>1</sup>	p-value
Birth pattern (birth order and interval y)				
Fourth or higher child, ≤2	1.00 (reference)		1.00 (reference)	
Fourth or higher child, >2	1.48 (0.87, 2.51)	0.15	1.55 (0.91, 2.61)	0.10
Second or third child, ≤2	1.40 (0.78, 2.51)	0.27	1.30 (0.72, 2.36)	0.38
Second or third child, >2	1.32 (0.79, 2.22)	0.29	1.26 (0.75, 2.13)	0.39
First birth	1.93 (1.15, 3.25)	0.01	1.77 (1.02, 3.04)	0.04
Child-related factors				
Sex of child				
Male	1.00 (reference)		-	
Female	0.98 (0.87, 1.11)	0.78	-	
Size of child at birth				
Smaller	1.00 (reference)		1.00 (reference)	
Larger	0.93 (0.80, 1.07)	0.30	0.90 (0.71, 1.14)	0.15
Average	1.36 (1.09, 1.69)	<0.01	1.30 (1.04, 1.63)	<0.05
Parental factors				
Mother's age (y)				
15-19	1.00 (reference)		-	
20-24	0.86 (0.60, 1.23)	0.41	-	
25-29	0.80 (0.56, 1.14)	0.23	-	
30-34	0.73 (0.51, 1.05)	0.09	-	
35-39	0.75 (0.52, 1.08)	0.12	-	
40-44	0.74 (0.48, 1.15)	0.18	-	
45-49	1.07 (0.45, 2.57)	0.88	-	
Mother's knowledge level				
Low	1.00 (reference)		-	
Medium	1.40 (0.91, 2.16)	0.13	-	
High	1.39 (0.89, 2.18)	0.14	-	
Mother's occupation				
Unskilled labor	1.00 (reference)		-	
Not working	1.05 (0.92, 1.21)	0.45	-	
Professional	1.04 (0.82, 1.30)	0.76	-	

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Table 3. Continued from the previous page

Variables	Univariable		Multivariable	
	OR (95% CI)	p-value	aOR (95% CI) <sup>1</sup>	p-value
Husband/partner's occupation				
Agricultural	1.00 (reference)		-	
Non-agricultural	0.99 (0.87, 1.13)	0.89	-	
Husband/partner's educational attainment				
None/incomplete primary education	1.00 (reference)		-	
Complete primary or some secondary	0.85 (0.65, 1.10)	0.21	-	
Complete secondary or higher	0.86 (0.66, 1.12)	0.27	-	
Age difference between mother and father (y)				
>7	1.00 (reference)		1.00 (reference)	
Mother is older than husband	1.32 (1.07, 1.62)	<0.05	1.31 (1.06, 1.61)	<0.05
0-4	1.19 (0.99, 1.41)	0.06	1.18 (0.98, 1.40)	0.07
5-7	1.13 (0.92, 1.40)	0.24	1.15 (0.93, 1.43)	0.20
Household factors				
Household wealth index				
Richest	1.00 (reference)		1.00 (reference)	
Poorest	1.00 (0.81, 1.24)	0.98	0.90 (0.71, 1.14)	0.39
Poorer	1.04 (0.84, 1.30)	0.69	0.97 (0.77, 1.22)	0.79
Middle	1.03 (0.83, 1.28)	0.78	1.00 (0.80, 1.24)	0.97
Richer	1.24 (1.01, 1.52)	<0.05	1.23 (1.00, 1.51)	<0.05
Household size (n)				
≥4	1.00 (reference)		1.00 (reference)	
<4	0.87 (0.69, 1.09)	0.25	1.04 (0.81, 1.34)	0.74
No. of living children				
≥3	1.00 (reference)		1.00 (reference)	
1-2	1.26 (1.09, 1.44)	<0.01	1.15 (0.96, 1.37)	0.13
Residence				
Urban	1.00 (reference)		1.00 (reference)	
Rural	1.11 (0.96, 1.28)	0.17	1.16 (0.99, 1.35)	0.07
No. of antenatal care visits				
≥4	1.00 (reference)		1.00 (reference)	
<4	0.85 (0.68, 1.07)	0.17	0.81 (0.64, 1.03)	0.08
Access to health factors				
Place of delivery				
Health facility	1.00 (reference)		-	
Non-health facility	0.96 (0.80, 1.14)	0.62	-	
Assistance during delivery				
Non-health professional	1.00 (reference)		-	
Health professional	1.00 (0.77, 1.32)	0.98	-	
Control over woman's healthcare				
Husband or others	1.00 (reference)		1.00 (reference)	
Joint decision	1.07 (0.86, 1.33)	0.57	1.08 (0.87, 1.35)	0.49
Mother	0.93 (0.75, 1.17)	0.54	0.95 (0.76, 1.20)	0.69

OR, odds ratio; CI, confidence interval; aOR, adjusted odds ratio.

<sup>1</sup>Adjusted by size of child at birth, age difference between mother and father, household index, household size, number of living children, residence, number of antenatal care visits, control over women's healthcare.



mothers delivered their babies at a health facility. Furthermore, 94.6% had maternal health checks by health professionals. The majority (93.3%) also had more than 4 antenatal care visits. They had high control over their healthcare, as 44.9% of them were decision-makers.

### Distribution of delayed breastfeeding initiation status and birth patterns

First children had the highest proportion of children who were not breastfed within the first hour of birth (46.2%; 95% confidence interval [CI], 43.3 to 49.1). Delayed breastfeeding initiation became less common as the birth order increased (Table 2).

### Associations of Birth Pattern and Control Variables With Delayed Breastfeeding Initiation

In the univariable analysis, first children showed an association with delayed breastfeeding initiation (odds ratio [OR], 1.93; 95% CI, 1.15 to 3.25;  $p=0.01$ ) (Table 3). Control variables that were also reported to have significant associations with delayed breastfeeding initiation were the size of the child at birth, the age difference of the mother and father, the household wealth index, and the number of living children (Table 3).

In the multivariable analysis, the size of child at birth, the age difference between the mother and father, the household wealth index, household size, the number of living children, residence, number of antenatal care visits, and control over women's healthcare were covariates that remained significant in the final model. Those covariates influenced the relationship between birth patterns and delayed breastfeeding initiation. However, even when controlling for these covariates, first children were more likely not to be breastfed within the first hour after birth. They had 77% (adjusted OR, 1.77; 95% CI, 1.02 to 3.04;  $p<0.05$ ) higher odds of experiencing delayed breastfeeding initiation than children with a birth order of 4 or higher and a birth interval  $\leq 2$  years after adjusting for the control variables (Table 3). The odds of delayed breastfeeding initiation in the other birth pattern categories did not show significant differences from the reference group (fourth or higher child, interval  $\leq 2$  years) (Table 3).

## DISCUSSION

Our study found that 2 out of 5 newborns in Indonesia did not receive early breastfeeding initiation. This finding is not

strikingly different from those of prior studies conducted in Costa Rica, Fiji, Zimbabwe, Nigeria, Sierra Leone, Burkina Faso, and the Philippines [5,20,23]. The rate of delayed breastfeeding initiation in Indonesia was lower than the rates worldwide and in Asia [5]. Nevertheless, this issue still requires attention because the rate was above the Global Breastfeeding Collective target. A global partnership led by WHO and United Nations Children's Fund targeted the goal of 70% of newborns receiving early breastfeeding initiation by 2030 [18].

The trend of early breastfeeding initiation in Indonesia increased in the last 2 decades. The rate of early breastfeeding initiation increased more than 7 times compared to 1997 [16, 24]; as such, the proportion of infants who received delayed breastfeeding initiation decreased considerably. The enforcement of national policies regarding breastfeeding practice may contribute to the achievements of breastfeeding-related goals, although the implementation was not optimal [25]. The reduction in delayed breastfeeding initial can be attributed to several strategies and comprehensive programs supporting breastfeeding practice, such as providing mother and baby-friendly healthcare, increasing the skills of healthcare providers, facilitating breastfeeding support groups in the community, and providing adequate information access about breastfeeding [26].

In this study, we identified an association between birth patterns, operationalized as a composite measure combining birth order and birth interval, with delayed breastfeeding initiation. In both the univariable and multivariable analysis, the odds of firstborn children experiencing delayed breastfeeding initiation was higher than that of children with a birth order of 4 or higher who had a birth interval of  $\leq 2$  years (the reference group), but the odds of delayed breastfeeding initiation did not differ between other groups and the reference group. This finding is consistent with some studies that were conducted in Ethiopia and Namibia [10,11]. Those studies reported that the risk of delayed breastfeeding initiation decreased as the birth order increased. A study conducted in West Africa also reported that firstborn children had 22% lower odds of receiving early breastfeeding initiation than children with a birth order of 2 or 3 and a birth interval of more than 2 years (the reference group). The other groups showed no difference in the odds of early breastfeeding initiation from the reference group [9].

Firstborn children were at the highest risk for not receiving early breastfeeding initiation. For other birth orders, both with short and long intervals, there was no significant difference in

early breastfeeding initiation practices from the reference group, perhaps because the mothers had gained experience from the first child or the preceding birth. Mothers who had multiple children might have experienced changes in knowledge, awareness, beliefs, and behaviors regarding breastfeeding practices [7,10]. Both short (<24 months) and long ( $\geq$ 24 months) birth intervals have been associated with a higher likelihood of early breastfeeding initiation than firstborn children [7,9]. The mother's intention to breastfeed was similar regardless of whether they gave birth at short, intermediate, or long birth intervals [27].

The finding of higher odds of delayed breastfeeding initiation for firstborn children might be due to emotional distress, lack of maternal knowledge, lack of support from the family or healthcare providers, and lack of preparedness [28,29]. First births are also associated with a higher risk of childbirth complications [30], of which the most commonly reported was prolonged labor [16]. The majority of those cases were born through cesarean delivery, which has been established as a barrier to timely breastfeeding initiation [3,16,31,32]. A baby that is born by cesarean section is separated from the mother for a while. If a healthcare provider responsible for taking the baby from the recovery ward is not available, the time to initiate early breastfeeding may be missed [28].

First-time mothers have been reported to face more challenges in breastfeeding practice [33,34]. Despite intending to breastfeed, some of them felt insecure [29]. Ensuring adequate access to breastfeeding information through counseling at antenatal care visits and providing a strong support system are expected to increase breastfeeding initiation among first-time mothers [1,29]. Although in this study, the number of antenatal care visits did not show an association with delayed breastfeeding initiation, antenatal care is an entry point for providing intensive information and counseling about breastfeeding, since almost all mothers visited antenatal care for pregnancy check-ups. In fact, in this study, only 2% of mothers never visited antenatal care for their most recent birth [16]. The WHO also recommends that mothers and their husbands should be informed about breastfeeding as part of antenatal care in order to prepare for breastfeeding practice and to address any breastfeeding difficulties that they may face [18]. A communication session is included in the 10 essential services that are provided in antenatal care [18]. Breastfeeding is one of the topics that is presented in that session. A previous study reported that only 40.8% of mothers received breastfeeding information and

counseling in antenatal care [35]. Hence, addressing the needs of first-time mothers related to breastfeeding initiation and practice is a crucial issue that merits attention.

This study also found significant associations between the control variables and delayed breastfeeding initiation. The univariable analysis found that the size of child at birth, the age difference between mother and father, the household wealth index, and the number of living children were associated with delayed breastfeeding initiation, but only the size of child at birth and the age difference of the mother and father had significant associations in the multivariable analysis. Babies born with an average size had higher odds of experiencing delayed breastfeeding initiation than smaller babies. This finding does not align with those of studies conducted in the Economic Community of West African States countries and Nepal [9,14]. This finding might be explained by the awareness of health workers that babies with a low weight at birth should make skin-to-skin contact with the mother to receive early breastfeeding initiation and prevent hypothermia [14]. Larger babies were more likely to receive early breastfeeding initiation than smaller babies, although this difference was not statistically significant. Larger babies have a mature sucking reflex and are less likely to receive intensive care [9,14]. The parental age gap showed a significant relationship with delayed breastfeeding initiation. Mothers who were older than their husbands had a higher risk of delayed breastfeeding initiation. This association might be related to the risk of delivery complications experienced by older mothers, as well as the maturity and preparedness of the husband as a first-time father. Moreover, support from husband and family plays an essential role in helping mothers to initiate breastfeeding [11]. Other control variables, namely sex of the child, maternal age, parental education and occupation, household size, residence, number of antenatal care visits, and factors related to access to healthcare, did not show any associations with delayed breastfeeding initiation. These findings are consistent with those of previous studies [1,11,36].

This study was conducted in a developing country in Asia to identify the combined effects of birth order and birth interval on delayed breastfeeding initiation [9]. This study provides a deeper understanding of the family structure for breastfeeding initiation. Prior studies focused on the relationship of each variable (birth order or birth interval) with breastfeeding initiation separately [1,7,10-14,20,36]. Furthermore, it was necessary to obtain more evidence on breastfeeding initiation prac-



tices in Indonesia since the number of children and birth intervals vary widely throughout the country [16]. This study found that first-time mothers were more likely not to initiate breastfeeding within the first hour of birth. This finding is important for healthcare providers, as it underscores the need to ensure that all newborns receive early breastfeeding initiation. Another strength of this study is the data source. The IDHS 2017 represents national data for which the response rate was almost 100% [16]. This study also had minimal measurement bias. All the procedures and instruments used were validated. The fieldworkers were also trained before the survey was conducted to ensure that they had the a consistent understanding of the operational definitions of the variables.

Despite these strengths, a potential limitation of this study is recall bias. The data were collected from the mother's recall. This potential bias could not be controlled in this study, so the results might be underestimated or overestimated. However, we only included each woman's last birth in the 2 years before the survey, which may have minimized recall bias. Maternal recall related to breastfeeding practice was found to be valid and reliable when the recall period was 3 years or less [37]. Other limitations stem from the study design. Specifically, this cross-sectional study could not explain the causality of the relationship between birth order and delayed breastfeeding initiation.

National regulations have codified the rights of receiving timely breastfeeding initiation and exclusive breastfeeding. To optimize the implementation of these regulations, all parties have to carry out their roles. The Ten Steps to Successful Breastfeeding is the key action to facilitate early breastfeeding initiation and exclusive breastfeeding practice [26]. Periodic monitoring and evaluation are required to ensure the full implementation of breastfeeding policies.

The first birth is an important phase in which mothers start their new roles. Preparing first-time mothers regarding what they have to do in the early days after birth is a good investment, especially regarding breastfeeding practices. Healthcare providers initiate skin-to-skin contact between the mother and the baby to facilitate early breastfeeding in the postpartum period [38]. Furthermore, healthcare providers can pay particular attention to first-time mothers by becoming familiar with their needs related to breastfeeding preparation. Strong support from their husband, other family members, as well as the social environment can provide a robust support system to encourage first-time mothers to initiate breastfeeding.

## CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

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## AUTHOR CONTRIBUTIONS

Conceptualization: TDT, EA. Data curation: EA, JOR. Formal analysis: TDT, EA. Funding acquisition: None. Methodology: TDT, EA. Project administration: TDT. Visualization: TDT, SK. Writing – original draft: TDT, EA. Writing – review & editing : TDT, EA, SK, JOR.

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