

Exclusive Breastfeeding, Knowledge, and Attitudes Toward Breastfeeding of Mothers at a Tertiary Hospital in Thailand: A Cross-Sectional Study

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ABSTRACT

OBJECTIVE Breastfeeding offers numerous benefits for both mother and child. While many mothers attending follow-up visits at the Pediatrics outpatient center of a tertiary hospital in Thailand are still breastfeeding, the precise rate of exclusive breastfeeding (EBF) up to six months remains unclear. This study aims to assess the rate of 6-month EBF, maternal knowledge and attitudes toward breastfeeding, and risk factors for failure of EBF.

METHODS This cross-sectional study included Thai mothers with babies over six months old who had consulted with our breastfeeding center between September 1, 2020, and December 31, 2022. Participating mothers completed a questionnaire covering personal and obstetric information, past and current breastfeeding patterns, breastfeeding problems, breastfeeding knowledge (good score ≥ 12 out of 15), and attitudes (good score ≥ 40 out of 50). EBF rates and factors related to failure of non-exclusive breastfeeding were studied.

RESULTS The mean age of the 683 mothers in the study was 35.7 ± 3.5 years, with 62.8% being primiparous. Most babies were delivered full-term (98.2%). EBF was achieved in 87.7% of cases. The mean scores of knowledge and attitudes related to breast milk and breastfeeding were 14.5 ± 1.1 and 47.3 ± 2.5 , respectively. The majority were assessed as having good knowledge (97.4%) and positive attitudes toward breastfeeding (98.8%). Significant risk factors for failure of EBF included age ≥ 40 years, separated/divorced status, multiparity, working more than 8 hours/day, contraception use, breastfeeding problems, failure of EBF with a previous child as well as low EBF knowledge and poor EBF attitude scores. Multiparity, contraception use, and breastfeeding problems were significantly associated with EBF in multivariable analysis.

CONCLUSIONS This study showed a high rate of 6-month EBF. Most participating mothers had good knowledge and positive attitudes toward breastfeeding. Multiparity, contraceptive use, and breastfeeding problems were independent risk factors for failure to achieve EBF.

KEYWORDS attitude, breastfeeding, contraception, knowledge, parity

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INTRODUCTION

Breastfeeding has several benefits for both mother and child. Mothers who breastfeed have been found to have a lower incidence of many illnesses such as breast cancer, ovarian cancer, and diabetes mellitus (1). Infants and children who are breastfed and receive proper nutrition also have lower rates of sudden infant death syndrome, necrotizing enterocolitis, diarrhea, respiratory tract infections, otitis media, malnutrition, and demonstrate better growth and development (1, 2). Long-term benefits among children who were breastfed include better intelligence quotient (IQ), a higher likelihood of better education and income in adulthood, and a lower risk of obesity and diabetes mellitus (3).

The World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) recommend initiating breastfeeding within the first hour of life and practicing exclusive breastfeeding (EBF) for the first six months. Continued breastfeeding up to two years of age or beyond, with the addition of nutritious and age-appropriate complementary foods, is also recommended (4). However, the WHO reported in 2021 that the global rate of EBF was only 44.0% (1). Rates of EBF vary by country in different years, e.g., 44.9% in Laos in 2017, 62.1% in Nepal and 63.0% in Bangladesh in 2019, and 45.4% in Vietnam in 2021 (5-8).

In Thailand, the national breastfeeding promotion scheme was established in 1991 through the Baby-Friendly Hospital Initiative (BFHI) program (9). This program follows the "WHO Ten Steps to Successful Breastfeeding" (9). However, the Multiple Indicator Cluster Survey (MICS) in Thailand reported EBF rates of only 5.4% in 2006, 12.3% in 2012, 23.1% in 2016, 14.0% in 2021, and 29.0% in 2023 (10-14). These EBF rates are below the national target of 50.0% set by the 12th National Economic and Social Development Plan 2017-2021 of Thailand (15), as well as the global targets of 50.0% by 2025 and 70.0% by 2030 (4).

Many factors may influence the success of EBF in each country, including national policy, economic status, culture, and support from family members and healthcare providers. Even within the same country, such as Thailand, the specific areas where studies are conducted and the characteristic features of mothers and family

members in each study, e.g., working status, financial status and education as well as breastfeeding beliefs, knowledge, and attitudes, may also influence the success of EBF (16, 17).

Apart from these factors, the practices of health personnel in each hospital or region are another crucial foundation for successful breastfeeding. The hospital in this study adheres strictly to the "WHO Ten Steps to Successful Breastfeeding." It begins with one or more educational sessions about breastfeeding, one-to-one or small group classes, and video presentations for pregnant women. Close and individualized support is provided postpartum, with immediate and uninterrupted skin-to-skin contact after birth. Initiation of breastfeeding within one hour of delivery and every three hours thereafter is encouraged. Rooming-in is also standard practice unless contraindicated. These practices are followed regardless of the route of delivery. With a hospital policy supporting EBF, no formula milk products are displayed in-house. Formula feeding is allowed only if the mother or her infant has medical conditions that prohibit breastfeeding, or if the mother insists on this option after thorough counseling. Continual counseling about breastfeeding during follow-up visits is routinely practiced in the pediatric outpatient center. Any problems related to breastfeeding are identified and corrected appropriately.

Although most mothers who brought their babies for follow-up visits in the pediatric outpatient center at this hospital were still breastfeeding, their exact rate of EBF up to six months was uncertain. This study aimed to assess the rate of EBF, maternal knowledge about breast milk and breastfeeding, and attitudes toward breastfeeding. Maternal characteristics and related problems potentially associated with EBF failure were also studied.

METHODS

This study was approved by the Institutional Review Board (IRB) of MedPark Hospital, Bangkok (No. COA 002-2022E, approval date 30/03/2022). The cross-sectional study assessed the rate of 6-month EBF, maternal knowledge and attitudes toward breastfeeding, and risk factors for EBF failure. The study followed the Strengthening the Reporting of Observational Studies in

Epidemiology (STROBE) guidelines, which included the study design, setting, participants, variables, measurement, study size, and statistical methods (18). The study participants were Thai mothers who had delivered either at this hospital or elsewhere but who had consulted with the breastfeeding center at MedPark Hospital between September 1, 2020, and December 31, 2022. Consultations must have commenced within one month after delivery, and their babies must have been at least six months old at the time of the survey. We excluded mothers with health problems, those with babies who had health conditions prohibiting breastfeeding, and mothers who could not recall their breastfeeding patterns for the first six months after delivery.

Prior to the study, the questionnaires for parts three (knowledge) and four (attitudes) in the Thai version were constructed to fit with Thai culture and reviewed, discussed, and revised until consensus was reached among the researchers. The final set of questionnaires was then validated by three experts not involved in the study (one obstetrician and two neonatologists). Reliability was tested with 30 mothers having the same characteristics as the study participants. The reliability of the knowledge and attitude questionnaires was analyzed, yielding Cronbach's α of 0.82 and 0.91, respectively. Personal and obstetric data collected included age, marital status, parity, education, occupation, workplace, duration of daily work (hours), monthly family income, birthplace of the current child, route of delivery, gestational age, maternity leave, plans for the next child, contraception within six months postpartum, and breastfeeding patterns within six months after delivery of a previous child (if any) and the current child. Problems related to breastfeeding the current child were also recorded.

The maternal knowledge section comprised 15 statements about breastfeeding, breast milk, and formula milk, with answers categorized as "correct," "incorrect," or "not sure" (the latter was considered "incorrect"). The total knowledge score ranged from 0 (all incorrect) to 15 points (all correct). Maternal attitudes towards breastfeeding were assessed with ten statements, with each item scored from 1 (strongly disagree) to 5 (strongly agree). The total attitude score ranged from 10 (all strongly disagree) to 50 (all strongly agree).

Mothers who met the inclusion criteria were informed about the study through an information sheet and a verbal explanation provided by a research assistant. Participation in the study was voluntary, and mothers were assured that their decision would not affect their access to medical services. Mothers who consented to participate self-completed the questionnaire. Informed consent was waived as the questionnaire was self-administered. The questionnaire comprised four parts: personal and obstetrical data; breastfeeding patterns and related problems; knowledge about breastfeeding, breast milk, and formula milk; and attitudes toward breastfeeding. Participants could withdraw from the study at any point during the survey. Data collected from the questionnaire were processed in a de-identified and anonymous manner during analysis and presentation. All data were scheduled to be securely retained for a minimum of 5 years following the conclusion of the study, stored on a personal computer protected by an access code.

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 28.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were used to investigate the characteristics of the study variables. Continuous variables are presented as mean $\pm$ standard deviation (SD) for normally distributed data or as median and range for non-normally distributed data. Categorical variables are presented as frequency and percentage. For comparison, data are grouped as follows: monthly family income $\geq$ 2,930 USD (the average familial monthly income in Thailand) or less; workplace as "mainly work from home" or "mainly office work"; duration of daily work as $\leq$ eight hours (usual daily work hours) or $>$ eight hours; route of delivery as "cesarean section" or "vaginal delivery"; birthplace of the current child as "in this hospital" or "elsewhere"; maternity leave as "yes" if mothers could leave work for at least one month (minimum duration of permission); and contraception within six months postpartum as "yes" or "no." For the primary outcomes, the breastfeeding pattern for either the previous or current child was grouped as "EBF" (only breast milk without other food, liquid, or water) or "non-EBF" (formula milk or mixed formula and breast milk); both knowledge and attitude scores were categorized as either "good" or "higher" based on

a total knowledge score ≥ 12 and a total attitude score ≥ 40 , respectively (approximately 80.0% of the total score of each, based on Bloom's cutoff point (19)).

A univariable analysis was performed to identify risk factors for EBF failure. Data were compared using the Chi-square test or using Fisher's exact test if 20.0% of expected cell counts were less than 5. Variables that were statistically significant in the univariable analysis were used to identify independent factors of EBF in the multivariable analysis. A p -value < 0.05 was considered statistically significant.

RESULTS

Basic characteristics

Mothers had to be able to recall their feeding patterns over the six-month period following the birth of the child. During the study period, 811 mothers consulted with the pediatric outpatient center. Of those, a total of 128 mothers were excluded because they had delivered elsewhere and did not consult with a breastfeeding center within one month postpartum ($n = 11$), were unable to breastfeed due to health problems ($n = 5$), or had babies less than six months old at the time of the study ($n = 112$).

A total of 683 mothers who met the inclusion criteria agreed to participate in this survey study. The mean age $\pm$ SD was 35.7 ± 3.48 years, with the majority (87.6%) aged under 40. Answers to some questions were incomplete, leading to varying numbers of respondents for each question. The basic characteristics of the mothers and the percentages of their responses to each question are shown in Table 1. Almost all participants (99.3%) were married and had a bachelor's degree or higher (97.7%). Slightly more than half were self-employed or owned a business (60.4%), and more than two-thirds had a monthly family income between 2,930 and 8,800 USD (72.9%). Nearly two-thirds (62.8%) had only one child. Less than half (45.4%) either worked or stayed at home. The mean $\pm$ SD daily work hours were 7.8 ± 2.5 hours. After excluding the mothers who had undergone tubal sterilization, 71.3% of the remainder did not practice contraception. The most common contraceptive method used was condoms (22.9%). We found that 13.8% planned to have their next child within an interval of 2.40 ± 0.85 years (mean $\pm$ SD). Among those who had a previous child, 74.3% had a history of EBF.

Obstetrical history and breastfeeding pattern

Respondents provided obstetrical data, birthplace, and postpartum maternal leave for the current child (Table 2). The mean $\pm$ SD gestational age was 38.1 ± 0.61 weeks, with only 1.8% having

Table 1. General characteristics of the mothers in a tertiary hospital in Thailand (N = 683)

Variables	n (%)
General characteristics	
Age (year)	
< 40	598 (87.6)
≥ 40	85 (12.4)
Marital status	
Married	678 (99.3)
Separated/divorced	5 (0.7)
Parity	
Primipara	429 (62.8)
Multipara	254 (37.2)
Education	
Higher than bachelor	130 (19.0)
Bachelor's degree	537 (78.7)
Lower than bachelor's degree	16 (2.3)
Occupation (n = 666)	
Employee	195 (29.3)
Self employed	402 (60.3)
Others (housewife or unemployed)	69 (10.4)
Monthly family income, USD ^a (n = 674)	
More than 8,800	158 (23.4)
Between 2,930-8,800	491 (72.9)
Less than 2,930	25 (3.7)
Workplace (n = 674)	
Work from home	306 (45.4)
Office	357 (53.0)
Both	11 (1.6)
Daily work hours (n = 610)	
≤ 8 hours	535 (87.7)
> 8 hours	75 (12.3)
Contraception (n = 618)	
No contraception or natural method	141 (22.9)
Condom	21 (3.4)
Pills	2 (0.3)
Condom & pills	10 (1.6)
Calendar method	3 (0.5)
Abstinence	11 (1.7)
Plan next child (n = 652)	
Tubal sterilization	90 (13.8)
Yes planned	551 (84.5)
No plan yet	162 (74.3)
History of breast feeding until 6 months in prior child (n = 218)	
Exclusive breastfeeding	4 (1.8)
Mixed breastfeeding and formula feeding	162 (74.3)
Formula feeding, with or without food supplements	52 (23.9)

^a1 USD approximate to 34.12 THB (20).

Table 2. Obstetrical history and pattern of breastfeeding at six months and problems related to breastfeeding of current child among mothers in a tertiary hospital, Thailand (N = 683)

Variables	n (%)
Gestational age at delivery (n = 569)	
< 37 weeks	10 (1.8)
≥ 37 weeks	559 (98.2)
Mode of delivery (n = 677)	
Vaginal delivery	57 (8.4)
Cesarean section	620 (91.6)
Birthplace (n = 682)	
The hospital of this study	606 (88.9)
Elsewhere	76 (11.1)
Maternity leave of at least 1 month (n = 120)	
Could	106 (88.3)
Could not	14 (11.7)
Pattern of breastfeeding	
Exclusive breastfeeding	599 (87.7)
Mixed breastfeeding plus formula feeding	74 (10.8)
Formula feeding, with or without food supplements	10 (1.5)
Breastfeeding problems	
No	569 (83.3)
Yes	114 (16.7)
Yes, Breastfeeding problems (n = 123) ^a	
No assistance/support	10 (8.1)
Breast issues	56 (45.5)
Inadequate breastmilk	48 (39.0)
Lump forming	3 (2.4)
Mastitis	3 (2.4)
Cracked nipple	1 (1.8)
Breast pain	1 (1.8)
Busy work	23 (18.7)
Fatigue	14 (11.4)
Others	20 (16.3)
Covid-19 infection	8 (6.5)
Food allergy	1 (0.8)
Twins	5 (4.1)
Pregnancy	5 (4.1)
Premature birth	1 (0.8)

^aMultiple responses

delivered preterm (< 37 weeks of gestational age). The majority who had delivery at this hospital (88.9%), had a cesarean section (91.6%), and had maternal leave for more than one month (88.3%).

We found that 87.7% of the mothers in the study had EBF up to six months, 10.8% used a combination of breastfeeding and formula feeding, and 1.5% used only formula feeding. Unfortunately, data regarding the duration of breastfeeding among those who did not exclusively breastfeed were unavailable for most participants. Regardless of their breastfeeding pattern, 113 out of 683

mothers (16.5%) reported experiencing more than one problem with breastfeeding. The two most common problems were breast issues (45.5%) and busy work schedules (18.7%). Notably, nine mothers stopped breastfeeding without providing any reasons. Table 2 shows the breastfeeding patterns in the first six months after delivery and the breastfeeding-related problems.

Knowledge and attitudes toward breastfeeding

Out of 15 questions assessing knowledge of breast milk and breastfeeding, the mean $\pm$ SD score was 14.5 ± 1.1 . Up to 97.4% of participants were classified as having good knowledge (score ≥ 12). More than 90.0% gave correct answers for almost all questions (Table 3). The only statement with a lower rate of correct answers (81.1%) was regarding the effect of breastfeeding during pregnancy.

For the ten items assessing attitude toward EBF, the mean $\pm$ SD score was 47.3 ± 2.5 . Most respondents (98.8%) were categorized as having a good attitude (score ≥ 40). Nearly 90% or more of the responses to most statements were “strongly agree.” The three statements with lower percentages of “strongly agree” (ranging from 40.0% to 70.0%) were related to the impact of breastfeeding on the couple’s sexual relationship, working outside the home, and the mother’s daily living (Table 4).

Factors with a negative impact on EBF for six months

We explored maternal characteristic features that could potentially impact breastfeeding patterns (Table 5). Univariate analysis identified significant factors associated with or risk factors for failure of EBF during the first six-months postpartum including age ≥ 40 years, separated/divorced status, multiparity, working over eight hours/day, using contraception, breastfeeding problems with the current child, a history of failure of EBF with a previous child, low EBF knowledge score, and low EBF attitude score. Multivariable analyses using the logistic regression method were performed using five factors: age, parity, daily working hours, contraception, and breastfeeding problems. The independent risk factors for non-EBF with the current child were multiparity, use of contraception, and breastfeeding problems. Of note, four statistically significant

Table 3. Mothers' knowledge of breast milk and breastfeeding in a tertiary hospital, Thailand (N = 683)

Variables	Correct n (%)	Incorrect n (%)
1. Breastmilk has benefits over infant formula regardless of time*	681 (99.7)	2 (0.3)
2. Breastmilk reduces chance of diabetes mellitus in mother and her child*	674 (98.7)	9 (1.3)
3. Breastmilk is less nutritious than infant formula	655 (95.9)	28 (4.1)
4. Water should be fed after breastfeeding to reduce infant oral candidiasis	674 (98.7)	9 (1.3)
5. Infant fed with fortified-infant formula has higher IQ than BF infant	678 (99.3)	5 (0.7)
6. The risk of contamination in infant formula is higher than that of breast milk*	670 (98.1)	13 (1.9)
7. Preserved breastmilk has lower value than infant formula	674 (98.7)	9 (1.3)
8. Breastmilk reduces risk of respiratory tract infection in infant*	677 (99.1)	6 (0.9)
9. Pregnant mother should stop breastfeeding to avoid uterine contraction	554 (81.1)	129 (18.9)
10. Prolonged breastfeed increases risk of osteoporosis	648 (94.9)	35 (5.1)
11. Mother with health problems should avoid breastfeeding	668 (97.8)	15 (2.2)
12. Infant who had breastfeeding at night has similar risk of dental caries as those with formula milk	669 (98.0)	14 (2.0)
13. Mother who resumes her work should start breast pumping after 1 month	637 (93.3)	46 (6.7)
14. Food supplement for infant should be given after 6 months of age*	678 (99.3)	5 (0.7)
15. Infant should be exclusively breastfed for the first 6 months*	676 (99.0)	7 (1.0)

*Referred to true statements[#]**Table 4.** Attitudes of mothers towards breastfeeding in a tertiary hospital, Thailand (N = 683)

Variables	Level of agreement				
	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
1. It is the responsibility of mother to breastfeed	8 (1.2)	5 (0.7)	15 (2.2)	62 (9.1)	593 (86.8)
2. Breastfeeding is a means of bonding between mother and child	1 (0.1)	-	-	5 (0.7)	677 (99.1)
3. Breastfeeding enhances the confidence in potentiality and ability of a mother	2 (0.3)	2 (0.3)	11 (1.6)	41 (6.0)	627 (91.8)
4. Breastfeeding does not bother sexual relationship of the couples	4 (0.6)	25 (3.7)	193 (28.2)	165 (24.2)	296 (43.3)
5. Breastfeeding has no negative impact on working outside home	1 (0.1)	13 (1.9)	152 (22.2)	232 (34.0)	285 (41.7)
6. Breastfeeding does not bother daily living of mother	2 (0.3)	11 (1.6)	48 (7.1)	145 (21.2)	477 (69.8)
7. Breastfeeding has health benefits to both mother and child	-	1 (0.1)	2 (0.3)	49 (7.2)	631 (92.4)
8. Breastmilk has complete nutrition for infant	-	1 (0.1)	1 (0.1)	11 (1.6)	670 (98.1)
9. Breastmilk enhances brain growth and intellectual development of infant	-	1 (0.1)	1 (0.1)	14 (2.0)	667 (97.7)
10. Breastfeeding saves the family expenses	-	1 (0.1)	3 (0.4)	10 (1.5)	669 (98.0)

*Referred to true statements[#]

features from the univariable analysis were not included in the multivariable analysis because of statistical issues: small numbers in the comparative subgroups (marital status, history of EBF for six months with a previous child, knowledge, attitude toward EBF) and correlation with parity (history of EBF for six months with a previous child).

DISCUSSION

The achievement of an 88.0% EBF rate for six months in this study is notably high compared with the Thailand's national target goal of 50% by 2021 (15) and the WHO global target goal of 70% by 2030 (4). This rate also surpasses EBF figures reported from various countries (5-8, 21-24). The success of this hospital-based program in meeting and exceeding these targets can be

Table 5. Features associated with exclusive breastfeeding or as risk factors for non-exclusive breastfeeding in a tertiary hospital, Thailand (N = 683)

Variables	n	Exclusive breastfeeding		Crude OR (95% CI)	p	Adjusted OR (95% CI)	p
		Yes n (%)	No n (%)				
Age (year)							
< 40	599	530 (88.6)	68 (11.4)	1.00	-	1.00	-
≥ 40	85	69 (81.2)	16 (18.8)	1.81 (0.99-3.29)	0.050*	1.58 (0.78-3.21)	0.202
Marital status							
Married	678	598 (88.2)	80 (11.8)	1.00	-	-	-
Separate/divorced	5	1 (20.0)	4 (80.0)	29.90 (3.30-270.85)	< 0.001**	-	-
Occupation (N = 666)							
Self-employed	471	415 (88.1)	56 (11.9)	1.00	-	-	-
Employee	195	170 (87.2)	25 (12.8)	1.09 (0.66-1.80)	0.738*	-	-
Parity							
Primipara	429	393 (91.6)	36 (8.4)	1.00	-	1.00	-
Multipara	254	206 (81.1)	48 (18.9)	2.54 (1.60-4.05)	< 0.001*	2.08 (1.23-3.53)	0.006
Education							
> Bachelor	667	585 (87.7)	82 (12.3)	1.00	-	-	-
< Lower	16	14 (87.5)	2 (12.5)	1.02 (0.23-4.57)	1.000**	-	-
Family income, USD ^b (n = 674)							
≥ 2,930 USD	649	569 (87.7)	80 (12.3)	1.00	-	-	-
< 2,930 USD	25	21 (84.0)	4 (16.0)	1.36 (0.45-4.05)	0.538**	-	-
Workplace (n = 674)							
Work at home	306	270 (88.2)	36 (11.8)	1.00	-	-	-
Office or both	368	320 (87.0)	48 (13.0)	1.13 (0.71-1.79)	0.617*	-	-
Workhours/day (n = 610)							
≤ 8 hours	535	478 (89.3)	57 (10.7)	1.00	-	1.00	-
> 8 hours	75	59 (78.7)	16 (21.3)	2.27 (1.23-4.22)	0.008*	1.89 (0.97-3.71)	0.063
Birthplace (n = 682)							
MedPark hospital	606	534 (88.1)	72 (11.9)	1.00	-	-	-
Elsewhere	76	65 (85.5)	11 (14.5)	1.26 (0.63-2.49)	0.515*	-	-
Route of delivery (n = 677)							
Normal labor	57	46 (80.7)	11 (19.3)	1.00	-	-	-
Cesarean section	620	547 (88.2)	73 (11.8)	0.56 (0.28-1.13)	0.099*	-	-
Maternal leave (n = 120)							
Cannot	14	12 (85.7)	2 (14.3)	1.00	-	-	-
Can	106	84 (79.2)	22 (20.8)	1.57 (0.33-7.54)	0.733**	-	-
Contraception (n = 652)							
No	454	408 (89.9)	46 (10.1)	1.00	-	1.00	-
Yes	198	163 (82.3)	35 (17.7)	1.91 (1.18-3.06)	0.007*	1.76 (1.01-3.09)	0.048
Plan for next child (n = 652)							
Yes	90	83 (92.2)	7 (7.8)	1.00	-	-	-
No	562	488 (86.8)	74 (13.2)	1.80 (0.80 - 4.04)	0.150*	-	-
Breast feeding problems							
No	569	520 (91.4)	49 (8.6)	1.00	-	1.00	-
Yes	114	79 (69.3)	35 (30.7)	4.70 (2.87-7.71)	< 0.001*	4.13 (2.35-7.28)	< 0.001
Pattern of breast feeding in prior child (n = 218)							
Exclusive	162	153 (94.4)	9 (5.6)	1.00	-	NA ^a	-
Non-exclusive	56	25 (44.6)	31 (55.4)	21.08 (8.97-49.52)	< 0.001*	-	-
Knowledge							
Score ≥ 12	665	587 (88.3)	78 (11.7)	1.00	-	NA ^a	-
Less than 12	18	12 (66.7)	6 (33.3)	3.76 (1.37-10.31)	0.016**	-	-
Attitude							
Score ≥ 40	675	595 (88.1)	80 (11.9)	1.00	-	NA ^a	-
Less than 40	8	4 (50.0)	4 (50.0)	7.44 (1.82-30.32)	0.010*	-	-

^aNA, not appropriate for multivariable analysis due to statistical issues (small number of certain subgroups); ^b1 USD approximate to 34.12 THB (20); *p-value by Chi-square test; **p-value by Fisher's exact test

attributed to several key factors, including effective hospital practices, maternal characteristics, and support systems.

The rates of EBF vary depending on several factors across different levels and aspects. National or cultural backgrounds, as well as overall economic status, are important considerations when setting targets, policies, and achievement rates for EBF in each country. In developing countries, EBF rates range from 45.0% to 63.0% (5-8), whereas in developed countries, the rates are much lower, ranging from 1% to 24.9% (25, 26). In developing countries, a lower economic status often makes breast milk a crucial source of nutrition for children. Even within the same country, factors such as geographic location, population size, and characteristics of the population can also impact the rate of EBF.

For example, a study from Jiaying, Zhejiang province, China, found a 37.0% rate of EBF among 494 mothers (23). Another national cross-sectional survey in the same country, which included over 5,000 infants, reported a 30.0% EBF rate (21). Another community-based study among mothers working in the informal sector in Kampala, Uganda reported an EBF prevalence of 42.8% (27). In Thailand, two studies reported six-month EBF rates of 37.4% among women recruited from three public provincial hospitals during the COVID-19 pandemic (28) and 66.0% among 65 employees in the hospital in Bangkok (29). The differences in these rates are likely due to variations in participant characteristics and their living and/or working environments. For instance, a study conducted in three public hospitals in areas affected by COVID-19 outside major cities which collected data from unemployed mothers or those working from home reported a 37.0% EBF rate (28). This was considerably lower than the 66.0% rate found among 65 health workers in a hospital located in the Bangkok Metropolitan area (29).

The high rate of EBF for six months observed in this study can likely be attributed to a combination of factors, including clinical practices related to breastfeeding and the characteristics of the mothers themselves. Several studies have shown that support from healthcare professionals can significantly influence a mother's decision to breastfeed or bottle-feed (30, 31). Various hospital

features and healthcare providers' health-related practices likely contributed to the high EBF rate in this study. Healthcare professionals' support and attitudes can influence maternal infant-feeding decisions (32). Our hospital's breastfeeding policy (30) aligns with the WHO Ten Steps to Successful Breastfeeding (9). The advocacy and practice of our health personnel, including the perinatologist, neonatologist, pediatrician, and nurses, also play a crucial role. Furthermore, being a private hospital with an optimal ratio of physicians to patients and an adequate number of health personnel at all levels allows provision of a range of services, such as counseling and education in various settings, immediate postpartum care for both mothers and babies and ongoing support in the pediatric wards and outpatient centers.

Maternal characteristics and socioeconomic features are also key factors in the success of EBF. Many previous studies have reported the mothers' high socioeconomic status as one favorable factor for EBF achievement (21, 23, 29). Most mothers in this study had a high socioeconomic status (Table 1) and should have had greater resources, contributing to the high rate of EBF in this study. Other favorable features of the mothers identified from univariate analysis were younger age, being married, primiparity, working $\leq$ eight hours a day, not using contraception, a history of successful EBF with a previous child, no breastfeeding problems, good knowledge of and a good attitude toward EBF.

On the other hand, we would like to emphasize significant unfavorable or risk factors for non-achievement of EBF. Using univariate analysis, separated/divorced status showed the highest risk for non-EBF (odds ratio (OR) = 29.90) followed by a history of non-EBF with a previous child (OR = 21.08), low attitude score (OR = 7.44), breastfeeding problems (OR = 4.70), low knowledge score (OR = 3.76), multiparity (OR = 2.54), working > 8 hours/day (OR = 2.27), using contraception (OR = 1.91), and age $\geq$ 40 years (OR = 1.81). These risk factors for non-achievement identified in this study have also been reported in many previous studies (21-23, 33-37). Separated/divorced status was found to have the highest risk for non-EBF in our study. These women may struggle to raise their baby by themselves without physical and/or psychological support from

their spouse, leading to an earlier stop of EBF (23, 33). However, this could not be confirmed as an independent risk factor due to the small number of separated/divorced women in this study which precluded multivariable analysis.

Other risk factors that were statistically significant for non-EBF in our univariate analysis were a history of non-EBF with a previous child as well as low scores on attitude toward and knowledge of EBF. These factors may be linked to the mother's personality, which can influence her attitudes and knowledge regarding breastfeeding practices. Previous studies have reported that the history of EBF with a previous child, as well as good knowledge of and good attitude toward EBF, have a positive influence on successful EBF (21, 22, 36). Again, in this study the limited number of participants having non-EBF with a previous child and the low number displaying poor attitudes or low knowledge scores hindered our ability to conduct further in-depth analysis to establish these as independent risk factors for non-EBF.

The associations between non-EBF and long working hours (> 8 hours), which was statistically significant ($p = 0.008$) and with mothers aged 40 years or older, which was only marginally significant ($p = 0.050$), can likely be attributed to the fact that mothers may experience exhaustion and fatigue due to long working hours, as well as potential health issues or fatigue among older mothers. However, other influencing factors may have rendered these two features not statistically significant in multi-variate analyses.

This study, using multivariable analysis, identified only 3 features as independent risk factors for non-EBF: breastfeeding problems (aOR = 4.13), multiparity (aOR = 2.08), and use of contraception (aOR = 1.76). The risk of breastfeeding problems and multiparity for non-EBF identified in this study are consistent with many previous reports (29, 34, 36, 38, 39). Breast issues were the most common problem reported in this study. Some of these issues are likely to have been detected early by immediate self-awareness and could be remedied by medical care, so the mothers could continue breastfeeding (35, 38, 39). However, other issues were likely more difficult to overcome, discouraging the mothers from continuing breastfeeding. This study did not explore in detail whether the reported problems could poten-

tially have been resolved. The second important problem for breastfeeding in this study was 'being busy with work.' Other studies also reported being busy with work or unfavorable workplace environments, e.g., inconvenient uniforms, inadequate private location or equipment, and workload, were barriers to successful EBF (31, 36). Although most mothers in this study may not have had problems similar to those reported in previous studies, their relatively high socioeconomic background could have been associated with high responsibility and being busy, especially business owners.

Multiparity was found to be an independent risk factor in this study, probably due to the time spent caring for the elder siblings. Previous studies have had inconsistent findings regarding the influence of parity (21, 23). One found multiparity tended to be a risk for non-EBF (21), whereas the others reported primiparous status was associated with non-EBF (23). The impact of multiparity remains to be confirmed in future studies. Regarding the use of contraception, some authors have reported that combined hormonal oral contraceptives could reduce the volume of breast milk (40). We attempted to assess the possible effect of the hormonal contraceptive method (among 23 mothers), but we did not find any association with non-EBF (data not shown).

Although not significant risk factors for non-EBF, we would like to relate two features of interest: the site (hospital) and the delivery route. The mothers who had delivered elsewhere had higher non-EBF, 14.5%, compared to 11.9% of mothers who delivered in the hospital of this study. We propose that our continual promotion and support in the pediatrics outpatient center may have bolstered the use of EBF by mothers who had delivered elsewhere and had received inadequate antepartum and immediate postpartum coaching, making this feature not statistically significant. Regarding the negative impact of cesarean section, previous studies have reported a lower rate of EBF among mothers who had cesarean section compared to normal delivery due to postoperative pain, stress, and the use of general anesthesia which could hinder maternal-newborn contact and delay the initiation of breastfeeding (21, 41, 42). Our study did not encounter this problem, probably because the study

hospital used regional block instead of general anesthesia, so immediate latching could be promoted.

We are aware of some limitations in this study. First, the study population was mothers who had high socioeconomic status. Second, the participants were mothers who had received medical services in a breastfeeding clinic. These may have introduced a selective bias due to their higher knowledge and better attitudes toward EBF than other mothers, and may limit the generalization of the findings to other populations. Third, our survey study was conducted during the COVID-19 pandemic. There were many unpredictable factors which could potentially have affected each individual and their surrounding situations. For example, the policy of “working from home” instead of going to the office should positively affect the rate of EBF. On the other hand, an extra precaution against COVID-19 transmission, especially among family members in the same household, may have had a negative impact on the rate of EBF due to a lack of support for the mother. Fourth, all statements assessing the attitude of mothers towards breastfeeding were positive. This was intended to estimate the extent of agreement of the respondents with those statements. This might, however, have led to a response bias. Future studies should be cautious regarding this issue. Fifth, the duration of EBF among those who could not achieve EBF was unavailable. Knowledge of this time period is certainly important for problem-solving and/or intervention. Future studies may focus on this issue.

Our study had notable strengths. First, the number of participants was quite large compared to previous reports. Although the majority of the participants had high socioeconomic status and good knowledge of and attitudes toward EBF (partly from having received medical service in a breastfeeding clinic), other characteristic features, especially the ones that were associated with non-EBF, could be informative to the other health practitioners in this field. Second, we designed the questionnaire to capture various aspects of both the mothers and their babies, with the aim of exploring potential obstacles to successful EBF. The knowledge and attitude components and potential factors influencing breastfeeding were carefully designed and validated by experts in the field before the study commenced.

Although conducted in a single hospital where the participants may have had different characteristics than other populations, our hospital practices which contributed to a high rate of EBF as well as other factors that helped reduce the risk of failure for EBF, should be a lesson-learned for other hospitals and health units in the area. For example, it is crucial to identify mothers at risk of EBF failure during pregnancy and the early postpartum period. In those cases, various supportive activities should be implemented, such as encouraging mothers and their families, promoting group support led by successful breastfeeding mothers, providing continuing support from physicians and other healthcare providers, and creating “breastfeeding-friendly” environments.

CONCLUSIONS

This study demonstrated that 88% of mothers used EBF for the first six months. Significant risk factors for the non-achievement of EBF were a history of non-EBF for the first six months with a previous child, separated/divorced status, low EBF attitude scores, problems with breastfeeding the current child, low knowledge scores, long working hours, use of contraception, and older age. The independent risk factors were multiparity, use of contraception, and breastfeeding problems.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

S.U.: conceptualization, methodology, data curation, investigation, and writing – review & editing; K.L.: conceptualization, methodology, investigation, and writing – review & editing; S.T.: conceptualization, methodology, formal analysis,

data curation, funding acquisition, writing – original draft, and writing – review & editing; W.K.: conceptualization, methodology, data curation, writing – original draft, and writing – review & editing; N.A.: formal analysis, data curation, and writing – review & editing; C.P.: conceptualization, methodology, investigation, and writing – review & editing.

All authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

DATA AVAILABILITY

Data are available upon a request to corresponding author.

INSTITUTIONAL REVIEW BOARD STATEMENT

This study was approved by the Institutional Review Board of MedPark Hospital (No. COA 002-2022E, approval date 30/03/2022).

INFORMED CONSENT STATEMENT

Informed consent was waived by the institutional policy and nature of the study wherein data were obtained from the self-administered questionnaire.

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