

# Association between Breastfeeding and Child Stunting among Adolescent Mothers

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**Abstract Introduction:** Child stunting is one of the global public health problems and breastfeeding is one of the modifiable maternal factors protecting against child stunting. The current study aims to determine the prevalence of breastfeeding and its association with child stunting among adolescent mothers. **Methods:** A cross-sectional study was conducted in Phra Nakhon Si Ayutthaya province. Using multi-stage stratified sampling method, 250 participants were recruited. Data were collected using structured interview questionnaires in 6 districts from August 2016 to March 2017. Descriptive and analytic statistics were used to analyze data. **Results:** 16.4% of children were stunted and 22.4% were breastfed for  $\geq 6$  months. Univariable logistic regression disclosed significantly associated factors of stunting included age at delivery, educational level, family members, weight gain during pregnancy, birth weight, complete immunization, recent illness, breast feeding and complementary feeding ( $p$ -value < 0.05). After adjusting multivariable logistic regression analysis for potential confounders, babies breastfed <4 months were 1.83 times at risk compared with those breastfed  $\geq 6$  months (OR=1.83, 95%CI=0.41-8.30) but without significance. **Conclusion:** Efforts to reduce child stunting should include surveillance systems of stunting which should be conducted accompanied by providing perspectives on maternal and child health care,

implementing health literacy regarding breastfeeding among adolescent mothers and prevention programs to reduce and prevent child stunting.

**Keywords** Breastfeeding, Child Stunting, Adolescent Mothers, Teenage Mothers

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## 1. Introduction

Stunting is the most prevalent form of child under-nutrition and one of the global health problems, a deficit of height to age relation, and it is responsible for delayed development including impaired cognitive function and increased susceptibility to infectious diseases among children. The World Health Assembly is dedicated to supporting the achievement of the Global Nutrition Targets 2025 to reduce by 40% the number of children under five years who are stunted [1]. In 2012 globally, approximately 162 million children under five were stunted [2]. Global prevalence of stunting in 2019 increased 21.4% [3]. In developing countries, approximately 40% of children under five are stunted [1], over 200 million young children. Stunting rates among children under five years are unconscionably high in Africa

and South Asia countries, because children's height or length can develop when they receive adequate nutrition since the beginning of life [4-6]. In Thailand, 16.3% of children under 5 years were stunted, and 5.9% present severe stunting at risk of low intelligence [7]. Nutrition is one of the key factors to achieve adequate child growth and development [8]. In particular, breastfeeding has been associated with maternal and child health benefits [9]. The first 1,000 days of life are a critical period to intervene and prevent stunting in order to achieve short and long-term healthy growth [10]. One of the risk groups are adolescent mothers. They were associated with stunting among children, because of being young and lack of maturity and nutritional knowledge to take care of their child. In addition, many had unplanned pregnancy, and might not have been aware of food consumption since becoming pregnant [11-12]. Moreover, trends of stunting among children under 6 months were higher but lower when they aged up to 36 months [7]. Hence, the present study aimed to determine the prevalence of breastfeeding and its association with stunting among children 6 to 36 months of adolescent mothers in Phra Nakhon Si Ayutthaya Province. The author selected Phra Nakhon Si Ayutthaya province as the area of study because of its characteristics as a proxy of central provinces of Thailand with an area of about 2,557 km<sup>2</sup>. It lies around 70 km north of Bangkok, the capital of Thailand containing a population of 817,441 and density 320/km<sup>2</sup> in 2018 [13-14]. In addition, average adolescent birth rate (56.2/1,000) in Phra Nakhon Si Ayutthaya Province was higher than that of provinces under the Regional Health Office 4 (51.5/1,000) and Thailand (51.2/1,000) in 2013 [15].

## 2. Methods

### *Study design and setting*

The analytical cross-sectional study was conducted from August 2016 to March 2017 to explore prevalence of stunting and determine the association between breastfeeding and stunting occurrence among children aged 6-36 months of adolescent mothers in Phra Nakhon Si Ayutthaya Province, Thailand.

### *Sample size and sampling technique*

The sample size was calculated using a formula with specified absolute precision [16] according to the following assumptions: 10.48% of stunting among children (P) [17], with 95% confidence interval and 5% specified absolute precision (d). As a multistage sampling technique was employed to identify study subjects, a design effect of 1.5 was used. The calculated sample size was at least 218. Also, approximately 10% was added to adjust for nonresponses. Thus, the final sample size was at least 250.

### *Measures*

Information was obtained by interviewing the study subjects by the researcher and trained research assistants. The questionnaire comprised demographic factors of maternal and child, factors of breastfeeding and stunting. Stunting was evaluated using the definition of WHO [18].

### *Variable Definitions*

**Child Stunting** is a chronic restriction of a child's potential growth and development. A child aged 0 to 59 months is classified as stunted when her/his height for age falls below the -2 standard deviations from the median height for age determined by the WHO Child Growth Standards 2006 [8, 18-19].

**Adolescent Mother** means the mother whose age at delivery was less than 20 years.

**Exclusive Breastfeeding** is defined as the period after birth during which the infant was fed only breast milk (with the exception ordered medicines and vitamins by health professionals) one day (24 hrs) before the survey was conducted [20-21].

**Complementary Feeding** is defined as the period the infant was fed breast milk with addition of liquid foods like cow milk and formula milk and soft foods like mashed potatoes/meat, porridge, egg or butter one day (24 hrs) before the survey was conducted [22].

### *Ethical Issues*

This study was reviewed and approved by the Ethics Committee for Research in Human Subjects of the Faculty of Public Health, Mahidol University (Committee's reference number: MUPH 2016-096 on 7<sup>th</sup> July 2016) and agreed with the Declaration of Helsinki. All participants participated in this study on a voluntary basis. Informed consent to participate in the study was obtained from participants after informing them the details of study. The participant's responses were strictly confidential and were unused for any other purpose. The decision to participate or not did not rely on any other person apart from the participants themselves. Participants' names were unidentified in questionnaires, confidentiality was conducted throughout the study using anonymous techniques and the results were analyzed as a whole group.

### *Statistical Analysis*

The data were analyzed using the statistical package. Categorical variables were given as frequency and percent, crude odds ratio (OR<sub>c</sub>), 95% CI of OR and p-value. Moreover, numerical variables were expressed as mean, median, minimum and maximum, standard deviation. Univariate analysis was performed using the univariable logistic regression to differentiate proportional exposures between stunted and normal children for categorical

variables. Adjusted odds ratio (OR<sub>adj</sub>) and 95% CI of OR were calculated from the multivariable logistic regression to examine associations between breastfeeding and stunting occurrence, adjusted for potential confounders.

All statistical analyses were performed using two-sided tests and a p-value of <0.05 was judged to be statistically significant.

**Table 1.** Demographic factors of adolescent mothers

Variable	Number (%)
Age at delivery (years)	
<16	48 (19.20)
16 – 17	106 (42.40)
≥18	96 (38.40)
Mean (SD)	16.83 (1.45)
Min - Max	13 - 19
Education level	
Primary school	22 (8.80)
Junior high school	111 (44.40)
Senior high school	62 (24.80)
Vocational school	55 (22.00)
BMI before pregnancy (kg/m <sup>2</sup> )	
Normal (18.5-24.9)	165 (66.00)
Underweight (16.0-18.4)	73 (29.20)
Very underweight (<16.0)	12 (4.80)
Family members	
≤5	198 (79.20)
>5	52 (20.80)
Mean (SD)	5.03 (1.16)
Min - Max	3 - 9
Weight gain during pregnancy (kg)	
≥10	50 (20.00)
<10	200 (80.00)
Mean (SD)	11.52 (2.57)
Min - Max	6 - 20
Number of parity	
First	229 (91.6)
Second	21 (8.40)
Marital status	
Lived with husband	193 (77.20)
Widowed, divorced	14 (5.60)
Separated	43 (17.20)
Monthly family income (THB)	
≤10,000	61 (24.40)
10,001 - 15,000	65 (26.00)
15,001 – 20,000	55 (22.00)
20,001 – 25,000	31 (12.40)
>25,000	38 (15.20)
Mean (SD)	18,000.00 (8,433.06)
Min-Max	6,000-45,000
Complications during pregnancy	
No	237 (94.80)
Yes	13 (5.20)
First antenatal care visit (weeks)	
≤12	87 (34.80)
>12	163 (65.20)
Frequencies of antenatal care	
≥5	195 (78.00)
<5	55 (22.00)
Mean (SD)	6.95 (2.77)
Min - Max	2 - 14
Daily iron and folic supplements during pregnancy	
Yes	202 (80.80)
No	48 (19.20)

SD, Standard deviation; Min, Minimum; Max, Maximum

**Table 2.** Demographic factors of children

Variable	Number (%)
Age (years)	
<1	45 (18.00)
1	98 (39.20)
2	36 (14.40)
3	71 (28.40)
Mean (SD)	1.52 (0.84)
Min - Max	<1 – 3
Sex	
Male	127 (50.80)
Female	123 (49.20)
Birth weight (grams)	
<2,500	69 (27.60)
2,500-2,999	99 (39.60)
≥3,000	82 (32.80)
Mean (SD)	2,740.80 (493.49)
Min-Max	1,350-3,900
Preterm birth	
No	222 (88.80)
Yes	28 (11.20)
Underlying diseases	
No	241 (96.40)
Yes	9 (3.60)
Complete immunization	
Yes	230 (92.00)
No	20 (8.00)
Recent illness history	
No	214 (85.60)
Yes	36 (14.40)
Breast feeding (months)	
≥6	56 (22.40)
4-5	81 (32.40)
<4	113 (45.20)
Complementary feeding (months)	
≥6	129 (51.60)
4-5	92 (36.80)
<4	25 (10.00)

SD, Standard deviation; Min, Minimum; Max, Maximum

### 3. Results

#### Maternal Characteristics

A total of 250 adolescent mothers participated in the present study. The majority were aged 16 to 17 years (67.82%); mean age was 16.83 ± 1.45 years, most obtained junior high school level education (44.40%), normal level of BMI before pregnancy (66%), ≤5 family members (79.20%), weight gain <10kgs (80%), first order of parity (91.6%), living with husband (77.20%), monthly family income 10,001 to 15,000 THB (26%), mostly without complications during pregnancy (94.80%), antenatal care visit ≥5 times (78%) the first antenatal care visit >12 weeks (65.20%), and having iron and folic acid supplements (80.80%), as shown in Table 1.

#### Child Characteristics

Two hundred and fifty young children of adolescent

mothers were selected for the present study. The majority were aged 1 year (39.20%), male (50.80%), birth weight ≥3,000 grams (32.80%), mostly no preterm birth (88.80%) no underlying diseases (96.40%), complete immunization (92%), no recent illness (85.60%), breastfeeding <4 months (45.20%) and having complementary feeding ≥6 months (51.60%), as shown in Table 2.

Of 250 children with adolescent mothers, prevalence of stunting was 16.4%. Using univariable logistic regression, associated demographic factors of mothers and children included age at delivery, education, family members, weight gain, birth weight, immunization, recent illness, breastfeeding and complementary feeding (p<0.05), as shown in Table 3. Multivariable logistic regression, association between breastfeeding, complementary feeding and stunting among young children (adjusted for potential confounders), babies with breastfeeding <4 months were 1.83 times at risk compared with those breastfeeding ≥6 months (OR=1.83, 95%CI=0.41-8.30) but without significance, as shown in Table 4. Comparing height for

age with Z score and standard deviation revealed significant stunting as shown in Table 5.

**Table 3.** Univariable logistic regression of factors associated with child stunting among adolescent mothers

Variable	Stunting/total	%	ORc	95%CI	p-value
Maternal factors					
Age at delivery (years)					
≥18	7/96	7.29	1		
16-17	23/106	21.69	3.52	1.44 – 8.64	0.006*
<16	11/48	22.92	3.78	1.36 – 10.51	0.011*
Educational level					
Vocational school or higher	5/55	9.09	1		
Senior high school	6/62	9.68	1.07	0.31 – 3.73	0.914
Junior high school	24/111	21.62	2.76	0.99 – 7.68	0.052
Primary school	6/22	27.27	3.75	1.01 – 13.95	0.049*
BMI before pregnancy (kg/m <sup>2</sup> )					
Normal (18.5-24.9)	25/165	15.15	1		
Underweight (16.0-18.4)	12/73	16.44	1.10	0.52 – 2.33	0.801
Very underweight (<16.0)	4/12/	33.33	2.80	0.78 – 10.01	0.113
Family members					
≤5	26/198	13.13	1		
>5	15/52	28.85	2.68	1.29 – 5.55	0.008
Weight gain during pregnancy (kg)					
≥10	26/200	13.00	1		
<10	15/50	30.00	2.87	1.38 – 5.96	0.005
Number of parity					
First	39/229	17.03	1		
Second	2/21	9.52	0.51	0.12 – 2.30	0.382
Marital status					
Lived with husband	30/193	15.54	1		
Separated	9/43	20.93	1.44	0.63 – 3.30	0.392
Widowed, divorced	2/14	14.29	0.91	0.19 – 4.25	0.900
Monthly family income (THB)					
≥15,000	130/164	18.29	1		
<15,000	11/86	12.79	0.66	0.31 – 1.32	0.267
Complications during pregnancy					
No	37/237	15.61	1		
Yes	4/13	30.77	2.40	0.70 – 8.21	0.162
First antenatal care visit (weeks)					
≤12	10/87	11.49	1		
>12	31/163	19.02	1.81	0.84 – 3.89	0.130
Frequencies of antenatal care					
≥5	28/195	14.36	1		
<5	13/55	23.64	1.85	0.88 – 3.87	0.104
Daily iron and folic acid supplements during pregnancy					
Yes	32/202	15.84	1		
No	9/48	18.75	1.23	0.54 – 2.78	0.625
Child factors					
Age (months)					
36	4/23	17.39	1		
24-35	18/108	16.67	0.95	0.27 – 4.29	0.933
12-23	15/86	17.44	1.00	0.27 – 4.64	0.995
6-11	4/33	12.12	0.66	0.11 – 4.00	0.579
Sex					
Male	22/127	17.32	1		
Female	19/123	15.45	1.15	0.57 – 2.24	0.818
Birth weight (grams)					
≥3,000	10/82	12.19	1		
2,500–2,999	13/99	13.13	1.09	0.45 – 2.63	0.851
<2,500	18/69	26.09	2.54	1.08 – 5.96	0.032*

**Table 3. Continued**

Preterm birth						
No	33/222	14.86	1			
Yes	8/28	28.57	2.29	0.80 – 5.97	0.098	
Underlying diseases						
No	39/241	16.18	1			
Yes	2/9	22.22	1.48	0.12 – 6.92	0.644	
Complete immunization						
Yes	34/230	14.78	1			
No	7/20	35.00	3.10	1.16 – 8.34	0.025*	
Recent illness history						
No	28/214	13.08	1			
Yes	13/36	36.11	3.76	1.71 – 8.25	0.001*	
Breast feeding (months)						
≥6	5/56	8.93	1			
4-5	9/81	11.11	1.28	0.40 – 4.03	0.679	
<4	27/113	23.89	3.20	1.16 – 8.84	0.025*	
Complementary feeding (months)						
≥6	14/129	10.85	1			
4-5	20/92	21.74	2.16	1.03 – 4.54	0.042*	
<4	7/25	28.00	3.19	1.14 – 8.99	0.028*	

ORc= crude odds ratio, CI= confidence interval.

\*Statistically significant (p<0.05)

**Table 4.** Multivariable logistic regression of breastfeeding associated with child stunting among adolescent mothers

Variable	ORc	95%CI	ORadj	95%CI	p-value
Breast feeding (months)					
≥6	1		1		
4-5	1.28	0.40 – 4.03	0.71	0.18 – 2.86	0.630
<4	3.20	1.16 – 8.84	1.83	0.41 – 8.30	0.431

ORc = crude odds ratio, ORadj = adjusted odds ratio for age at delivery, educational level, family members, weight gain during pregnancy, birth weight, complete immunization, recent illness history and complementary feeding

**Table 5.** Number and percent of height for age graph of growth status

Variable	Number	Percent
Standard Normal (-1.5 SD < Z-score < +1.5 SD)	171	68.4
Relatively tall (+1.5 SD < Z-score < +2 SD)	10	4.0
Over standard height (Z-score > +2 SD)	9	3.6
Relative stunting (-1.5 SD < Z-score < -2 SD)	19	7.6
Stunting (Z-score > -2 SD)	41	16.4

SD, Standard deviation

## 4. Discussion

The findings showed that the prevalence of child stunting was approximately 16.4% higher than related studies conducted in Thailand [17, 23]. Evidence from related studies on stunting showed the prevalence of stunting was approximately 10.5% [17, 23]. Our investigation indicated a serious health problem among teenage mothers, possibly stemming from unwanted pregnancy, poverty, low education and other unsuitable maternal socio-economic factors [24]. Several studies have shown that adolescent mothers were too young, too immature and lacked sufficient nutritional knowledge to take appropriate care of their child. In addition, teenage mothers with unplanned pregnancy might be unaware of food consumption needed to support embryo growth and development. This would create a continuing effect on her

nutritional status throughout the pregnancy. Their nutritional status during the time they became pregnant was also an important factor that influenced the health of the fetus, as well as long term health of the infant [11-12].

The study indicated only 22.4% practiced predominant breastfeeding over 6 months, and 32.4% breastfed exclusively 4-5.9 months, while 45.2% breastfed their babies less than 4 months. This study also found that exclusive breastfeeding <4 months had a positive association with stunting but without significance (p>0.05). However, exclusive breastfeeding times were associated with underweight status among children because giving any other liquid or food apart from breast milk, before 4 months, was associated with increased risk of gastro-intestinal disease, resulting in growth retardation, micronutrient deficiencies and vulnerability towards various infectious diseases within the first 2 years of life

[25-26]. Regarding the duration of complementary feeding, mostly over 6 months (51.6%), the result showed no significant association with stunting. Similarly, related studies showed the pattern of growth and development was unrelated to the duration of breastfeeding [27-28]. In contrast, a recent study of Syeda et al. showed a positive relationship between breastfeeding in the second and third year of life with stunting [29]. Several studies showed breastfeeding's benefits in reduction of child under-nutrition [30-33]. Breastfeeding was beneficial compared with formula feeding among infants according to Dimnjakovic [34]. The WHO recommends among health infants introducing complementary feeding should be delayed until 6 months of exclusive breastfeeding to confer several benefits to the infant and mother [1]. Early feeding to solid foods, early cessation of breastfeeding and increased consumption of fatty or sugary foods at one year of age were proven risk factors for infection. The WHO and United Nations Children's Fund recommend that breastfeeding a child up to 2 years of age is essential for proper growth and development [1].

## 5. Study Limitations

This study encountered a few limitations that needed to be addressed. First, the cross-sectional survey reduced the ability to make direct causal inferences, we couldn't rule out reverse causation or assess the temporal relationship of some factors preceding child stunting. Second, these data apply only to those teenage mothers in a rural area; therefore, they could not represent all teenage mothers. Third, this study used only height for age for stunting and might not include all stunting. Finally, all data were collected from teenage mothers. Most had mental health problems, such as depression and stress disorder. In addition teenage mothers were also more likely to reside in communities and families that were socially and economically disadvantaged. These circumstances could have adversely affected outcomes for their children.

## 6. Conclusions

Our results suggest that efforts to prevent and reduce child stunting should include the surveillance system of stunting and campaign of healthy diet and basic techniques for healthy lifestyles among risk groups should be established along with knowledge sharing programs about associated factors of stunting among adolescent mothers to minimize and reduce risks of child stunting.

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## Conflict of Interest

The authors declare that they have no conflict of interests.

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