

# The Rate and Influencing Factors of Exclusive Breastfeeding for the First 6 Months in Nanjing, China

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## Research article

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# Abstract

**Background:** The rates of exclusive breastfeeding for the first 6 months in China are relatively low. The purpose of our study was to investigate the rate and influencing factors of exclusive breastfeeding for the first 6 months in Nanjing, China.

**Methods:** A total of 1261 mothers from six community healthcare centres in the main urban and suburban districts of Nanjing were enrolled from January 2019 to June 2019. A multivariate logistic regression analysis and chi-squared test were used to explore the factors related to exclusive breastfeeding for the first 6 months.

**Results:** The rate of exclusive breast-feeding for the first 6 months was 29.4% in our study. A high education level, caesarean delivery, gestational age <37 weeks, having babysitters care for their babies, taking medicine during lactation and using a bottle to feed breast milk were shown to be associated with non-exclusive breast-feeding. The reasons for providing milk formula to babies were different among different stages in the first 6 months. A common reason for giving up exclusive breast-feeding was a perceived insufficiency of breast milk.

**Conclusion:** Investigating the reasons and then implementing the corresponding measures would improve exclusive breast-feeding in the future.

## Background

Breast milk is the best food for infants, and it has been well established to have numerous health benefits for infants and mothers. Thus, several countries have adopted the recommendation to exclusively breast-feed for the first six months as suggested by the World Health Organization (WHO) [1]. Beyond that, the WHO recommends that breast-feeding can continue to the age of two years old. Therefore, in China various policy initiatives from the National Breast-feeding Strategy have been issued to promote breastfeeding continuation [2, 3]. However, until now, limited studies about the rate of exclusive breastfeeding from China have been written in English, and most studies are in Chinese. We searched the information about breastfeeding in the Chinese Academic Journal Full Text Database (CNKI) and PubMed. From these studies [4-7], we found that the rates of exclusive breastfeeding in the first 6 months in many cities were far below 50%. According to the United Nations Fund for Children of 2019 (UNICEF), the rate of exclusive breastfeeding in the first 6 months in China from 2013-2018 was only 21% [8]. A survey in 2016 reported that only 6.2% of infants were still exclusively breastfeeding at 6 months in Wuhan, China [4].

Numerous factors that are possibly associated with the low rates of exclusive breastfeeding have been identified. Among these factors, knowledge on breastfeeding, misinterpretation of infant cries, insufficient breast milk, type of delivery, breast problems and education status of mother have been reported [9-11]. However, different studies have shown that the factors influencing different peoples vary from each other.

Therefore, our paper aimed to investigate the rate of exclusive breastfeeding in the first 6 months and the factors and reasons that may encourage or deter women from breastfeeding in Nanjing, China.

## Methods

### Design and Participants:

This was a retrospective study conducted by the Child Health Care Department of Nanjing Maternity and Child Health Care Hospital Affiliated with Nanjing Medical University. Using stratified random cluster sampling, the participants were recruited from six community healthcare centres in the main urban and suburban districts of Nanjing. Eligible participants were mothers taking their infants to a general physical examination at the Child Health Care Department. A total of 1,261 participants with infants between 6 to 10 months of age were recruited in the clinic waiting area to reduce possible recall bias. No incentives were offered for participation. Ethical approval was obtained from the Research Ethics Committee of the Hospital Administration, and written informed consent was obtained from all participants. Data were collected from January 2019 to June 2019.

### Data collection

The questionnaire consisted of a series of closed and semi-open-ended questions, and these questions were based on previous reports. The main information about the general history of pregnancy and delivery, infant's birth, modes of infant feeding and potentially related factors was collected. In detail, the questionnaire included five sections (appendix 1): (1) a section about the general information of infants (birth information, sex, gestational weeks, birth weight, delivery mode, parity and present body weight); (2) a section on demographic and socioeconomic information, such as the age and educational level of the mother and family income; (3) a section associated with the past health of mothers during and after gestation; and (4) a section related to the feeding patterns of infants before 6 months of age and the potential reasons for adding milk formula in different periods. According to the WHO suggestion, exclusive breastfeeding in our research was defined as infants being fed with only breast milk and no other solids or liquids other than medications.

### Statistical Analysis

Data were documented using Epi-data version 3.1. To test whether significant differences existed in three different feeding patterns (exclusive breastfeeding, partial breastfeeding and formula feeding), a chi-squared test was applied with Yates' correction. All statistical analyses were performed using IBM SPSS version 22.0.

## Results

### General information

In our study, a total of 1261 questionnaires were distributed, and 1165 valid questionnaires were returned (response rate: 92.38%). The general characteristics of the 1165 participants are shown in table 1. Mothers of 635 boys (54.51%) and 530 girls (45.49%) were enrolled. These mothers had given birth to 1142 singleton and 23 twin infants. Approximately 66.87% of these participants were first-time mothers. Over 95.45% of these infants were full term, and approximately 4.55% were preterm. Most of them (90.90%) had a normal birth body weight, less than 1.80% had a low birth body weight, and approximately 7.30% had a high birth body weight. Four hundred seven participants received caesarean section, accounting for 34.94%. Most of the participants were 25-40 years old and completed a tertiary level of education or more. More than 46.0% had a monthly family income RMB 8,000 or more. Approximately 17.85% of the mothers had different diseases before and during delivery, such as thyroid disorder, gestational diabetes and gestational hypertension. Less than 2.1% of the mothers had received breast surgery.

### **The feeding patterns within 6 months age and the contributing factors of not exclusively breastfeeding**

As shown in Table 2, approximately 29.35% of the infants within 6 months of age were fed exclusively with breast milk, and more than 70.0% of the infants were fed with formula milk for partial breastfeeding (67.30%) or total artificial feeding (3.35%). The education level of the mother and monthly family income were not significantly associated with exclusive breastfeeding ( $p>0.05$ ). The possible factors influencing different feeding pattern are shown in Table 3. Caesarean delivery ( $p<0.05$ ) was an important factor preventing exclusive breastfeeding. The first pregnancy of the mothers, delivery with normal gestational weeks and normal body weight at birth of infants were not significantly different among the groups. In addition, pregnancy complications (17.6%) and breast surgery (2.1%) were also not significantly different. Approximately two-thirds of the infants had missed early breastfeeding within the first two hours, and these infants were more likely to consume formula milk in the future ( $p<0.001$ ). Most of the infants (68.3%) could initiate breastfeeding in less than two hours after delivery, which was shown to be a protective factor. As reported, 30.6% of the participants employed a babysitter to look after their infants, and approximately 11.5% of mothers took medicine during lactation; both situations were obstructive factors for exclusively breastfeeding ( $p<0.01$ ). More than half of the non-artificially fed infants (57.4%) were directly fed breast milk via the breast, which was beneficial to exclusive breastfeeding ( $p<0.001$ ).

### **Reasons for partial breastfeeding or full formula feeding**

Several reasons for providing formula and giving up exclusive breastfeeding at different time points before 6 months age old of infants are shown in Tables 4-7. A total of 435 infants were non-exclusively breastfed within the first 3 days for mothers' reasons or their own reasons, as shown in Table 4. Regarding the mothers' reasons, more than 76.17% of the mothers thought that their infants did not receive sufficient breast milk, and this was the most frequent reason cited. Swollen breasts or mastitis (14.00%) and crater nipples or nipple appianation (12.78%) were the second and third most frequently stated reasons, respectively. Among the infants' reasons, other reasons (29.67%), weak sucking force (26.32%) and infant illness (21.53%) were listed as the top three reasons.

As demonstrated in Table 5, 382 mothers provided formula milk or water to children between 4 days to 1 month of age. Similarly, perceived insufficient breast milk (73.39%) was the primary reason, followed by painful nipples/damaged nipples (13.45%) and swollen breasts/mastitis (13.17%). Among the infants' reasons, the top three reasons were insufficient breast milk and doctor suggestion (53.50%), unsatisfactory weight gain (25.00%), and breast rejection (15.50%).

At 1 to 3 months of infant age, perceived insufficient breast milk was still the most frequent reason (Table 6). Then, 61 mothers (17.23%) needed to return to work, which was the second reason. Furthermore, insufficient breast milk and doctor suggestion, unsatisfactory weight gain and other reasons accounted for 58.29%, 28.88% and 16.04% of infants' reasons, respectively.

The reasons for giving up exclusive breastfeeding from 4 to 6 months of infant age are summarized in Table 7. As with the 1- to 3-month-old infants, perceived insufficient breast milk and returning to work were still the primary two reasons, accounting for 64.66% and 26.18%, respectively. Formula milk was suggested for 280 infants (43.57%) due to insufficient breast milk from the mother. In addition, 120 infants (42.86%) were provided solid food, which was as the second reason.

## Discussion

As recommended by WHO and UNICEF, it is better to exclusively breastfeed infants at least for 6 months postpartum, and breast milk has been identified as the ideal food that benefits the healthy growth and development of children <sup>[1, 8]</sup>. Therefore, many of the policies formulated by our government to a certain extent play an important role in promoting breastfeeding. In our study, the rate of exclusive breastfeeding for six months reached 29.4% and was higher than that of a large national representative survey conducted by Tang Kun et.al in 2018, with the rate of 15.4% <sup>[12]</sup>.

As shown by other studies, women with a high monthly family income were more likely to have lower exclusive breastfeeding rates <sup>[13]</sup>. In our study, the relationship between monthly family income and exclusive breastfeeding was not statistically significant. However, the group with a monthly family income >¥10,000 had the lowest level of exclusive breast-feeding. As previously explained <sup>[13]</sup>, the reason may be that higher-income families can afford to purchase milk formula. However, the <¥5,000 group had the second-lowest rate among the four groups, indicating that the economic advantage may not be the reason. Our results showed that women with a higher education level more readily fed the infants with milk formula, which was similar to other findings <sup>[12, 14]</sup>

The women with a higher education level generally have more busy work lives and a higher family income <sup>[15]</sup>. Therefore, we also speculated that women with a high monthly family income or high education level were likely to go back to work early and must take more time for their work, and this may be the reason for the lower exclusive breastfeeding rate among these women.

In our study, more than ten percent of women had taken medicine during the lactation period, and only 12.7% of these mothers were exclusively breastfeeding. In fact, we found that some mothers did not need to stop feeding breast milk because some medications are safe for lactation, such as cephalosporin, macrolides and NSAIDs (non-steroidal anti-inflammatory drugs) (data not shown). These mothers may have been worried about transmitting illness or drugs to their babies. They decided to stop breastfeeding their children based on their own experience or were even suggested by doctors to stop. Until now, there have been limited data investigating the misjudgements about whether to stop breastfeeding with the usage of drugs during lactation. We think this would be an interesting and meaningful research topic.

Interestingly, we found that approximately one-third of the mothers in our research asked a babysitter for help in raising their infants. However, these mothers were more likely to give formula milk to children, and only 23.0% of these infants were exclusively breastfed, which was less than of the prevalence among the infants without a babysitter. In China, infants who are cared for by babysitters tend to have more time with their babysitters, even in the first month and at night. As reported, the support from others, such as a mother-in-law or babysitter, did not affect exclusive breastfeeding or breastfeeding initiation<sup>[16]</sup>. We know that these infants had less time to bond with their mothers. Therefore, it was difficult for mothers to promote or sustain breast milk secretion.

As previously reported<sup>[9-11]</sup>, several factors could cause lactating mothers to give up exclusive breastfeeding, such as perceived insufficient breast milk, infant illness, and painful nipples. In our study, we were also interested in the possible influencing factors. As we know, mothers can encounter various difficulties and discontinue exclusive breastfeeding at different age stages in the first six months. Therefore, we divided the six months into four stages to survey the main reasons in different stages. As the data show, perceived insufficient breast milk is the most common reason in all four stages, and more than half of mothers claimed to have this situation. Interestingly, less than 50% of infants were confirmed by doctors to receive insufficient intake of breast milk. This finding indicated that many mothers could not distinguish perception from reality, which was similar to other studies<sup>[16, 17]</sup>. In our investigation, we found that even under the Chinese standard maternity leave of 98 days, “returning to work” was the third reason for some mothers to give up exclusive breastfeeding. Thus, other than appealing for extended maternity leave, guiding mothers on how to express, transport and conserve breast milk to maintain breast milk secretion after returning to work is important. In addition, some laws to guarantee lactating women to have a time and place to express breast milk during working hours should be passed.

More than 40% of infants (n=280) were supplemented with solid food before 6 months of age, as shown in Table 7; solid food was a notable reason for giving up exclusive breastfeeding. Moreover, our survey showed that a small portion of mothers provided water to infants in every age group. According to the WHO recommendations, it is better to provide complementary food or water after six months of age. Therefore, it is necessary to provide knowledge about breastfeeding in different ways.

## Conclusion

Our study reported that the rate of exclusive breastfeeding for the first 6 months was 29.4% in Nanjing. Mothers who had a high education level, delivered through caesarean section, had a gestational age <37 weeks, had babysitters to take care their infants, took medicine during lactation or used a bottle to provide breast milk were more likely to discontinue exclusive breastfeeding. The reasons for providing milk formula to babies were different among different stages. A common reason for giving up exclusive breast-feeding was perceived insufficient breast milk. Therefore, investigating the reasons and then providing the corresponding measure would improve exclusive breastfeeding in the future.

## **Limitation**

Some limitations in the research should be considered when interpreting the results. First, as it was a retrospective study and a self-reported questionnaire was used, recall bias could not be avoided by the participants. Second, because participation in the survey was entirely voluntary, it cannot be excluded that participants were more active breastfeeders. Data were not available on the women who refused to participate in the study. Third, the present study recruited subjects only in some designed regions. The results may not be generalizable to the entire population of Nanjing. A future study with a larger sample may be necessary to verify the results.

## **Declarations**

### **Ethics approval and consent to participate**

This research was approved by the Ethics Committee of Nanjing Maternity and Child Health Care Hospital Affiliated with Nanjing Medical University and written informed consent to participate in the study was obtained.

### **Consent for publication**

Not applicable

### **Availability of data and materials**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### **Competing interests**

The authors declare that they have no competing interests.

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## Authors' Contribution

LC and LZ collected and analyzed the data, LC drafted the manuscript and revised the paper. XC and JQ monitored data collection for the whole process and revised the paper. XC, JQ, LZ and LC designed the study. XC is responsible for the integrity of this study.

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Not applicable.

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## Tables

<b>Table 1: Characteristics of infants and mothers (n=1165)</b>		
<b>Characteristics</b>	<b>N</b>	<b>%</b>
<b>Infants</b>		
Sex		
Boys	635	54.51
Girls	530	45.49
Number of babies		
Single baby	1142	98.03
More than one baby	23	1.97
Times of pregnancy		
First pregnancy	779	66.87
>First pregnancy	386	33.13
Gestational age at childbirth		
Term ( $\geq 37w$ )	1112	95.45
Preterm ( $< 36+6w$ )	53	4.55
Body weight at birth (g)		
2500-4000	1059	90.90
<2500	21	1.80
>4000	85	7.30
Mode of childbirth		
Vaginal childbirth	758	65.06
Caesarean section	407	34.94
<b>Mothers</b>		
Age		
$\leq 25$ years	128	10.99
26-30 years	567	48.67
31-40 years	457	39.23

>=41 years	13	1.12
Education		
high school and below	177	15.19
undergraduate and college	814	69.87
master and above	174	14.94
Household income (RMB)		
<5000	233	20.00
5000-8000	385	33.05
8000-10000	244	20.94
>10000	303	26.01
Complication of pregnancy		
NO	957	82.15
Yes	208	17.85
Breast surgery		
NO	1141	97.94
Yes	24	2.06

<b>Table 2: Feeding patterns (n=1165)</b>		
Breastfeeding status	N	%
Exclusively breast fed	342	29.35
Partially breast fed	784	67.30
Formula feeding	39	3.35

<b>Table 3:</b> Bivariate analysis of different factors on feeding patterns					
Influence factors	Entire number	Exclusive breast feeding n=342	Partially breast feeding n=784	Formula feeding n=39	Chi-square test ( $\chi^2$ ) p-Value
<b>Demographic and socio-economic characteristics</b>					
Mother Age					
<=25 years	128(11.0)	37(28.9)	86(67.2)	5(3.9)	0.475
26-30 years	567(48.7)	155(27.4)	397(70.0)	15(2.6)	
31-40 years	457(39.2)	146(31.9)	292(63.9)	19(4.2)	
>=41 years	13(1.1)	4(30.8)	9(69.2)	0(0.0)	
Mother Education					
High school and below	177(15.2)	59(33.3)	107(60.5)	11(6.2)	0.056
College and Undergraduate	814(69.9)	238(29.2)	555(68.2)	21(2.6)	
Master and above	174(14.9)	45(25.9)	122(70.1)	7(4.0)	
Monthly family income (RMB)					
<5000	233(20.0)	63(27.0)	162(69.6)	8(3.4)	0.097
5000-8000	385(33.0)	129(33.5)	241(62.6)	15(3.9)	
8000-10000	244(20.9)	78(31.9)	158(64.8)	8(3.3)	
>10000	303(26.0)	72(23.8)	223(73.6)	8(2.6)	
<b>Obstetric characteristics</b>					
Times of pregnancy					
First pregnancy	779(66.9)	224(28.8)	527(67.6)	28(3.6)	0.683
>First pregnancy	386(33.1)	118(60.6)	257(36.5)	11(2.8)	
Number of babies					

Single baby	1142(98.0)	340(29.8)	764(66.9)	38(3.3)	0.089
More than one baby	23(2.0)	2(8.7)	20(87.0)	1(4.3)	
Mode of delivery					
Vaginal delivery	758(65.1)	243(32.1)	492(64.9)	23(3.0)	0.020*
Caesarean delivery	407(34.9)	99(24.3)	292(71.8)	16(3.9)	
Gestational age (weeks)					
37-42w	1112(95.5)	335(30.1)	738(66.4)	39(3.5)	0.002*
<37w	53(4.5)	7(13.2)	46(86.8)	0(0.0)	
Body weight at birth (g)					
<2500	21(1.8)	4(19.0)	17(81.0)	0(0.0)	0.519
2500-4000	1057(90.7)	313(29.6)	709(67.1)	35(3.3)	
>4000	87(7.5)	25(28.7)	58(66.7)	4(4.6)	
Complication of pregnancy					
NO	959(82.3)	294(30.6)	634(66.1)	31(32.3)	0.107
Yes	206(17.6)	48(23.3)	150(72.8)	8(3.9)	
Breast surgery					
NO	1141(97.9)	339(29.7)	763(66.9)	39(3.4)	0.096
Yes	24(2.1)	3(12.5)	21(87.5)	0(0.0)	
<b>Breast-Feeding related characteristics</b>					
Times of early breastfeeding					
< 1 hours	474(40.7)	152(63.7)	310(33.8)	12(2.5)	<0.001***
1-2 hours	310(27.6)	123(64.9)	192(32.9)	7(2.2)	
>2 hours	369(31.6)	67(49.3)	282(45.3)	20(5.4)	
Methods for breast feeding information					
NO	160(13.7)	54(33.8)	97(60.6)	9(5.6)	0.052
Professional	646(55.5)	199(30.8)	429(66.4)	18(2.8)	

Non-professional	359(30.8)	89(24.8)	258(71.9)	12(3.3)	
Baby-sitter					
NO	809(69.4)	260(32.1)	524(64.8)	25(3.1)	0.007**
YES	356(30.6)	82(23.0)	260(73.0)	14(4.0)	
Lactation medication					
NO	1031(88.5)	325(31.5)	671(65.1)	35(3.4)	<0.001***
YES	134(11.5)	17(12.7)	113(84.3)	4(3.0)	
The pattern for fed with breast milk					
Breast-feeding	646(57.4)	233(36.1)	413(63.9)		<0.001***
Bottle-feeding	45(4.0)	5(11.1)	40(88.9)		
Both	435(38.6)	104(23.9)	331(76.1)		

**Table 4:** The reasons for giving partly-breast feeding or full formula feeding within the first 3 days [n=435]

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Mothers' factors (n=407)</b>		
Perceived insufficient breast milk	310	76.17
Swollen breasts/mastitis	57	14.00
Painful nipples/damaged nipples	43	10.57
Crater nipples/applanation nipples	52	12.78
Postpartum complication to mother-baby separation	16	3.93
Family members do not support breastfeeding	10	2.46
Others reasons	36	8.85
<b>Infants' factors (n=209)</b>		
Infant's illness	45	21.53
Rejecting breasts	43	20.57
Weak sucking force	55	26.32
Oral Diseases (cleft lip, cleft palate, et.ac.)	12	5.74
Preterm/multiparous	24	11.48
Supplement with water	20	9.57
Others reasons	62	29.67

**Table 5:** The reasons for giving partly-breast feeding or full formula feeding between 4 days age to 1 month (n=382)

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Mothers' factors (n=357)</b>		
Perceived insufficient breast milk	262	73.39
Swollen breast/mastitis	47	13.17
Painful nipples/damaged nipples	48	13.45
Crater nipples/applanation nipples	40	11.20
Maternal illness and usage of medicine	7	1.96
Family members do not support breastfeeding	3	0.84
Mother going out for something	23	6.44
Nighttime sleep problems	25	7.00
Others reasons	25	7.00
<b>Infants' factors (n=200)</b>		
Insufficient breast milk and doctor suggested	107	53.50
Unsatisfactory weight gain	50	25.00
Rejecting breasts	31	15.50
Infant's illness	17	8.50
Weak sucking force	15	7.50
Oral Diseases (cleft lip, cleft palate, et.ac.)	16	8.00
Preterm/multiparous	14	7.00
Supplement with water	13	6.50
Others reasons	25.00	12.50



**Table 6:** The reasons for giving partly-breast feeding or full formula feeding between 1 to 3 month n=368

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Mothers' factors (n=357)</b>		
Perceived insufficient breast milk	263	74.29
Swollen breast/mastitis	37	10.45
Painful nipples/damaged nipples	25	7.06
Crater nipples/applanation nipples	35	9.89
Returning to work	61	17.23
Maternal illness and usage of medicine	15	4.24
Family members do not support breastfeeding	1	0.28
Mother going out for something	16	4.52
Nighttime sleep problems	9	2.54
Others reasons	17	4.80
<b>Infants' factors (n=200)</b>		
Insufficient breast milk and doctor suggested	109	58.29
Unsatisfactory weight gain	54	28.88
Rejecting breasts	26	13.90
Infant's illness	15	8.02
Preterm/multiparous	14	7.49
Supplement with water	13	6.95
Others reasons	30	16.04

**Table 7:** The reasons for giving partly-breast feeding or full formula feeding between 4 to 6 month (n=434)

Variables	n	%
Mothers' factors (n=382)		
Perceived insufficient breast milk	247	64.66
Swollen breast/mastitis	46	12.04
Painful nipples/damaged nipples	25	6.54
Crater nipples/applanation nipples	21	5.50
Maternal illness and usage of medicine	11	2.88
Family members do not support breastfeeding	9	2.36
Returning to work	100	26.18
Nighttime sleep problems	6	1.57
Others reasons	30	7.85
Infants' factors (n=280)		
Insufficient breast milk and doctor suggested	122	43.57
Unsatisfactory weight gain	54	19.29
Rejecting breasts	24	8.57
Infant's illness	12	4.29
Supplement with solid food	120	42.86
Supplement with water	32	11.43
Others reasons	29	10.36

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [questionnaire.docx](#)