Original Article



# Trends in breastfeeding duration in Korea from 2007 to 2022 and implications for low-birth-weight infants: a repeated cross-sectional study

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**Background:** Breastfeeding provides essential health benefits to both infants and mothers and is strongly recommended for the particularly vulnerable group of low birth weight (LBW) infants. However, little is known about the breastfeeding trends among LBW infants in Korea. Therefore, this study aimed to investigate the breastfeeding trends among LBW infants in Korea from 2007 to 2022.

**Methods:** Using data from the Korea National Health and Nutrition Examination Survey (KNHANES) from 2007 to 2022, we analyzed the trends in breastfeeding duration among Korean LBW infants. We analyzed trends in mean breastfeeding duration and the prevalence of exclusive breastfeeding at 3 and 6 months, examining associations with demographic variables using multivariable regression. We conducted a trend analysis using Joinpoint analysis and examined factors associated with breastfeeding duration using Cox proportional hazards regression. The study population comprised 4,080 children aged 12–48 months at the time of the survey, including 227 LBW infants.

**Results:** The mean breastfeeding duration significantly decreased from 2015 to 2022, with an annual percentage change (APC) of −8.44% (P<0.05). The decline was more pronounced among LBW infants, whose mean breastfeeding duration consistently decreased from 2007 to 2022 (APC, −7.81%; P<0.05). LBW [hazard ratio (HR) =1.59; 95% confidence interval (CI): 1.50–1.69; P<0.001], and male sex (HR =1.11; 95% CI: 1.08–1.13; P<0.001) were associated with shorter breastfeeding duration, while urban residence (HR =0.91; 95% CI: 0.89–0.94; P<0.001) were associated with prolonged breastfeeding.

**Conclusions:** Despite the several benefits of breastfeeding, its duration has been decreasing among Korean infants, with LBW infants experiencing particularly shorter durations. Stronger efforts are needed to support breastfeeding, particularly for this vulnerable group.

**Keywords:** Breastfeeding; Joinpoint; Korea National Health and Nutrition Examination Survey (KNHANES); low birth weight infants (LBW infants)

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## Introduction

The benefits of breastfeeding for both infants and mothers are well established. Breastmilk provides the infant sufficient nutrition and protection against common infectious diseases, such as diarrhea, respiratory infections, and otitis media (1). Moreover, breastfed children have relatively low risk of overall hospital admission (2), type 1 diabetes mellitus (3), necrotizing enterocolitis, sudden and unexpected infant death, and overall mortality (4-6). In the long term, breastfeeding is associated with better cognitive performance in adulthood (7) and a relatively low risk of chronic diseases, such as type 2 diabetes and obesity (4). In addition, mothers who breastfeed have a relatively low risk of various diseases, such as invasive breast cancer and ovarian cancer (1). Recognizing the benefits of breastfeeding to both the infant and mother, the World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) recommend the initiation of exclusive breastfeeding within the first hour of birth until the first 6 months of life (8).

Infants with low birth weight (LBW), which is defined as <2,500 g at birth, are at increased risk of early growth retardation, infectious disease, developmental delay, and death during infancy and childhood (9,10). To reduce morbidity in this particularly vulnerable population, the WHO recommends the initiation of breastfeeding as soon as possible, and exclusive breastfeeding until 6 months of age, for clinically well LBW infants, just as in term infants, provided that the infants are not seriously ill or extremely LBW. Although recent studies have investigated breastfeeding practices in LBW infants using nationwide databases (11), they primarily focused on cross-sectional associations, and few studies have specifically analyzed long-term trends in breastfeeding duration among Korean LBW infants.

This study aimed to address this knowledge gap by investigating the breastfeeding trend in Korea from 2007 to 2022, with a particular focus on infants with LBW. We analyzed the trends and factors associated with breastfeeding rates using nationwide annual data from the Korea National Health and Nutrition Examination Survey (KNHANES). We hypothesized that infants with LBW were less likely to be breastfed and that circumstances including the coronavirus disease 2019 (COVID-19) pandemic would affect the duration of breastfeeding. We present this article in accordance with the STROBE reporting checklist (available at https://tp.amegroups.com/article/view/10.21037/tp-2025-aw-813/rc).

### Highlight box

**Key findings**

- Breastfeeding duration declined in Korea, with a steeper decrease among low birth weight (LBW) infants.

**What is known and what is new?**

- Breastfeeding is critical for LBW infants, yet their long-term trends have been unclear.
- National data show a significant decline in breastfeeding duration, especially in LBW infants.

**What is the implication, and what should change now?**

- Targeted support is needed to improve breastfeeding duration, particularly for LBW infants.

## Methods

### *Data and variables*

This study used KNHANES data from 2007 to 2022 to analyze breastfeeding practices over time. KNHANES is an annual nationwide cross-sectional survey conducted by the Korea Disease Control and Prevention Agency (12). Households are selected using a stratified, multistage probability sampling design and are interviewed by a trained survey team; All statistical analyses incorporated sample weights to account for the complex survey design, non-response, and post-stratification, ensuring nationally representative estimates. The survey includes recall questions on birth history, breastfeeding duration, and demographic information, including income and residential areas. In this study, we included children aged 12–48 months at the time of the household survey. The KNHANES data can be freely downloaded from the official website for public use (13).

### *Definitions*

Breastfeeding duration was defined as the period of breastfeeding regardless of formula feeding, and exclusively breastfed meant giving no other food or drink except breastmilk. The proportions of infants who were exclusively breastfed for 3 months (EBF-3) and 6 months (EBF-6) were derived from the database. Infants with LBW were defined as infants with a birth weight of <2.5 kg. Participants from Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon,

**Table 1** Demographic information of the study population[†]

| Variables | Data (n=4,080) |
|---|---|
| Male | 2,115 (51.8) |
| Age (years) | |
| 1 | 1,320 (32.4) |
| 2 | 1,377 (33.8) |
| 3 | 1,383 (33.9) |
| Urban area residents | 2,889 (70.8) |
| Birth weight (kg) | 3.22±0.46 |
| Maternal smoking status: ever smoker | 601 (16.4) |
| Maternal education: university or higher | 2,801 (78.2) |
| Breastfeeding duration (months) | 8.16±6.99 |
| Ever breastfed | 3,628 (88.9) |
| EBF-3 | 1,693 (41.7) |
| EBF-6 | 1,420 (35.0) |

Data are presented as n (%) or mean ± SD. [†], unweighted for all measures. EBF-3, exclusively breastfed for 3 months; EBF-6, exclusively breastfed for 6 months; SD, standard deviation.

Ulsan, Sejong, and Gyeonggi were classified as urban area residents; whereas those from Gangwon, Chungbuk, Chungnam, Jeonbuk, Jeonnam, Gyeongbuk, Gyeongnam, and Jeju were classified as rural area residents, as previously described (14). Maternal smoking status was categorized as ever or never smoked, and maternal education level was classified as university or higher versus high school or below.

### *Statistical analysis*

To test for trends and annual percentage change (APC) in breastfeeding from 2007 to 2022, we used Joinpoint trend analysis software, a statistical software developed by the United States National Cancer Institute for analyzing trends of multiple-period segments connected with a "Joinpoint" (15,16). The permutation test was used to select the number of Joinpoints with a significance level of 0.05, and the minimum number of observations between two Joinpoints was set to 2. We performed Cox proportional hazards regression to determine the association between variables and breastfeeding; adjustments in population size were standardized based on the 2007 data, which served as the baseline for the study period. All statistical analyses incorporated sample weights to account for the complex survey design and post-stratification, ensuring nationally representative estimates. The survey package in R was used to properly account for the stratified, multistage sampling design, including primary sampling units and stratification variables. Regression was performed using R software (version 4.3.2; R Core Team, Vienna, Austria). Statistical significance was set at $P<0.05$.

### *Ethics and guidelines*

The study was conducted in accordance with the Declaration of Helsinki and its subsequent amendments. KNHANES data are publicly available, and as the study was not deemed to include human subjects, this study did not require approval from the institutional review board.

## Results

### *Characteristics of the study population*

Of the 4,080 children included in this study (*Table 1*), 51.8% were male infants, and the proportions of those aged 1, 2, and 3 years were 32.4%, 33.8%, and 33.9%, respectively. In addition, 70.8% of infants were born in urban households. The mean birth weight was 3.22 kg, with 227 infants classified as LBW. The mean breastfeeding duration was 8.16 months, and 88.9% of the participants were breastfed at least once. The EBF-3 and EBF-6 groups accounted for 41.7% and 35.0% of the population, respectively. Among the mothers, 78.2% had a college degree or higher, and 16.4% reported smoking during pregnancy. Demographic characteristics stratified by survey cycle are presented in Table S1. The proportion of urban residents increased from 56.8% in 2007 to 71.9% in 2022 and proportion of LBW increased from 5.5% in 2007 to 9.9% in 2022.

### *Trends in mean breastfeeding duration*

*Table 2* presents the APC estimates of mean breastfeeding duration for each year. The trend showed a significant decrease in mean breastfeeding duration from 2015 to 2022, with estimated APCs of –8.44% overall, –7.81% for infants with LBW, and –8.16% for normal infants. Conversely, there were no significant changes in mean breastfeeding duration from 2007 to 2015, except among infants with LBW, who showed the same trend of decreasing breastfeeding duration from 2007 to 2022 without a

**Table 2** Breastmilk duration and APC in breastfeeding duration according to year

| Group | Breastmilk duration (months), mean ± SD | | | APC [2007–2015] (%) | APC [2015–2022] (%) |
|---|---|---|---|---|---|
| | 2007 | 2015 | 2022 | | |
| Total | 8.53±0.60 | 8.99±0.54 | 4.64±0.61 | −0.59 | −8.44* |
| LBW | 5.78±2.58 | 4.57±1.73 | 1.30±0.34 | −7.81* | −7.81* |
| Normal | 8.66±0.61 | 9.22±0.55 | 4.96±0.66 | −0.53 | −8.16* |

*, P<0.05. APC, annual percentage change; LBW, low birth weight; SD, standard deviation.

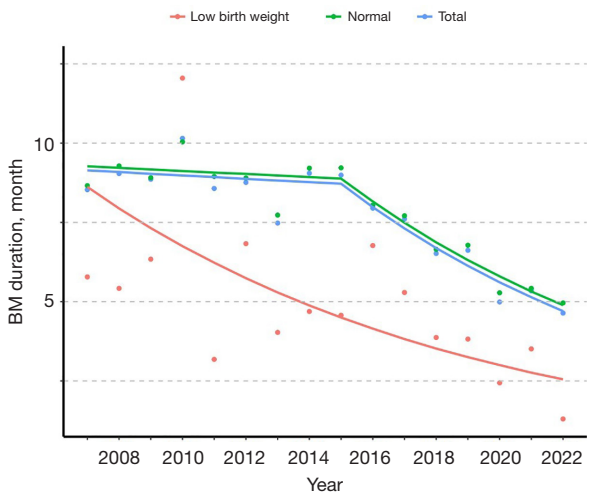


**Figure 1** Mean breastfeeding duration by group. BM, breastmilk.

Joinpoint (*Figure 1*).

### *Factors associated with breastfeeding duration*

Breastfeeding duration decreased by 0.28 months per year; each calendar year was associated with a 4% increase in the hazard of breastfeeding cessation [hazard ratio (HR) =1.04; 95% confidence interval (CI): 1.04–1.05; P<0.001]. LBW infants had a 59% higher hazard of breastfeeding cessation compared to normal weight infants (HR =1.59; 95% CI: 1.50–1.69; P<0.001). Male infants had an 11% higher hazard of cessation compared to female infants (HR =1.11; 95% CI: 1.08–1.13; P<0.001), and maternal smoking during pregnancy was associated with a 23% higher hazard of cessation (HR =1.23; 95% CI: 1.19–1.27; P<0.001). In contrast, urban residence was associated with a 9% lower hazard of breastfeeding cessation compared to rural residence (HR =0.91; 95% CI: 0.89–0.94; P<0.001), indicating longer breastfeeding duration. Higher maternal education was also protective (HR =0.96; 95% CI: 0.93–0.99; P=0.004) (*Table 3*).

**Table 3** Multivariable Cox proportional hazards regression analysis for factors associated with breastfeeding cessation

| Variables | HR (95% CI) |
|---|---|
| Survey year | 1.04 (1.04–1.05)*** |
| Sex | |
| Male | 1.11 (1.08–1.13)*** |
| Female | Ref. |
| Household income quartile | |
| Q1 (lowest) | Ref. |
| Q2 | 0.93 (0.93–0.96)** |
| Q3 | 1.02 (0.99–1.05) |
| Q4 | 1.05 (1.01–1.08)** |
| Urban area residents | 0.91 (0.89–0.94)*** |
| LBW | 1.59 (1.50–1.69)*** |
| Maternal smoking | |
| Never smoker | Ref. |
| At least once | 1.23 (1.19–1.27)*** |
| Maternal education | |
| Below university | Ref. |
| University or higher | 0.96 (0.93–0.99)** |

**, P<0.01; ***, P<0.001. CI, confidence interval; HR, hazard ratio; LBW, low birth weight; Q, quartile.

## Discussion

We examined the trends in breastfeeding duration among Korean women using the KNHANES database. In the Republic of Korea, nationwide surveys on breastfeeding have been conducted by the Korea Institute for Health and Social Affairs, with the first being the Survey of

Breastfeeding in Korea in 1994. Subsequently, the National Survey on Fertility, Family Health and Welfare in Korea has been conducted every 3 years and has included questionnaires on breastfeeding since 2000. In addition, the Korea Ministry of Health and Welfare and the Korea Centers for Disease Control and Prevention have reported breastfeeding rates in the KNHANES since 1998 (17). According to the aforementioned surveys, the breastfeeding rate in Korea has remained low, compared with that in India, China, the United States, and Europe (18).

The percentage of breastfeeding women was previously reported to increase from 76.3% in 2010–2012 to 81.5% in 2016–2018 (19). However, our results suggested that the mean breastfeeding duration has been decreasing in the time period, which is consistent with previous results on a decrease in prolonged breastfeeding and EBF-6 in the 2010s (20). Therefore, although more mothers initially try breastfeeding, most discontinue breastfeeding early in the course. Notably, this decreasing trend parallels the precipitous drop in South Korea's total fertility rate observed around 2015. This temporal synchronization suggests that the intensifying socioeconomic pressures driving the demographic crisis may also be undermining the capacity of mothers to sustain breastfeeding.

In particular, LBW infants in this study had a 59% higher hazard of breastfeeding cessation compared to normal-weight infants, indicating substantially shorter breastfeeding duration. Several factors may explain this pattern. First, the high rate of neonatal intensive care unit (NICU) admission among infants with LBW likely contributes to reduced breastfeeding duration. NICU admission inherently limits maternal-infant contact and increases exposure to formula feeding, which is more readily accessible to healthcare staff. Second, because of concerns about inadequate caloric intake in smaller infants, caregivers may choose formula that can be fortified rather than breast milk. If early feeding is challenging or early weight gain is slow, parents may also discontinue breastfeeding prematurely out of concern. Targeted education and reinforcement of the long-term benefits of sustained breastfeeding are needed to improve breastfeeding continuation in this population. Furthermore, the steadily declining mean breastfeeding duration since 2008, reaching an estimated 1.1 months in 2022, is concerning. Breastfeeding that barely exceeds 1 month, far below even 3 months, indicates an urgent need for multifaceted interventions.

We found an interesting discrepancy in breastfeeding duration between male and female infants, with the former being breastfed for a shorter duration. Although no previous reports have been published in Korea, several countries and ethnicities, including India, China, and Hispanic Americans, have been reported to exhibit the same pattern (21). Further research is required to confirm this pattern.

The relationship between income and breastfeeding is complex. A previous study reported a U-shaped relationship between income and breastfeeding rate (18), and we found a similar association between income and breastfeeding duration. In addition, we found that urban residents breastfed their infants longer than rural residents did. This result may be explained by the occupation of the mother, which affects breastfeeding rate (18). Despite several programs launched by the Korean government, UNICEF, and WHO to promote breastfeeding, including the Baby-Friendly Hospital Initiative and Mother-Friendly Workplace projects, obstacles, such as lack of education and work constraints, remain (22). Various programs are still needed in Korea to help employed women achieve longer breastfeeding duration, such as ensuring protected time for pumping and providing access to breast-pump rental services.

This study had some limitations. The retrospective cross-sectional survey design had an inherent recall bias, particularly for older children (up to 48 months) whose breastfeeding information is reported retrospectively. In addition, the KNHANES database did not include other potential factors, such as delivery method, rooming-in, and use of a baby-friendly hospital, which may have influenced breastfeeding duration. In the future, analysis of breastfeeding trends in a nationwide birth cohort would be possible using the National Health Screening Program for Infants and Children database, which has included questionnaires on exclusive breastfeeding since 2021 (23).

## Conclusions

Despite the limitations mentioned above, to the best of our knowledge, this study was the first to report the trend of breastfeeding duration among infants with LBW in Korea using a representative nationwide KNHANES database. Considering that infants with LBW are at high risk of various postnatal morbidities, the decreasing trend in breastfeeding in this population was particularly worrisome. Efforts from healthcare providers and the government are needed to promote longer breastfeeding in infants with LBW.

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## Footnote

*Reporting Checklist:* The authors have completed the STROBE reporting checklist. Available at https://tp.amegroups.com/article/view/10.21037/tp-2025-aw-813/rc

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*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki and its subsequent amendments. KNHANES data are publicly available, and as the study was not deemed to include human subjects, this study did not require approval from the institutional review board.



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