RESEARCH PAPER

Impact of Maternal Education and Feeding Practices on Growth and Development in 18-Month-Old Children.

Dr Pritish Pradip Yesaji[1], Dr Praneta Swarup[2], Dr Bindu T Nair[3], Dr Gaytri Koley[4],Dr Rajeev Kumar Thapar[5]

[1]Senior Resident, Cloudnine Hospital, Mumbai.
[2]Associate Professor, Department of Paediatrics, Sharda School of Medical Sciences and Research, Sharda University, Knowledge Park III, Greater Noida, UP - 201310, India.
[3,5]Professor, Department of Paediatrics, Sharda School of Medical Sciences and Research, Sharda University, Knowledge Park III, Greater Noida, UP - 201310, India.
[4]Professor, PGICH, Sector – 30, Noida, UP – 201303, India

ABSTRACT

Background: Optimal growth and development during early childhood are profoundly influenced by feeding practices and maternal education. This study aimed to assess the relationship between these factors and growth and developmental outcomes in 18-month-old children.

Methods: This was a hospital-based cross-sectional study at a tertiary care hospital in North India. Two hundred asymptomatic children attending the immunization OPD were recruited through consecutive sampling. Maternal education, infant feeding practices, anthropometric data (weight-for-age, length-for-age), and developmental milestones (gross motor, fine motor, language, and social) were recorded. Data analysis was performed using SPSS v26, applying chi-square and t-tests, with significance set at $p<0.05$.

Results: Significant associations were found between maternal education and fine motor ($p<0.01$), language development ($p<0.01$) and social and adaptive milestones ($p<0.01$). Children exclusively breastfed ≥6 months had better weight-for-age scores ($p<0.01$), and adequate calorie intake after introduction of complementary feeding was significantly linked with improved length-for-age ($p<0.01$) and fine motor, language and social milestone development ($p<0.01$).

Conclusion: Maternal education and appropriate and adequate feeding practices are crucial for optimal physical and developmental outcomes in early childhood

Keywords: Maternal education, Feeding practices, Exclusive breastfeeding, Child development, Calorie intake

How to cite this article: Yesaji PP, Swarup P, Nair BT, Koley G, Thapar RK., Impact of Maternal Education and Feeding Practices on Growth and Development in 18-Month-Old Children...Int J Drug Deliv Technol. 2026; 16(11s): 718-725; DOI: 10.25258/ijddt.16.11s.74

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

The first 1000 days of life is considered the critical window for growth and development of children. The World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) have put emphasis on this formative period, i.e., 270 days in the uterus and first 2 years after birth as an optimal period for adequate physical, mental, and cognitive growth and development of the children. Optimal breastfeeding practices which include early initiation of breastfeeding (EIBF) within 1hour of birth, exclusive breastfeeding (EBF) for the first 6 months of age, and continued breastfeeding (CBF) for 2 years of age or beyond with complementary foods are vital for child survival, proper growth and development. [1]

Infants and young children are at increased risk of malnutrition during the period of changeover of baby's diet from breastmilk to solid food, i.e, from 6 months to 2 years of age. Introducing complementary feeds earlier or later than recommended can lead to malnutrition. Around 38% and 21% of children under the age of 5 still suffer from stunting and wasting respectively.[2] This is attributed mainly to inadequate knowledge about appropriate feeding practices among parents rather than the lack of food due to poverty. [3-5] Maternal education is often considered one of the most important factors explaining the child's health outcomes. A large body of literature already links a mother's education to her child's immunizations, nutrition, morbidity, medical care, and survival. [6-7] However, there has been little conceptual work in the social sciences that might suggest which child outcomes might be especially sensitive to maternal education.

The present study aims to gain information about the effect of maternal education and the feeding practices currently undertaken by the mothers of children aged up to 18 months and its effect on growth and development of these children.

MATERIALS AND METHODS

It was a hospital-based cross-sectional descriptive study conducted in the Pediatric Outpatient Department of a tertiary care hospital in North India. The study was carried out over a period of 18 months, from August 2022 to March 2024 after ethical clearance from Institutional Ethics Committee of the Hospital. The study included asymptomatic children aged 18 months (±4weeks) attending the immunization OPD. Children born preterm,

**Author for Correspondence: Dr Bindu T Nair*

having chronic illness, congenital anomalies and eventful neonatal periods were excluded.

Consecutive sampling was used to recruit all eligible children attending the OPD during the study period. Recruitment continued daily until the desired sample size was achieved. Using the formula $n = Z^2PQ/l^2$ with 95% confidence level, 7% precision, and 50% assumed prevalence, the required sample size was calculated as 196 children.

Mothers were interviewed using a structured proforma after taking informed consent, Children underwent anthropometric measurement and developmental assessment during their routine OPD visit.

Statistical Analysis

Data obtained from direct interviews regarding infant feeding practices which included duration of exclusive breastfeeding and introduction of complementary feeding with adequate caloric intake, anthropometric measurements, and developmental milestones as per Trivandrum Development Screening Chart (TDSC) were recorded in case record form and thereafter, entered in Microsoft Excel Version 2017 (Microsoft Corporation, New York, USA)..

Data was analyzed using SPSS (Statistical Package for Social Sciences (SPSS statistics for Windows, Version 26, Armonk, NY: IBM Corp). Normality of each variable was assessed by using the Kolmogorov-Simirnov test. Quantitative data is expressed by mean and standard deviation or median with interquartile range and depends on normal distribution. Difference between two groups was tested by Student T test or Mann Whitney U test. Qualitative data was expressed in percentage and difference between the proportions was tested by Chi square test or Fisher's exact test.

RESULTS

Two hundred eligible children as per inclusion and exclusion criteria visiting the Immunization OPD were included in the study. The demographic profile of the study participants is shown in **Table 1.**

Table 1: Demographic profile of study participants

Variable		Number(n)	Percentage (%)
Maternal Age	20-25 years	178	89
	26-30 years	22	11
Parity	Primigravida	109	54.5
	Multigravida	91	45.5
Maternal Education	Uneducated	65	32.5
	Primary school	47	23.5
	High School	43	21.5
	Graduate	40	20.0
	Postgraduate or more	5	2.5
Mode of Delivery	NVD	138	69
	LSCS	62	31
Maternal Illness	None	194	97
	GDM	3	1.5
	Hypothyroidism	3	1.5
Gender of baby	Male	107	53.5
	Female	93	46.5

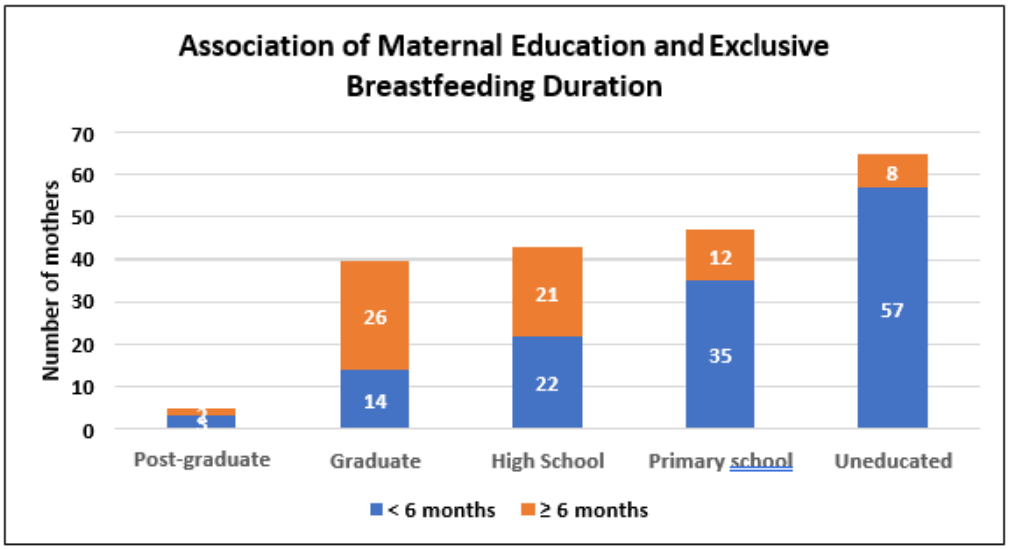

Figure 1: Association of maternal education and exclusive breastfeeding duration

Exclusive breastfeeding was more prevalent amongst the women who were more educated as compared to mothers with lesser literacy (Figure 1). Evaluation of developmental milestones as per TDSC is shown in Figure 2.

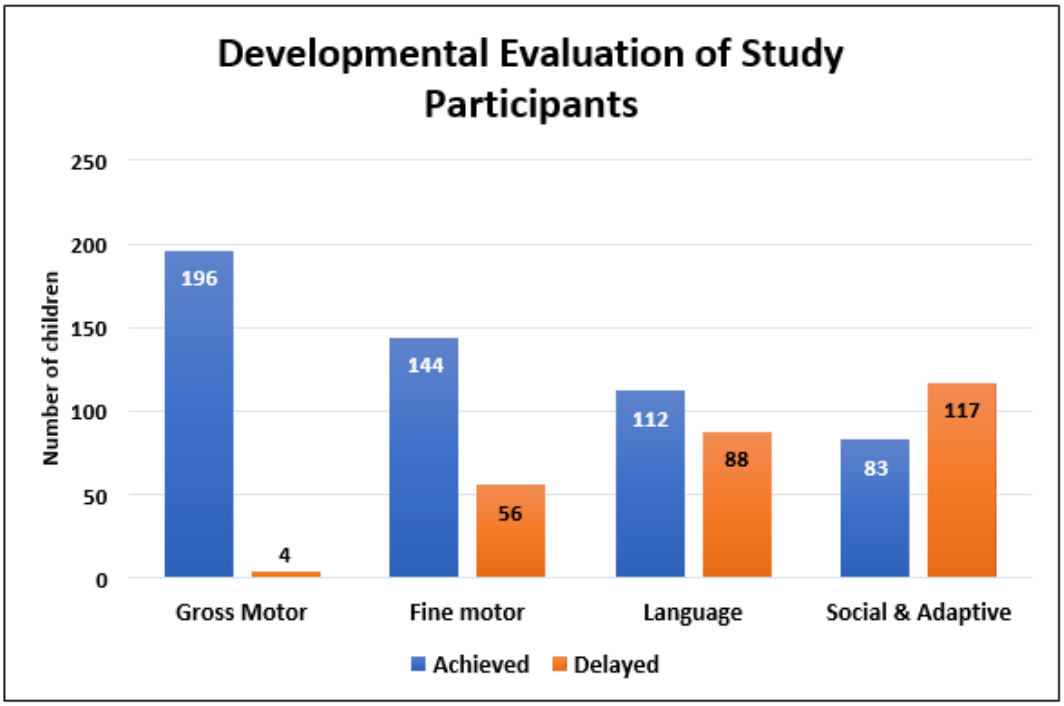

Figure 2: Developmental Evaluation of study participants

Table 2 shows association of feeding practices (duration of breastfeeding and introduction of complementary feeding with adequate caloric intake) with the anthropometry and achievement of age-appropriate developmental milestones. Exclusive breastfeeding for at least 6 months showed better weight for age in the children and this was statistically significant. Similarly adequate complementary feeding also led to better length for age and achievement of developmental milestones in all 4 domains (gross motor, fine motor, language and social and adaptive milestones) which was statistically significant **(Table 2).**

Table 2: Association of feeding practices (exclusive breastfeeding and complementary feeding) with anthropometry of study participants

*Author for Correspondence: Dr Bindu T Nair

Anthropometry					
		Exclusive Breastfeeding		**Chi Square**	**p *value***
Weight for age		<6 months	≥ 6months	35.6	<0.01*
	>+1SD	3	1		
	Median to +1SD	9	23		
	Median	15	17		
	Median to <-1SD	7	3		
	-<1SD to -<2SD	2	1		
	<-2SD to -<3SD	84	19		
	<-3SD	11	5		
		Caloric Intake (exclusive breastfeeding and complementary feeding)			
Length for Age		**Adequate**	**Inadequate**		
	>+1SD	4	0	76.17	<0.01*
	Median to +1SD	29	0		
	Median	32	2		
	Median to <-1SD	2	14		
	-<1SD to -<2SD	0	31		
	<-2SD to -<3SD	3	68		
	<-3SD	0	15		
Weight for age	>+1SD	4	0	75.91	<0.01*
	Median to +1SD	31	1		
	Median	31	1		
	Median to <-1SD	1	2		

T

Table 3: Association of caloric intake/feeding practices with developmental milestones of study participants

Developmental Milestones		Caloric Intake (exclusive breastfeeding and complementary feeding)			
		Adequate	Inadequate		
Gross Motor	Achieved	71	125	0.311	0.576
	Not achieved	0	4		
Fine Motor	Achieved	65	79	19.39	<0.01*
	Not achieved	6	50		
Language	Achieved	57	26	65.74	<0.01*
	Not achieved	14	103		
Social	Achieved	62	50	41.89	<0.01*
	Not achieved	9	79		

Table 4: Association of Maternal Education with developmental milestones of study participants

	Milestones Achieved	Milestones Delayed	Chi square	p value
Education				
	Gross Motor Milestones			
Post-graduate	5	0	3.4	0.49
Graduate	40	0		
High School	43	0		
Primary school	45	2		
Uneducated	63	2		
	Fine Motor Milestones			
Post-graduate	4	1	20.98	<0.01*
Graduate	38	2		
High School	34	9		
Primary school	32	15		
Uneducated	36	29		
Language Milestones				
Post-graduate	4	1	79.53	<0.01*
Graduate	36	4		
High School	25	18		

Primary school	12	35		
Uneducated	6	59		
Social and Adaptive Milestones				
Post-graduate	4	1	42.33	<0.01*
Graduate	37	3		
High School	29	14		
Primary school	21	26		
Uneducated	21	44		

Better achievement of developmental milestones were seen in children whose mothers who were better educated and had better feeding practices as compared to those with lesser literacy and this difference was statistically significant (**Table 3 and 4).**

DISCUSSION

The present study was done to evaluate the understanding of maternal education on children's diets and nutritional status and also on development of child in all four domains (gross motor, fine motor, social, language).

In this study, maximum mothers were uneducated 65 (32.5%) followed by 47 (23.5%) females who had received primary education, 45 (22.5%) were graduate and 43 (21.5%) had completed high school. This shows that the majority of mothers were either illiterate or just have bare minimum primary education. These findings were similar to results of Jain V et al., (2024). [8] In study done by El-Asheer OM et al., (2021) [9] they found Illiterate were 36%, who received basic education were 34% and 30 % received High school and higher education. These findings were similar to present study. Bimpong, K.A et al., (2020) [10] found in his study that 49% mothers received no education, 20.5% received low level education and 30.5% received high level education.

In the study, (n=131, 65.5%) had received exclusive breast feeding for <6 months and 69 (34.5%) had received ≥ 6 months. These findings were in accordance to results of Dhami MV et al., (2021) [11] who found that the exclusive breastfeeding rate in children aged less than 6 months was 62%. Similar were results of Dharel D et al., (2020) [12] who found that rate of exclusive breastfeeding until 6 months of age was 23.2%. In study done by Ganesan S et al., (2022) [13] 73.68% mothers continued to exclusively breastfeed their children until 6 months of age. This variance in breastfeeding practices among young infants may be explained by the literacy rate of the respondents, and diverse cultural and traditional practices prevalent in different topographical areas.

In the present study, there was significant positive association between mother education and weight for age i.e., more the mother educated higher the chances of appropriate weight for age. There was also significant positive association between mother education and length for age i.e., more the mother educated higher the chances of adequate length for age. Similar were the findings of Ickes SB et al., (2015)[14] who found that Women with some formal education, compared with women with none, had children with consistently lower probabilities of stunting (P <0.05) and childhood underweight (P < 0.05).Similar were the findings of Dorjee B et al.,(2023) [15] whose results indicated that the association of maternal education with height-for- age z-scores (HAZ) was significant. In a study done by Mamabolo RL et al., (2004) [16] they found that the mother's educational status also appeared to play a role as lower weights at 12 months and lower weight gain from birth to 12 months were seen in infants of mothers who had only a primary school education as compared with those having secondary and tertiary education, which is in accordance to our study.

In the present study, there was statistically significant relation between maternal education and adequacy of feeds of child (p<0.01) as subject's mother who were uneducated of them maximum (n=64) did not have adequacy of feeds and subjects whose mother was graduate of them maximum i.e., n=36 have adequacy of feeds. The findings may be due to educated women being more likely to have access to quality health services and messages. Similar were the findings of Ickes SB et al., (2015) [14] who found that maternal literacy was associated with a greater likelihood of feeding children the minimum frequency, dietary diversity, iron rich foods, and minimum acceptable diet. This association was strongest for the indicator of minimum acceptable diet in 2006: mothers who were literate were >2 times as likely to achieve this indicator (OR: 2.25; 95% CI: 1.13, 4.47; P < 0.05). Same were the findings of Dhami MV et al., (2021) [11] who found that mothers who had primary education were significantly more likely to provide minimum meal frequency than those without schooling. They also found mothers with a secondary education or higher had higher odds of meeting the minimum acceptable diet requirement than those who had no schooling.

According to studies in India, maternal education is associated with greater access and utilization of health care facilities, earning, and autonomy (Das et al. 2020 [17];Vikram and Vanneman 2020.[18] Das et al. 2020[17] concluded that the decision-making power of women in the family is an important predictor of early child growth in India.

In present study, there was statistically significant relation between maternal education and exclusive breast feeds time of child (≥ 6months vs <6months) ($p<0.01$) as subject's mother who were uneducated of them maximum (n=57) received exclusive breast feed for <6months and subjects whose mother was graduate of them maximum i.e., n=28 have received exclusive breast feeds of child for ≥ 6months.This suggest that mothers with a higher education level have more exposure to various sources of information and better knowledge about appropriate infant and young child feeding compared to uneducated mothers. Hence, mothers with a lower level of education should be given extra support to maintain exclusive breastfeeding until 6 months. These findings were in accordance to results of Dharel D et al., (2020) [12] who found on univariate logistic regression, maternal education was significantly associated with partial breastfeeding (p-value < 0.05). El-Asheer OM et al., (2021) [9] also found that mothers who only completed their basic education (completed preparatory education) were associated with higher levels of non-exclusive breast feeding.

This study indicates that there is a highly significant association between education level and the time of starting semisolid foods (earlier than 6 months vs after 6 months). Mothers who were uneducated (n=57) started complementary food before 6months of age and mothers with education of high school (n=21) started complementary food after 6 months of age. These findings show that illiterate mothers were more likely to early initiate complementary foods compared to highly educated mothers. Our results can be explained by the fact that the better educated mothers have good knowledge about the importance of complementary foods practice, might also better understand the message and can use nutrition information resources. Similar were the findings of Dhami MV et al., (2021)[11] who found that maternal education was positively associated with adequate complementary feeding practices.

In the present study, there was significant positive association between exclusive breast feed time (<6 months vs ≥ 6 months) and weight for age i.e., more the time of exclusive breast feed higher the chances of appropriate weight for age. In this trial, there was significant positive association between exclusive breast feed time (<6 months vs >6 months) and length for age i.e., more the time of exclusive breast feed higher the chances of appropriate length for age. Similar were the results of El-Asheer OM et al., (2021) [9] who found that 25.7% of exclusive breast-feeding infants were wasted and 33.6% were stunted.

In present study, majority of study subjects (n=130, 65%) did not have adequate calorie intake and only 35% have adequate calorie intake. In study done by Saaka M [19] 24.9% of the children meeting minimum adequate diet. In this study, there was significant positive association between calorie intake (adequate vs inadequate) and weight for age. There was also significant positive association between calorie intake (adequate vs inadequate) and length for age.

In this study, majority of study subjects achieved gross motor skill (n=196, 98%) and only 4 (2%) did not achieve it. 144 (72%) subjects achieved fine motor skills and 56 (28%) were delayed. Social skills were achieved by 112 (56%) subjects and 88 (44%) did not achieve it. Majority of study subjects (n=117, 58.5%) had delayed language skills and only 83 (41.5%) achieved it. This may be because of early (less than 6 months of age) introduction and faulty preparation of complementary foods.

In the present study, no significant relation was found between mother's education and achievement of gross motor skills of babies. In this study, there was statistically significant relation between maternal education and achievement of fine motor skill development of child ($p<0.01$). These findings were similar to results of Jain V et al., (2024) [8] who found that children whose mothers were educated at least up to high school were significantly less developmentally delayed as compared to the children whose mothers were either illiterate or did not get an education up to high school. This association was statistically significant. (P=0.023 for the motor developmental delay)

In present study, there was statistically significant association between maternal education and social skill development of child ($p<0.01$). There was also statistically significant association between maternal education and language skill development of the children ($p<0.01$). This may be because educated mothers were more aware of methods to develop social skills and language development in child.

Limitations of the study:

As this study is cross-sectional, it only captures a snapshot in time and cannot assess changes or developments over time. Longitudinal studies would be more informative in understanding the dynamics of child development. Data on feeding practices and maternal education may be subject to recall bias if collected retrospectively from mothers, potentially affecting the accuracy of the information.

CONCLUSION

The study findings underscore a compelling correlation between a mother's educational attainment and the health and developmental outcomes of her child. From the initiation of breastfeeding to the timely introduction of complementary foods, educated mothers exhibit a greater propensity to provide optimal nutrition, thereby mitigating the risk of malnutrition- related ailments

REFERENCE

1. Infant and Young Child Feeding. 2023. https://www.who.int/news-room/fact- sheets/detail/infant-and-young-child-feeding. (Last accessed on 26 January, 2026)
2. National Family Health Survey (NFSH-6) 2023-24.https://www.nfhsiips.in/nfhsuser/nfhs6.php (Last accessed on 26 January, 2026)
3. Rao S, Swathi P, Unnikrishnan B, Hegde A. Study of complementary feeding practices among mothers of children aged six months to two years - A study from coastal south India. Australas Med J. 2011;4(5):252-7. doi: 10.4066/AMJ.2011.607.
4. Kabir A, Maitrot MR. Factors influencing feeding practices of extreme poor infants and young children in families of working mothers in Dhaka slums: A qualitative study. PLoS One. 2017; 12(2):e0172119. doi: 10.1371/journal.pone.0172119.
5. Venugopal S, Chandrashekar. Knowledge of complementary feed and its effect on the child nutrition. Pediatr Rev: Int J Pediatr Res 2016;3:24-31. DOI: https://doi.org/10.17511/ijpr.2016.i01.06.
6. Aggarwal A, Verma S, Faridi M; Dayachand. Complementary feeding--reasons for inappropriateness in timing, quantity and consistency. Indian J Pediatr. 2008 ;75(1):49-53. doi: 10.1007/s12098-008-0006-9.
7. Fuchs R, Pamuk E, Lutz W. Education or wealth: Which matters more for reducing child mortality in developing countries? Vienna Yearbook Popul Res(VYPR) 2010;8:175–9.
8. Jain V, Agrawal A, Tomar S, Parihar AS. Impact of maternal education on the development of severe acute malnourished children. Asian J Med Sci 2024;15(5):121-5. DOI: https://doi.org/10.3126/ajms.v15i5.62145
9. El-Asheer OM, Darwish MM, Abdullah AM, Mohammed HA. Complementary feeding pattern and its impact on growth and development of under 2-years infants in upper Egypt. Egypt Pediatric Association Gaz 2021;69:17. DOI: 10.1186/s43054-021-00061-3.
10. Bimpong KA, Cheyuo EK, Abdul-Mumin A, Ayanore MA, Kubuga CK, Mogre V. Mothers' knowledge and attitudes regarding child feeding recommendations, complementary feeding practices and determinants of adequate diet. BMC Nutr. 2020 ;6(1):67. doi: 10.1186/s40795- 020-00393-0.
11. Dhami MV, Ogbo FA, Diallo TMO, Olusanya BO, Goson PC, Agho KE, On Behalf Of The Global Maternal And Child Health Research Collaboration GloMACH. Infant and Young Child Feeding Practices among Adolescent Mothers and Associated Factors in India. Nutrients. 2021;13(7):2376. doi: 10.3390/nu13072376.
12. Dharel D, Dhungana R, Basnet S, Gautam S, Dhungana A, Dudani R, Bhattarai A. Breastfeeding practices within the first six months of age in mid-western and eastern regions of Nepal: a health facility-based cross-sectional study. BMC Pregnancy Childbirth. 2020;20(1):59. doi: 10.1186/s12884-020-2754-0.
13. Ganesan S, Jayaraj J, Geminiganesan S, Rajan M. A study on parental awareness of feeding practices in children in the age-group 12-24 months. J Prev Med Hyg. 2022 ;62(4):E909-E917. doi: 10.15167/2421-4248/jpmh2021.62.4.2287.
14. Ickes SB, Hurst TE, Flax VL. Maternal Literacy, Facility Birth, and Education Are Positively Associated with Better Infant and Young Child Feeding Practices and Nutritional Status among Ugandan Children. J Nutr. 2015 ;145(11):2578-86. doi: 10.3945/jn.115.214346.
15. Dorjee B, Debnath, M./Bogin, B. Impact of maternal education on the growth of children in a patriarchy. Human Biology and Public Health 2023;1:1-9. DOI: https://doi.org/10.52905/hbph2023.1.60.
16. Mamabolo RL, Alberts M, Mbenyane GX, Steyn NP, Nthangeni NG, Delemarre-Van De Waal HA, Levitt NS. Feeding practices and growth of infants from birth to 12 months in the central region of the Limpopo Province of South Africa. Nutrition. 2004 ;20(3):327-33. doi: 10.1016/j.nut.2003.11.011.
17. Das S, Chanani S, Shah More N, Osrin D, Pantvaidya S, Jayaraman A. Determinants of stunting among children under 2 years in urban informal settlements in Mumbai, India: evidence from a household census. J Health Popul Nutr. 2020 ;39(1):10. doi: 10.1186/s41043-020-00222-x.
18. Vikram K, Vanneman R. Maternal education and the multidimensionality of child health outcomes in India. J Biosoc Sci. 2020 ;52(1):57-77. doi: 10.1017/S0021932019000245.
19. Saaka M. Relationship between mothers' nutritional knowledge in childcare practices and the growth of children living in impoverished rural communities. J Health Popul Nutr. 2014;32(2):237-48