ISSN (Print): 2663-9491 ISSN (Online): 2789-6897

Original Article

Relationship between Feeding Pattern & Maternal Educational Status and Duration of Hospital Stay among under 5 Children with Diarrhea in a Rural Area of Bangladesh

DOI: dx.doi.org

A B M Ali Hasan[1], Tahmina Rahman[2], Manir Hossain[1], Abdul Matin[3], Puspita Das[4], Mita Halder[4], Lipi Rani Adhikari[4], Krishna Karmaker[4]

Received: 19 November 2024
Accepted: 28 November 2024
Published: 15 December 2024

Published by:
Gopalganj Medical College,
Gopalganj, Bangladesh

*Corresponding Author

ABSTRACT

Introduction: *Diarrhea is responsible for the deaths of approximately 2.5 million people annually, with 60-70% of these fatalities occurring in children under the age of five. Most of these deaths take place in developing countries, where diarrheal disease accounts for an estimated 25% of mortality among children under the age of five.* ***Methods & Materials:*** *The study investigated relationship between feeding pattern and maternal educational status and duration of hospital stay in children under 5 admitted to Kumudini Hospital's pediatric ward due to diarrhea from October 2023 to March 2024. Employing a cross-sectional design, convenience sampling selected participants, with parental consent obtained upon admission.* ***Results:*** *Mothers with primary education often used diverse or unconventional feeding practices (71.4%), while secondary-educated mothers preferred "Breast Milk and Complementary Feeding" (69.5%), reflecting balanced nutrition awareness. Those above HSC favored "Breast Milk and Infant Formula" (16.7%), with minimal participation from illiterate mothers. A Pearson correlation of 0.2 links higher maternal education to improved feeding practices.* ***Conclusion:*** *The study concludes that higher maternal education is linked to better feeding practices and shorter*

(The Insight 2024; 7(1): 288-298)

1. *Associate Professor, Department of Paediatrics, Kumudini Women's Medical College Hospital, Mirzapur, Tangail, Bangladesh*
2. *Assessor, National Skill Development Authority, Prime Minister Office*
3. *Professor, Department of Paediatrics, Kumudini Women's Medical College Hospital, Mirzapur, Tangail, Bangladesh*
4. *Kumudini School of Public Health, R. P. Shaha University, Narayanganj, Bangladesh*

hospital stays, with educated mothers more likely to adopt balanced nutrition strategies.

Keywords: *Diarrhea Mortality, Maternal Education, Feeding Practices, Hospital Stay Duration, Under-Five Children*

INTRODUCTION

Diarrheal disease continues to be a significant cause of illness and death in developing countries[1]. Diarrhea is responsible for the deaths of approximately 2.5 million people annually, with 60-70% of these fatalities occurring in children under the age of five. Most of these deaths take place in developing countries, where diarrheal disease accounts for an estimated 25% of mortality among children under the age of five[2]. Mothers worldwide, particularly in developing countries, have been educated on the types, usage, and significance of this crucial tool for managing diarrhea and its related complications through antenatal clinics and child welfare programs. Additionally, print and electronic media also serve as important channels for providing health education[3,4]. While these efforts have been effective in reducing the severity of acute diarrheal episodes and significantly lowering the number of related deaths, many children still suffer from diarrhea, which adversely affects their growth and development[4]. Factors associated with a higher prevalence of diarrhea include maternal lack of education, inadequate exclusive breastfeeding, breastfeeding for less than one year, roundworm infestations, nutritional status, immunization status, night blindness, female gender, literacy levels, personal hygiene practices, overcrowding, improper garbage disposal, the source of water supply, and the availability of toilet facilities[5]. Maternal education is a crucial factor in determining the health status of children under the age of five[6]. Various factors contribute to the occurrence of diarrhea in children under five, and these factors vary by location. A study conducted in Kenya identified six factors independently associated with diarrheal diseases: the occupation of the parent/guardian, the caretaker not washing hands after changing napkins, the child drinking untreated river water, the child not being exclusively breastfed, and the child not washing hands before eating and after using the toilet[7]. Moreover, malnutrition contributes to approximately 60% of annual under-five mortality worldwide, with over two-thirds of these deaths resulting from inappropriate feeding practices. An analysis revealed that proper breastfeeding and complementary feeding practices alone can prevent 19% of under-five deaths[8,9]. The World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life, followed by the introduction of complementary foods from six months onwards, while continuing breastfeeding until at least two years of age[10,11]. Appropriate Infant and Young Child Feeding (IYCF) practices are crucial for ensuring optimal growth, cognitive development, and overall well-being during the early, vulnerable years of life[12]. So, this study

aimed to assess the relationship between feeding pattern & maternal educational status and duration of hospital stay among under 5 children with diarrhea in a rural area of Bangladesh.

METHODS & MATERIALS

The study aimed to investigate the relationship between feeding pattern & maternal educational status and duration of hospital stay among children under 5 years old admitted to the pediatric ward of Kumudini Hospital with diarrhea from October 2023 to March 2024. A cross-sectional design was employed for this research. The study population comprised children aged below 5 years who were admitted to the pediatric ward due to diarrhea. Convenience sampling was utilized to select participants for the study. Upon admission, informed consent was obtained from the parents or guardians of the children. Data collection involved a combination of methods. Firstly, demographic information such as age, gender, educational qualification of mother and medical history was gathered through interviews with the parents or guardians and by reviewing medical records. The clinical evaluation involved observing symptoms such as nausea & vomiting, bloating, abdominal pain, abdominal cramping, abdominal distension etc. Ethical considerations were ensured throughout the study, and confidentiality of participant information was maintained. Data analysis was performed in SPSS version 26.

RESULTS

Table I illustrates the distribution of the study population based on various basic characteristics, with a total sample size (N) of 180 individuals. A significant majority, 147 participants (81.7%), were between 7 to 24 months old, while 20 participants (11.1%) were between 1 to 6 months old. Smaller groups were aged 25 to 36 months (6 participants, 3.3%) and over 36 months (7 participants, 3.9%). In terms of sex distribution, 107 participants (59.4%) were male, and 73 participants (40.6%) were female. Regarding religious affiliation, 166 participants (92.2%) identified as Muslim, and 14 participants (7.8%) identified as Hindu. The weight distribution showed that 48 participants (26.7%) weighed between 3 to 7 kg, 109 participants (60.6%) weighed between 8 to 11 kg, and 23 participants (12.7%) weighed between 12 to 16 kg. Education levels of mothers varied, with the majority having a secondary education (58.9%), followed by those with education above Higher Secondary Certificate (HSC) (17.8%), primary education (21.7%), and a small percentage being illiterate (1.7%). Total monthly family income, measured in Bangladeshi Taka (BDT), predominantly fell within the 5000-25000 BDT range (65.55%), followed by 26000-45000 BDT (21.11%), 46000-65000 BDT (7.77%), 66000-85000 BDT (2.22%), 86000-100000 BDT (2.77%), and a single case with an income of 200000 BDT (0.55%). Regarding current feeding practices, the highest proportion was found in the category of breast milk (BM) and complementary feeding (CF) (32.8%), followed by BM and infant

formula (20.0%), infant formula and CF (15.6%), cow milk and CF (14.4%), BM and cow milk (CM) (5.6%), infant formula alone (5.0%), exclusive breast feeding (2.8%), and others (3.9%).

Table – I: Distribution of Study Population Based on Basic Characteristics (*n*=180)

Basic Characteristics	*n*(%)
Age (months)	
1-6	20(11.1)
7-24	147(81.7)
25-36	6(3.3)
>36	7(3.9)
Sex	
Male	107(59.4)
Female	73(40.6)
Religion	
Muslim	166(92.2)
Hindu	14(7.8)
Weight (kg)	
3-7	48(26.7)
8-11	109(60.6)
12-16	23(12.7)
Education of mother	
Primary	39(21.7)
Secondary	106(58.9)
Above HSC	32(17.8)
Illiterate	03(1.7)
Total monthly family income (BDT)	
5000-25000	118(65.55)
26000-45000	38(21.11)
46000-65000	14(7.77)
66000-85000	4(2.22)
86000-100000	5(2.77)
200000	1(0.55)
Current Feeding	
Exclusive breast Feeding	5(2.8)
BM and Infant formula	36(20.0)
Infant formula	9(5.0)
BM and CF	59(32.8)
BM and CM	10(5.6)
Cow milk and CF	26(14.4)
Infant formula and CF	28(15.6)
Others	7(3.9)

*BDT = Bangladeshi Taka *BM = Breast Milk *CF = Complementary Feeding *CM = Cow Milk

Table II provides a breakdown of the study population concerning clinical features, with a total sample size (n) of 180 individuals. Among the clinical features other than diarrhea, vomiting was the most prevalent, affecting 106 individuals (58.9%), followed by fever in 57 cases (31.7%), and cold symptoms in 27 cases (15.0%). Abdominal pain was reported in 14 cases (7.8%), while nausea and cough were less common, each affecting 8 individuals (4.4%). Abdominal distension was observed in 2 cases (1.1%), and abdominal cramping was reported in 1 case (0.6%). Regarding the type of diarrhea, Acute Watery Diarrhea (AWD) was predominant, affecting 171 individuals (95.0%), followed by persistent diarrhea in 8 cases (4.4%), and dysentery in 1 case (0.6%). In terms of prognosis, the majority of cases, accounting for 173 individuals (96.11%), experienced recovery, while a smaller proportion, comprising 7 cases (3.88%), were discharged upon request (DOR) before recovery.

Table – II: Distribution of Study Population Based on Clinical Feature (*n*=180)

Clinical features	*n*(%)
Clinical features other than diarrhoea	
Vomiting	106 (58.9)
Nausea	08 (4.4)
Abdominal pain	14 (7.8)
Abdominal cramping	01 (0.6)
Abdominal distension	02 (1.1)
Fever	57 (31.7)
Cough	8 (4.4)
Cold	27 (15.0)
Type of diarrhoea	
AWD	171(95.0)
persistent diarrhoea	08 (4.4)
Dysentery	1 (0.6)
Prognosis	
Recovered	173 (96.11)
DOR	07 (3.88)

Table III presents a detailed distribution of the study population based on the education level of mothers and the feeding practices of their children under five who have diarrhea. The feeding practices are categorized as Exclusive Breastfeeding (EBF), Breast Milk and Infant Formula, Infant Formula, Breast Milk and Complementary Foods (CF), Breast Milk and Cow's Milk (CM), Cow's Milk and CF, Infant Formula and CF, and Others. The maternal education levels are classified as Primary, Secondary, Above Higher Secondary Certificate (HSC), and Illiterate. In this study, mothers with primary education showed a higher proportion in the "Others" feeding category (71.4%), indicating diverse or unconventional feeding practices. For secondary education, the most common feeding practice was "Breast Milk and Complementary Foods" (69.5%), suggesting that these mothers might be more informed about the benefits of balanced nutrition. Mothers with education above HSC were more inclined towards "Breast Milk and Infant Formula" (16.7%), while illiterate mothers were scarcely represented, with only minor participation in "Infant Formula" and "Breast Milk and Complementary Foods". Pearson correlation of 0.2 indicates that maternal education has a positive effect on feeding practices.

Table – III: Distribution of Study Population Based on Education of Mother and Feeding Practice (*n*=180)

Feeding Practice Education of mother	EBF (*n*=5)	BM and Infant formula (*n*=36)	Infant Formula (*n*=9)	BM and CF (*n*=59)	BM and CM (*n*=10)	CM and CF (*n*=26)	Infant formula and CF (*n*=28)	Others (*n*=7)
Primary	3(60)	7(19.4)	2(22.2)	7(11.9)	1(10)	8(30.8)	6(21.4)	5(71.4)
Secondary	2(40)	23(63.9)	6(66.7)	41(69.5)	7(70)	11(42.3)	15(53.6)	1(14.3)
Above HSC	-	6(16.7)	-	9(15.3)	2(20)	7(26.9)	7(25)	1(14.3)
Illiterate	-	-	1(11.1)	2(3.4)	-	-	-	-

Table IV provides insights into the relationship between maternal education levels and the duration of hospital stay for children under five with diarrhea in a rural area of Bangladesh. Among the children whose mothers had primary education, 26 (15.9%) had hospital stays of less than 7 days, while a significant 13 (81.2%) had hospital stays of more than 7 days. In contrast, mothers with secondary education had 106 children (64.6%) with hospital stays of less than 7 days and no children with longer hospital stays. Similarly, mothers with education above HSC had 32 children (19.5%) with shorter hospital stays and none with longer hospital stays. Interestingly, there were no illiterate mothers whose children had hospital stays of less than 7 days; however, 3 children (18.7%) from illiterate mothers had hospital stays of more than 7 days. These findings suggest that higher maternal education levels, specifically secondary and above HSC, are associated with shorter hospital stays for children with diarrhea. This correlation could be attributed to better health literacy, more effective early management of the illness, and improved access to healthcare resources among mothers with higher education. Conversely, lower maternal education levels, such as primary or illiterate, are linked to longer hospital stays. This indicates that these mothers might face challenges in effectively managing their children's health conditions, possibly due to lower health literacy, delayed healthcare-seeking behavior, or limited access to healthcare resources. Pearson correlation of 0.13 indicates that maternal education has a positive effect on hospital stay.

Table – 4: Distribution of Study Population Based on Education of Mother and Hospital Stay (*n*=180)

Education of Mother	Hospital Stay <7 days (*n*=164)	Hospital Stay >7 days (*n*=16)
Primary	26(15.9)	13(81.2)
Secondary	106(64.6)	-
Above HSC	32(19.5)	-
Illiterate	-	3(18.7)

Table V provides a detailed breakdown of the study population, categorizing them by different feeding practices and their corresponding durations of hospital stay. Infants who were exclusively breastfed (EBF) showed a striking pattern, with 100% of them having hospital stays less than 7 days, indicating a strong association between exclusive breastfeeding and shorter hospitalization periods. For infants fed with a combination of breast milk (BM) and infant formula, approximately 97.2% had hospital stays less than 7 days, demonstrating a high prevalence of shorter hospital stays compared to other feeding practices involving formula or complementary feeding alone. Similarly, infants fed exclusively with infant formula showed a lower but still substantial percentage (88.9%) of hospital stays less than 7 days, suggesting that while formula feeding may correlate with shorter stays, it might not confer the same benefits as exclusive breastfeeding in terms of health outcomes during hospitalization. The strong correlation coefficient of 0.88 reinforces the association between feeding practices and hospital stay.

Table – V: Distribution of Study Population Based on the Feeding Practices and Hospital Stay (*n*=180)

Feeding Practice	EBF (*n*=5)	BM and Infant formula (*n*=36)	Infant Formula (*n*=9)	BM and CF (*n*=59)	BM and CM (*n*=10)	CM and CF (*n*=26)	Infant formula and CF (*n*=28)	Others (*n*=7)
Hospital Stay <7 days (*n*=164)	5(100)	35(97.2)	8(88.9)	55(93.2)	8(80)	25(96.1)	24(85.7)	4(57.1)
Hospital Stay >7 days (*n*=16)	-	1(2.7)	1(11.1)	4(6.7)	2(20)	1(3.9)	4(14.2)	3(42.9)

DISCUSSION

The study population predominantly consisted of children aged 7 to 24 months (81.7%), with 59.4% males and 40.6% females. In the study of Mahmud et al. data on 13321 children under 5 years of age were analysed, of whom 61.5% were male and 38.5% were female[13]. The mean (±SD) age of children with diarrhoea was 5.63 (±3.49) months. Weight-wise, the majority fell within 8-11 kg (60.6%) in this study. The average body weight of children who have diarrhea was less than the average body weight of children who have no diarrhea, although statistically insignificant in another study[14]. Family income mostly ranged from 5000 to 25000 BDT (65.55%). Similarly, ***Wilunda C et. al.*** conducted a study where the household wealth index quintile was found to be associated with diarrhea, with children in the poor, middle, and fourth wealth index quintiles being at higher risk compared to children in the richest wealth index quintile[15]. Among clinical features other than diarrhea, vomiting was most prevalent (58.9%), followed by fever (31.7%) and cold symptoms (15.0%). Abdominal pain was reported in 7.8% of cases, while nausea and cough affected 4.4% each. Acute Watery Diarrhea (AWD) was predominant (95.0%), with 4.4% experiencing persistent diarrhea and 0.6% dysentery in this study. Similarly fever and vomiting were the main symptoms accompanying acute diarrhea in the study of ***Tian L et. al.***[16]. In this study, mothers with primary education were predominantly associated with diverse or unconventional feeding practices, comprising 71.4% in the "Others" category. Secondary education mothers leaned towards "Breast Milk and Complementary Foods" (69.5%), indicating awareness of balanced nutrition benefits. Those with education above HSC favored "Breast Milk and Infant Formula" (16.7%), while illiterate mothers had minimal representation, engaging slightly in "Infant Formula" and "Breast Milk and Complementary Foods". A Pearson correlation of 0.2 suggests a positive impact of maternal education on feeding practices. However, Bahartha AS et al. showed in their study that, the mother's education had an insignificant relation with diarrheal disease as a risk factor, where 44% of mothers of children with diarrhea were illiterate[17]. In the study of ***Ogbo FA et. al.*** the prevalence of diarrhea was lower among infants whose mothers practiced exclusive breastfeeding (EBF) and predominant breastfeeding (PBF), compared to those who did not exclusively and predominantly breastfeed. In infants aged 6–8 months, the introduction of complementary foods was associated with a higher prevalence of diarrhea compared to those exclusively breastfed during this period. Infants who received exclusive and predominant breastfeeding were less prone to diarrhea than those who did not receive these feeding practices[18]. Moreover, in this study higher maternal education levels, particularly secondary and above HSC, correlate with shorter hospital stays for children with diarrhea, suggesting better health literacy and access to healthcare resources. Conversely, primary or illiterate

mothers are associated with longer hospital stays, possibly due to challenges in managing their children's health effectively. A Pearson correlation of 0.13 indicates a positive effect of maternal education on hospital stay duration, mirroring the findings in the study of ***Wasihun AG et. al.***[19]. In this study, exclusively breastfed infants had the best outcomes, with 100% staying in the hospital for less than 7 days. This aligns with existing research, which underscores the health benefits of exclusive breastfeeding, such as improved immune protection and reduced infection rates[20]. Infants fed a combination of breast milk and formula also had a high percentage (97.2%) of shorter hospital stays, though not as high as exclusively breastfed infants. This suggests mixed feeding is beneficial but not as effective as exclusive breastfeeding[21].

Conclusion

This study highlights the significant impact of maternal education on feeding practices and the duration of hospital stay among children under five with diarrhea in a rural area of Bangladesh. The findings demonstrate that higher maternal education levels are positively correlated with better feeding practices and shorter hospital stays. Mothers with secondary education or above were more likely to adopt balanced nutrition strategies, such as combining breast milk with complementary foods or infant formula. Additionally, children of mothers with higher education levels had shorter hospital stays, suggesting that better-educated mothers are more effective in managing their children's health and accessing healthcare resources promptly. The positive Pearson correlations (0.2 for feeding practices and 0.13 for hospital stay duration) indicate that maternal education plays a crucial role in improving health outcomes for children with diarrhea.

Recommendation

Based on the findings of this study, it is recommended to enhance maternal education programs, particularly in rural areas, by implementing community-based initiatives that focus on maternal health and child nutrition. These programs should emphasize the importance of exclusive breastfeeding, the timely introduction of complementary foods, and balanced nutrition. Strengthening healthcare access in rural areas is also essential, ensuring that mothers have adequate access to pediatric care, nutritional guidance, and emergency medical services. Community engagement is vital, and local community leaders and organizations should be involved to promote awareness about the benefits of maternal education and proper feeding practices. Finally, continuous research and monitoring of the relationship between maternal education, feeding practices, and child health outcomes are necessary to identify gaps and inform future interventions.

Funding

This research was funded by the authors themselves.

Conflict of Interest

The authors declare no conflict of interest.

REFERENCES

1. *Kosek M, Bern C, Guerrant RL. The magnitude of the global burden of diarrhoeal disease from studies published 1992-2000 Bull World Health Organ. 2003;81:197–204*
2. *Cesar GV, Bryce J, Fontaine O, Monasch R. Reducing deaths from diarrhoea through oral rehydration therapy Bull World Health Organization. 2000;78:1246–55*
3. *Ekanem EE, Akitoye CO, Adedeji OT. Food hygiene behavior and childhood diarrhea in Lagos, Nigeria: A case-control study J Diarrhoeal Dis Res. 1991;9:219–26*
4. *Babaniyi OA. Oral rehydration of children with diarrhea in Nigeria: A 12-year review of impact on morbidity and mortality from diarrheal diseases and diarrheal treatment practices J Trop Pediatr. 1991;37:57–63*
5. *Gupta A, Sarker G, Rout AJ, Mondal T, Pal R. Risk correlates of diarrhea in children under 5 years of age in slums of Bankura, West Bengal. Journal of global infectious diseases. 2015 Jan 1;7(1):23-9.*
6. *Desmennu AT, Oluwasanu MM, John-Akinola YO, Oladunni O, Adebowale SA. Maternal education and diarrhea among children aged 0-24 months in Nigeria. African journal of reproductive health. 2017 Oct 1;21(3):27-36.*
7. *Getachew A, Guadu T, Tadie A, Gizaw Z, Gebrehiwot M, Cherkos DH, Menberu MA, Gebrecherkos T. Diarrhea prevalence and sociodemographic factors among under-five children in rural areas of North Gondar Zone, Northwest Ethiopia. International journal of pediatrics. 2018 Jun 3;2018.*
8. *Ministry of Women and Child Development FaNB and Government of India, National Guidelines on Infant and Young Child Feeding, Ministry of Women and Child Development FaNB, Government of India, New Delhi, India, 2nd edition, 2006.*
9. *Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS. How many child deaths can we prevent this year?. The lancet. 2003 Jul 5;362(9377):65-71.*
10. *WHO, Global Strategy on Infant and Young Child Feeding, World Health Organzation, Geneva, Switzerland, 2003.*
11. *World Health Organization, Complementary Feeding: Report of the Global Consultation. Summary of Guiding Principles for Complementary Feeding of the Breastfed Child, World Health Organization, Geneva, Switzerland, 2003.*
12. *Patel DV, Bansal SC, Nimbalkar AS, Phatak AG, Nimbalkar SM, Desai RG. Breastfeeding practices, demographic variables, and their association with morbidities in children. Advances in preventive medicine. 2015 Aug 10;2015.*
13. *Mahmud I, Das S, Khan SH, Faruque AS, Ahmed T. Gender disparity in care-seeking behaviours and treatment outcomes for dehydrating diarrhoea among under-5 children admitted to a diarrhoeal disease hospital in Bangladesh: an analysis of hospital-based surveillance data. BMJ open. 2020 Sep 1;10(9):e038730.*
14. *Bahartha AS, AlEzzi JI. Risk factors of diarrhea in children under 5 years in Al-Mukalla, Yemen. Saudi medical journal. 2015 Jun;36(6):720.*
15. *Wilunda C, Panza A. Factors associated with diarrhea among children less than 5 years old in Thailand: a secondary analysis of Thailand multiple indicator cluster survey 2006. J health Res. 2009 Dec 1;23(Suppl):17-22.*
16. *Tian L, Zhu X, Chen Z, Liu W, Li S, Yu W, Zhang W, Xiang X, Sun Z. Characteristics of bacterial pathogens associated with acute diarrhea in children under 5 years of age: a hospital-based cross-sectional study. BMC infectious diseases. 2016 Dec;16:1-8.*
17. *Bahartha AS, AlEzzi JI. Risk factors of diarrhea in children under 5 years in Al-Mukalla, Yemen. Saudi medical journal. 2015 Jun;36(6):720.*
18. *Ogbo FA, Nguyen H, Naz S, Agho KE, Page A. The association between infant and young child feeding practices and diarrhoea in Tanzanian children. Tropical medicine and health. 2018 Dec;46:1-9.*
19. *Wasihun AG, Dejene TA, Teferi M, Marugán J, Negash L, Yemane D, McGuigan KG. Risk factors for diarrhoea and malnutrition*

among children under the age of 5 years in the Tigray Region of Northern Ethiopia. PloS one. 2018 Nov 26;13(11):e0207743.

20. *Victora CG, Bahl R, Barros AJ, França GV, Horton S, Krasevec J, Murch S, Sankar MJ, Walker N, Rollins NC. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. The lancet. 2016 Jan 30;387(10017):475-90.*
21. *Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. Cochrane database of systematic reviews. 2012(8).*