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Association between Maternal Education and Inappropriate Complementary Feeding Practices in Children Aged 6–24 Months

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Abstract

Background: *Complementary feeding practices are influenced by several factors, among which maternal education plays a critical role in shaping infant feeding behaviors and child nutritional outcomes. However, there remains a notable gap in current, region-specific evidence linking maternal education levels to complementary feeding practices during the crucial window of 6–24 months. The purpose of the study is to assess the relationship between maternal education levels and the prevalence of inappropriate complementary feeding practices in children aged 6–24 months.*

Aim of the study: *The aim of the study was to examine the relationship between maternal education levels and the prevalence of inappropriate complementary feeding practices in children aged 6–24 months.*

Methods: *This cross-sectional study at the Department of Pediatrics, Shahid Sohrawardy Medical College, Dhaka (Oct 2023–Mar 2024) enrolled 150 mother–child pairs (children 6–24 months). Data were collected via WHO-adapted questionnaires on sociodemographics and complementary feeding practices. Inappropriate feeding was defined by WHO indicators. Data analysis used SPSS and R with chi-square, multivariate, and exact logistic regression, plus trend tests; $p < 0.05$ was significant.*

Results: *Among 150 mother–child pairs, 87.3% of children had inappropriate complementary feeding practices, mainly due to poor dietary diversity (80%). Higher maternal education was significantly associated with better feeding practices, with secondary (aOR: 0.20, $p = 0.019$) and higher education (aOR: 0.07, $p = 0.006$) linked to lower odds of inappropriate feeding.*

Conclusion: *Maternal education plays a pivotal role in ensuring appropriate complementary feeding practices among children aged 6–24 months.*

Keywords: *Maternal Education, Complementary Feeding, Child Nutrition.*

1. INTRODUCTION

Globally, inadequate and inappropriate feeding practices during an infant's first year of life are responsible for approximately two-thirds of child deaths [1]. For optimal growth and development, it is essential to introduce complementary feeding at the right time, ensuring that the foods provided are both sufficient in quantity and nutritional quality [2-4]. The World Health Organization (WHO) advises starting breastfeeding within the first hour after birth, maintaining exclusive breastfeeding for six months, and then introducing safe, age-appropriate, and nutritionally adequate complementary foods from six months onward, while continuing breastfeeding up to two years or beyond [5]. This period marks a critical transition from breast milk or formula to solid foods and other beverages, where the timing and quality of the introduction can profoundly impact the child's immediate and future health.

Inadequate infant and young child feeding (IYCF) practices continue to be a major cause of childhood under nutrition worldwide [6,7], particularly in low- and middle-income countries (LMICs) and regions like South Asia and Sub-Saharan Africa. In South Asia, poor nutrition and inappropriate IYCF are common, with just 39% of children benefiting from early initiation of breastfeeding and only 46% exclusively breastfed [8]. Complementary feeding is frequently introduced late or is insufficient in

both quantity and quality, increasing susceptibility to illnesses such as acute respiratory infections and diarrhea, which in turn contribute to undernutrition and higher child mortality [9,10]. For instance, in Bangladesh, only 62% of infants aged 6 to 9 months receive complementary foods alongside continued breastfeeding, while the rates of childhood undernutrition remain alarmingly high [11,12].

Complementary feeding practices are affected by various factors such as socioeconomic status, cultural beliefs, parental education, and maternal knowledge and attitudes [13,14]. Of these, maternal education is a particularly important factor that positively influences infant feeding behaviors and child nutritional status. Research shows that enhancing maternal knowledge and attitudes through nutrition education and counseling can improve IYCF practices, which in turn supports better child growth and development, especially in areas with low maternal literacy rates [15]. However, existing data are still limited, highlighting the need for more comprehensive and current evidence on how maternal education relates to infant and young child feeding practices across different regions.

Despite the global emphasis on improving infant and young child feeding practices, there remains a notable gap in understanding the specific impact of maternal education on complementary feeding behaviors, particularly in LMICs like Bangladesh. While some studies have suggested that higher maternal education is associated with better feeding practices, the findings are not always consistent, and contextual variations often influence the outcomes. Moreover, many existing studies lack up-to-date, region-specific data and fail to account for the nuances in educational attainment levels and their direct association with complementary feeding practices during the critical age window of 6–24 months. This gap limits the development of targeted interventions and policies that could leverage maternal education as a key strategy to improve child nutrition outcomes. The purpose of the study is to assess the relationship between maternal education levels and the prevalence of inappropriate complementary feeding practices in children aged 6–24 months.

2. Objective

- To examine the relationship between maternal education levels and the prevalence of inappropriate complementary feeding practices in children aged 6–24 months.

3. Methodology & Materials

This cross-sectional observational study was conducted at the Department of Pediatrics, Shahid Sohrawardy Medical College, Dhaka, Bangladesh, between October 2023 and March 2024. A total of 150 mother–child pairs were included in the study. Participants were selected consecutively based on specific inclusion criteria, focusing on children aged 6 to 24 months and their mothers, to evaluate the association between maternal education and inappropriate complementary feeding practices.

Inclusion Criteria

- Mothers with children aged 6–24 months attending the pediatric outpatient department.
- Mothers willing to provide informed consent.

Exclusion Criteria

- Children with congenital anomalies or chronic illnesses affecting feeding.
- Mothers unable to communicate effectively (e.g., language barriers, cognitive impairments).

The study was conducted after obtaining written informed consent from all participants, ensuring their understanding of the study's purpose and procedures while maintaining confidentiality and anonymity. Ethical approval was obtained from the Shaheed Suhrawardy Medical College Ethical Review Committee, and all procedures were conducted in accordance with the principles of the Declaration of Helsinki. Data were collected through face-to-face interviews using a structured, pre-tested questionnaire adapted from WHO guidelines. Each mother–child pair was interviewed by trained data collectors to reduce interviewer bias. The questionnaire gathered sociodemographic information including maternal age, educational level (categorized as no formal, primary, secondary, or higher secondary and above), place of residence (urban or rural), and child's age and sex. Complementary feeding practices were assessed through questions on initiation timing (<6, 6, or >6 months), meal frequency in relation to WHO recommendations, and dietary diversity, with a minimum of four out of seven food groups consumed considered adequate. The primary outcome, inappropriate complementary feeding, was defined as failure to meet one or more WHO-

recommended indicators, with maternal education as the key exposure variable. Data were entered and analyzed using SPSS version 28 and R (logistf package). Descriptive statistics summarized participant characteristics. Associations between maternal education and feeding practices were examined using chi-square tests. Multivariate logistic regression was used to control for potential confounders such as child's age and sex, maternal age, and residence, while exact logistic regression was applied for small subgroups (e.g., higher secondary education, n=7). A Cochran-Armitage trend test assessed linear associations across education levels, with exact p-values reported throughout and statistical significance set at $p<0.05$.

4. RESULTS

Table 1. *Sociodemographic Characteristics of Study Participants (n = 150)*

Variable		Frequency (n)	Percentage (%)
Child's Age (months)	6–12	55	36.7
	13–24	95	63.3
Child's Sex	Male	83	55.3
	Female	67	44.7
Mother's Age (years)	15–19	4	2.7
	20–24	33	22.0
	25–29	65	43.3
	≥30	48	32.0
	Mean ± SD	27.2±4.8	
Mother's Education	No formal education	8	5.3
	Primary school education	45	30.0
	Secondary school education	90	60.0
	Higher secondary and above	7	4.7
Residence	Urban	34	22.7
	Rural	116	77.3

Among the 150 mother–child pairs included in the study, the majority of the children were aged 13–24 months (n = 95, 63.3%), while 36.7% (n = 55) were aged 6–12 months. More than half of the children were male (n = 83, 55.3%) and the rest were female (n = 67, 44.7%). Most mothers were aged 25–29 years (n = 65, 43.3%), followed by ≥30 years (n = 48, 32.0%), 20–24 years (n = 33, 22.0%), and 15–19 years (n = 4, 2.7%), with a mean maternal age of 27.2 ± 4.8 years. Regarding educational status, 60.0% (n = 90) of mothers had secondary school education, 30.0% (n = 45) had completed primary school, 5.3% (n = 8) had no formal education, and 4.7% (n = 7) had higher secondary education or above. In terms of residence, a large proportion of participants lived in rural areas (n = 116, 77.3%), while 22.7% (n = 34) resided in urban settings.

Table 2. *Prevalence of Inappropriate Complementary Feeding Practices (n = 150)*

Feeding Indicator	Inappropriate Practice (n)	Percentage (%)
Delayed initiation (>6 months)	56	37.3
Inadequate meal frequency	44	29.3
Inadequate dietary diversity (<4 groups)	120	80.0
Overall Inappropriate Practice	131	87.3

Among the 150 children, 56 (37.3%) had delayed initiation of complementary feeding, 44 (29.3%) received inadequate meal frequency, and 120 (80.0%) had insufficient dietary diversity. Overall, 131 children (87.3%) exhibited at least one inappropriate complementary feeding practice.

Table 3. *Association between Maternal Education and Complementary Feeding Practices (n = 150)*

Maternal Education	Total Mothers (n)	Inappropriate Feeding (n, %)	Appropriate Feeding (n, %)	p-value
No formal education	8	8 (100.0%)	0 (0.0%)	0.021
Primary school education	45	41 (91.1%)	4 (8.9%)	
Secondary school education	90	77 (85.6%)	13 (14.4%)	
Higher secondary and above	7	5 (71.4%)	2 (28.6%)	
Total	150	131 (87.3%)	19 (12.7%)	

Table 3 shows the relationship between maternal education levels and complementary feeding practices. Inappropriate feeding practices were most prevalent among mothers with no formal education (100%), followed by those with primary (91.1%) and secondary education (85.6%). Mothers with higher secondary education or above showed the lowest rate of inappropriate feeding (71.4%). The association between maternal education and feeding practices was statistically significant (p = 0.021).

Table 4. *Multivariate Logistic Regression Analysis of Factors Associated with Inappropriate Complementary Feeding Practices*

Variable		Adjusted Odds Ratio (aOR)	95% Confidence Interval	p-value
Maternal Education	Primary school	0.47	0.11–1.85	0.289
	Secondary school	0.2	0.05–0.76	0.019
	Higher secondary and above	0.07	0.01–0.66	0.006
Child's Age (months)		1.04	0.97–1.11	0.164
Child's Sex	Male	1.3	0.54–3.08	0.557
Mother's Age (years)		0.96	0.88–1.04	0.388
Residence	Rural	2.1	0.75–5.88	0.153

Table 4 presents the adjusted odds ratios (aOR) for various sociodemographic factors in relation to inappropriate complementary feeding practices. After controlling for confounders, higher maternal education was significantly associated with lower odds of inappropriate feeding. Compared to mothers with no formal education, those with secondary education (aOR: 0.20, p = 0.019) and higher secondary education or above (aOR: 0.07, p = 0.006) had significantly reduced odds of practicing inappropriate feeding. Other factors such as child's age, child's sex, mother's age, and rural residence were not significantly associated with feeding practices in the adjusted model.

5. Discussion

This study highlights the prevalence of inappropriate complementary feeding practices and their association with maternal education among children aged 6–24 months attending a tertiary care hospital in Bangladesh. Inappropriate complementary feeding, characterized by delayed initiation, insufficient meal frequency, and poor dietary diversity, remains a critical public health concern impacting child nutrition and growth. The findings emphasize the significant influence of maternal education on feeding behaviors, with lower educational levels linked to higher rates of suboptimal practices. These results underscore the importance of targeted educational interventions to improve complementary feeding and ultimately enhance child health outcomes in similar settings. In our study, the majority of children were aged between 13 and 24 months (63.3%), consistent with findings by Karki et al.[16], who reported 63.8% in this age group, highlighting this period as critical for complementary feeding interventions. The gender distribution showed a slight male predominance (55.3%), with females comprising 44.7%, closely matching the 44.6% female representation reported by Karki et al.[16] The mean maternal age was 27.2 ± 4.8 years, comparable to Karki et al.[16] (25.74 ± 4.96 years) and Yazew et al.[17] (27.33 ± 5.83 years), indicating similar maternal age profiles across complementary feeding studies. Regarding education, most mothers had completed secondary school (60.0%), aligning closely with Yunitasari et al. [18] (59.15%) and supported by Sichalwe et al.[19] (45.5%) and Gemede et al.[20] (58.5%), who also reported predominance of mothers with primary or secondary education. When combining secondary and higher education levels, our study's rate (64.7%) compares favorably with the 47.7% reported by Kabir et al.[3], suggesting maternal educational attainment plays a significant role in complementary feeding practices across diverse settings. Additionally, the rural predominance in our sample (77.3%) is nearly identical to Kabir et al.'s [3] (77.4%), emphasizing the need for targeted nutrition interventions in rural populations where access to education and services may be limited.

The present study revealed a high prevalence of inappropriate complementary feeding practices among children aged 6–24 months. Delayed initiation of complementary feeding occurred in 37.3% of children, closely aligning with Abate et al. [21], who reported a similar prevalence of

37%. Inadequate dietary diversity was the most common issue, affecting 80.0% of children, consistent with Forsido et al. [22], who found 83.9% of children in this age group failed to meet minimum dietary diversity. Overall, 87.3% of children exhibited at least one inappropriate complementary feeding practice, comparable to the 86% reported by Donkor et al.[23], highlighting a widespread pattern of suboptimal feeding behaviors across different contexts.

This study found a significant association between maternal education and complementary feeding practices. Mothers with no formal education showed the highest prevalence of inappropriate feeding (100%), while those with higher secondary education or above had the lowest (71.4%). This gradient suggests increased maternal education reduces the likelihood of inappropriate feeding, consistent with a multilevel analysis across 19 sub-Saharan African countries that reported higher maternal education significantly improves appropriate complementary feeding practices [24].

Moreover, higher maternal education was associated with substantially reduced odds of inappropriate feeding. Mothers with secondary education had an adjusted odds ratio (aOR) of 0.20 (95% CI: 0.05–0.76), and those with higher secondary education or above had an even stronger protective effect (aOR 0.07, 95% CI: 0.01–0.66). These findings mirror those of Shagaro et al. [24], who reported that mothers with primary education had 31% lower odds of appropriate complementary feeding (AOR = 0.69), and those with secondary or higher education experienced 48% lower odds of inappropriate feeding (AOR = 0.52). This inverse gradient underscores the critical role of maternal education in promoting optimal complementary feeding practices. Other factors such as child's age, sex, mother's age, and residence were not significantly associated with feeding practices, highlighting maternal education as the key determinant in this context.

6. Limitations of the Study

This study had some limitations:

- The study was conducted in a selected tertiary-level hospital.
- The sample was not randomly selected.
- The study's limited geographic scope may introduce sample bias, potentially affecting the broader applicability of the findings.

7. Conclusion

Inappropriate complementary feeding practices were observed in 87.3% of children aged 6–24 months, with inadequate dietary diversity being the most common issue. A significant association was found between maternal education and feeding practices, with the prevalence of inappropriate feeding decreasing as maternal education level increased. This trend was statistically significant overall. Multivariate analysis further demonstrated that mothers with secondary or higher education had significantly lower odds of practicing inappropriate feeding, even after adjusting for other variables. In contrast, child's age, sex, maternal age, and place of residence were not independently associated with feeding practices. These findings highlight the critical role of maternal education in promoting appropriate complementary feeding, underscoring the need for targeted educational interventions to improve child nutrition outcomes.

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