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Determinants of infant and young child feeding practices in Bangladesh: Secondary data analysis of Demographic and Health Survey 2004

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Abstract

Background. *In Bangladesh, poor infant and young child feeding practices are contributing to the burden of infectious diseases and malnutrition.*

Objective. *To estimate the determinants of selected feeding practices and key indicators of breastfeeding and complementary feeding in Bangladesh.*

Methods. *The sample included 2,482 children aged 0 to 23 months from the Bangladesh Demographic and Health Survey of 2004. The World Health Organization (WHO)-recommended infant and young child feeding indicators were estimated, and selected feeding indicators were examined against a set of individual-, household-, and community-level variables using univariate and multivariate analyses.*

Results. *Only 27.5% of mothers initiated breastfeeding within the first hour after birth, 99.9% had ever breastfed their infants, 97.3% were currently breastfeeding, and 22.4% were currently bottle-feeding. Among infants under 6 months of age, 42.5% were exclusively breastfed, and among those aged 6 to 9 months, 62.3% received complementary foods in addition to breastmilk. Among the risk factors for an infant not being exclusively breastfed were higher socioeconomic status, higher maternal education, and living in the Dhaka region. Higher birth order and female sex were associated with increased rates of exclusive breastfeeding of infants under 6 months of age. The risk factors for bottle-feeding were similar and included having a partner with a higher educational level (OR = 2.17), older maternal age (OR for age ≥ 35 years = 2.32), and being in the upper wealth quintiles (OR for the richest = 3.43). Urban mothers were at higher risk for not initiating breastfeeding within the first hour after birth (OR = 1.61). Those who made three to six visits to the antenatal clinic were at lower risk for not initiating breastfeeding within the first hour (OR = 0.61). The rate of initiating breastfeeding within the first hour was higher in mothers from richer households (OR = 0.37).*

Conclusions. *Most breastfeeding indicators in Bangladesh were below acceptable levels. Breastfeeding promotion programs in Bangladesh need nationwide application because of the low rates of appropriate infant feeding indicators, but they should also target women who have the main risk factors, i.e., working mothers living in urban areas (particularly in Dhaka).*

Key words: Bangladesh, bottle-feeding, breastfeeding, determinants, infant feeding, young child

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Introduction

In Bangladesh, infectious diseases such as diarrhea and acute respiratory infections are the main cause of mortality and morbidity in infants under 1 year of age [1, 2]. Undernutrition among children under 5 years of age remains a major problem, with 48% of such

children underweight, 43% stunted and 12.8% wasted in the year 2004 [2]. The importance of breastfeeding in the prevention of infectious diseases and undernutrition during infancy is well known [1, 3]. The World Health Organization (WHO) infant feeding guidelines recommend that infants should be exclusively breastfed for the first 6 months of life to achieve optimal growth, development, and health [4].

Although breastfeeding is almost universal in Bangladesh, the rates of exclusive breastfeeding of infants under 6 months of age are low. Cultural practices include feeding prelacteal foods, such as honey, sugar water, or mustard oil, immediately after birth, and this contributes to the low prevalence of exclusive breastfeeding [5]. Recent data show that 38% of children aged 2 to 3 months are exclusively breastfed and 23% of children are given complementary foods before the sixth month [2]. In addition, rates of bottle-feeding are high, with 30% of infants aged 2 to 3 months being bottle-fed. The rate of consumption of baby formula in infants aged 4 to 7 months has almost doubled since 2000 and is highest in urban areas [2].

This secondary data analysis of the Demographic and Health Survey of Bangladesh 2004 aims to estimate the key WHO-recommended indicators of breastfeeding and complementary feeding, and the individual-, household-, and community-level determinants of selected feeding practices in Bangladesh.

Methods

Survey design

This analysis was based on data collected for the Bangladesh Demographic and Health Survey 2004 [2], conducted under the authority of the National Institute for Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare. The sample for the 2004 Bangladesh Demographic and Health Survey covered the entire population residing in private dwelling units in the country. Administratively, Bangladesh is divided into six divisions. Each division is divided into *zilas* and each *zila* into *upazilas*. Each urban area in the *upazila* is divided into wards, and then into *mahallas* within the ward; each rural area in the *upazila* is divided into union *parishads* and into *mouzas* within the union *parishads*. The urban areas were stratified into three groups: standard metropolitan areas, municipality areas, and other urban areas. These divisions allow the country as a whole to be easily separated into rural and urban areas. The enumeration areas used in the 2001 census were used as the primary sampling units for the 2004 Bangladesh Demographic and Health Survey. In each division, the list of enumeration areas constituted the sample frame for the 2004 Bangladesh Demographic and Health Survey. A target number of completed interviews with eligible women for the 2004 Bangladesh Demographic and Health Survey was set at 10,000, based on information from the 1999–2000 Bangladesh Demographic and Health Survey. The 2004 Bangladesh Demographic and Health Survey sample is a stratified, multistage, cluster sample consisting of 361 primary sampling units: 122 in the urban area and 239 in the rural area. After the target sample was allocated to each group according to urban and rural areas, the number of primary sampling units was calculated in terms of an average of 28 completed interviews of eligible women per primary sampling unit (or an average of 30 selected households per primary sampling unit). A household listing was conducted in all the sample points in late 2003. A systematic sample of 10,811 households was then selected from these lists. All ever-married women aged 10 to 49 in the selected households were eligible respondents for the women's questionnaire. It was expected that the sample would yield interviews with approximately 10,000 ever-married women aged 10 to 49.

A total of 10,811 households were selected for the sample, of which 10,523 were occupied and 10,500 (99.8%) were successfully interviewed. The shortfall was primarily due to vacant or destroyed dwellings, or dwellings that the inhabitants had left for an extended period before the interviewing teams visited them. A total of 11,601 women were identified as eligible for the individual interview (i.e., ever-married and aged 10 to 49 years), and interviews were completed for 11,440 (98.6%). The principal reason for nonresponse among eligible women and men was the failure to find them at home despite repeated visits to the household. Our analysis was restricted to the last-born child under 24 months of age who was living with the respondent. The weighted total number of children was 2,482.

Feeding indicators and explanatory variables

Infant and young child feeding indicators as described by WHO in 1991 [6] were estimated. These indicators include the timely first suckling rate (the proportion of infants less than 12 months of age who first suckled within 1 hour after birth), the ever-breastfed rate (the proportion of infants less than 12 months of age who were ever breastfed), the current breastfeeding rate (the proportion of children less than 24 months of age who are currently breastfed), the continued breastfeeding rate (1 year) (the proportion of children 12 to 15 months of age who are breastfed), the continued breastfeeding rate (2 years) (the proportion of children 20 to 23 months of age who are breastfed), the exclusive breastfeeding rate (the proportion of infants less than 6 months of age who are exclusively breastfed), the predominant breastfeeding rate (the proportion of infants less than 6 months of age who are fed predominantly breastmilk with no additional food-based fluids other

TABLE 1. Individual-, household-, and community-level characteristics of children 0 to 23 months of age, Bangladesh 2004 (n = 2,482)

Characteristic	No.	%
Individual-level factors		
Mother worked during past 12 mo		
No	2,118	85.4
Yes	364	14.7
Maternal education (n = 2,483)		
None	823	33.1
Primary	784	31.6
Secondary or above	876	35.3
Husband's education (n = 2,481)		
None	942	38.0
Primary	674	27.2
Secondary or above	865	34.9
Mother's age (yr) (n = 2,476)		
15–19	632	25.5
20–34	1,696	68.5
35–49	148	6.0
Mother's marital status		
Currently married	2,449	98.7
Formerly married (divorced, separated, or widowed)	33	1.3
Birth order of child (n = 2,483)		
1	755	30.4
2–4	1,363	54.9
≥ 5	365	14.7
Preceding birth interval (n = 2,480)		
No previous birth	755	30.4
0–14 mo	52	2.1
15–24 mo	261	10.5
≥ 25 mo	1,412	56.9
Sex of baby		
Male	1,223	49.3
Female	1,259	50.7
Age of child (mo)		
0–5	677	27.3
6–11	586	23.6
12–17	721	29.0
18–23	498	20.1
Place of delivery		
Home	2,185	88.1
Health facility	297	12.0
Mode of delivery (n = 2,480)		
Noncesarean	2,359	95.1
Cesarean section	121	4.9
Type of delivery assistance (n = 2,069)		
Health professional	298	14.4
Traditional birth attendant	94	4.5
Other	1,677	81.1
No. of antenatal clinic visits (n = 2,388)		
0	1,012	42.4
1–2	759	31.8
3–6	572	24.0
≥ 7	45	1.9
Timing of postnatal checkup		
0–2 days	249	10.0
3–6 days	28	1.1
≥ 7 days	136	5.5
No checkups	2,069	83.4
Mother's BMI (kg/m^2) (n = 2,447)		
≤ 18.5	987	40.3
> 18.5	1,460	59.7
Mother reads newspapers		
No	2,073	83.5
Yes	409	16.5
Mother listens to radio		
No	1,359	54.8
Yes	1,123	45.3
Mother watches television (n = 2,480)		
No	1,171	47.2
Yes	1,309	52.8
Household-level factors		
Household wealth index (n = 2,481)		
Poorest (lowest quintile)	613	24.7
Poorer	483	19.5
Middle	536	21.6
Richer	433	17.5
Richest (highest quintile)	416	16.8
No. of categories of decisions in which women have final say (n = 2,483)		
0	232	9.3
1	168	6.7
2	84	3.4
3	65	2.6
4	149	6.0
5	1,785	71.9
Community-level factors		
Residence		
Urban	473	19.1
Rural	2,009	81.0
Geographic region		
Barisal	151	6.1
Chittagong	548	22.1
Dhaka	743	30.0
Khulna	270	10.9
Rajshahi	562	22.6
Sylhet	208	8.4

continued

than fruit juice and sugar water), the full breastfeeding rate (the proportion of infants less than 6 months of age who are either exclusively or predominantly breastfed), the bottle-feeding rate (the proportion of infants less than 12 months of age who received any food or drink from a bottle in the previous 24 hours), the timely complementary feeding rate (the proportion of infants 6 to 9 months of age who received complementary foods in addition to breastmilk in the previous 24 hours), the median duration of any breastfeeding (the age [in months] when 50% of children are no longer breastfed), and the median duration of exclusive breastfeeding (the age [in months] when 50% of children are no longer exclusively breastfed). The timely first suckling rate was based on the mother's response to the question of how soon after birth the child was given breastmilk, and the ever-breastfed rate on whether the child was given breastmilk at least once at any time since birth. All other indicators were based on a 24-hour recall of the infant's dietary intake by the mother. Selected feeding indicators were examined against a set of independent variables in order to explain how each indicator varied across individual-, household-, and community-level characteristics.

The explanatory variables were classified into three levels: individual, household, and community. The individual-level attributes included the child's sex, age, and size at birth; the mother's age, whether she worked in the past 12 months, and her marital status; and the highest educational level achieved by the mother and the father. Data on the number of antenatal clinic visits, place of delivery, mode of delivery, type of delivery assistance, birth order of child, and postnatal contacts with health care providers were also obtained. Attributes of the household environment, such as the mother's role in household decisions, her access to media, and the household wealth index, were included as household-level variables. The wealth index was constructed using principal components analysis to determine the weights for the index based on information collected about several household assets and facilities. This index was divided into five categories (quintiles), and each household was assigned to one of these categories. The community-level factors included geographic region and urban or rural residence.

Statistical analysis

Analyses were performed using Stata version 9.0 with Svy commands that adjusted the confidence intervals for the cluster sampling design used in the survey. Chi-squared tests were used to test the significance of associations. In the univariate analyses, odds ratios with 95% confidence intervals were calculated in order to assess the unadjusted risk of independent variables on selected adverse feeding outcomes. Multiple logistic regression was used in a stepwise backwards model to estimate the odds ratios adjusted for independent variables, and those with $p < .05$ were retained in the final model.

Results

Characteristics of the sample

Table 1 lists the individual-, household-, and community-level characteristics of the surveyed children. Approximately one-third (35.3%) of the mothers of these children had a secondary or higher level of education, and only 14.7% had worked in the 12 months prior to the survey. Male and female children of all age groups were almost equally represented in the sample. A total of 57.6% of the mothers had made at least one antenatal clinic visit during the pregnancy. Of the total births, 88.1% were home deliveries, and only 14.4% had received assistance at birth from a trained health professional. A large proportion (40.3%) of the mothers were underweight (body mass index [BMI] < 18.5 kg/m^2). The majority of the households (81.0%) were from rural areas.

Infant and young child feeding indicators, 2004

Of the total of 2,482 children aged 0 to 23 months, a high proportion (97.3%) had been breastfed during the past 24 hours (**table 2**). A very high proportion (99.9%) of infants had ever been breastfed, but only 27.5% had initiated breastfeeding within the first hour after birth, indicating that a considerable proportion had been given either nothing or prelacteal foods immediately after birth. The rate of continuation of breastfeeding was high at 96.4% in the first year (12 to 15 months) and 93.9% in the second year (20 to 23 months).

The rate of exclusive breastfeeding in infants under 6 months of age was 42.5%, indicating that more than half of these infants were given other liquids or foods in addition to breastmilk (**table 2**). The rate of exclusive breastfeeding given for this age group in the Bangladesh Demographic and Health Survey 2004 report was 36.2%; the reason for this discrepancy is that this figure was based on a 7-day dietary recall, as opposed to a 24-hour recall in our analysis. In infants under 12 months of age the bottle-feeding rate was 22.4%. A total of 62.3% of infants 6 to 9 months of age were receiving complementary food. Among children aged 0 to 36 months the median duration of any breastfeeding was 35 months and among infants aged 0 to 6 months; the median duration of exclusive breastfeeding was 1.7 months.

Differentials of feeding indicators

Tables 3 and **4** summarize the breastfeeding indicators according to individual-, household-, and community-

level characteristics. As seen in **table 3,** the proportion of infants who were ever breastfed was almost 100% across all the subcategories. The rate of timely initiation of breastfeeding was higher among children of more educated parents. The rate of timely inititation was lower for infants whose birth order was five or greater than for infants of lower birth order, and it was higher for infants born in health facilities than for children born at home. Antenatal care was associated with a higher rate of timely first suckling. Generally children in wealthier households had better rates of timely first suckling. There was a high rate of current breastfeeding and continued breastfeeding to 1 year of age, and there was little variation across the subcategories.

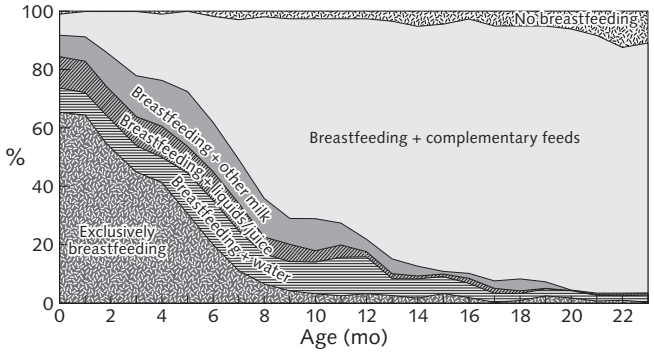

FIG. 1. Distribution of children aged 0 to 23 months according to breastfeeding status and age, Bangladesh 2004 (n = 2482)

Women who were underweight (BMI ≤ 18.5 kg/m^2) and who were poorer had a higher prevalence of continuing breastfeeding into the second year. Women who lived in rural regions were also more likely to continue breastfeeding through the second year.

Table 4 shows that the rate of exclusive breastfeeding of infants under 6 months of age was significantly lower among working mothers (29.3%) than among nonworking mothers (43.6%), and among women who lived in urban areas (34.5%) than among rural women (43.4%). Girls were more likely to be exclusively breastfed than boys (47.2% vs. 37.9%). Exclusive breastfeeding rates were significantly lower in the wealthiest quintile, but there was no clear pattern with respect to household wealth index. The highest rate of exclusive breastfeeding (60.8%) was reported in Chittagong District. The rate of exclusive breastfeeding did not differ significantly according to individual characteristics, such as mother's age or parents' educational level. The exclusive breastfeeding rate also did not differ according to the investigated health care characteristics, such as use of antenatal and postnatal care, place of delivery, and type of delivery assistance.

The rate of exclusive breastfeeding was over 60% at birth and declined rapidly to 20% by 6 months of age (**fig. 1**). Almost 100% of infants were given breastmilk during the first 5 months, and the rate declined slowly after completion of the sixth month of life.

Determinants of feeding indicators: Univariate and multivariate analyses

Unadjusted and adjusted odds ratios were calculated to estimate the effect of independent variables on the

TABLE 2. Breastfeeding indicators among children 0 to 35 months of age, Bangladesh 2004

Indicator	Size of subsample (weighted)	n (weighted)	Rate (%)	95% CI
Timely first suckling rate[a]	1,263	347	27.5	24.5, 30.6
Ever-breastfed rate[a]	1,263	1,262	99.9	99.9, 100.0
Current breastfeeding rate[b]	2,482	2,414	97.3	96.4, 97.9
Continued breastfeeding rate (1 yr)[c]	475	458	96.4	93.9, 97.9
Continued breastfeeding rate (2 yr)[d]	309	291	93.9	90.4, 96.3
Exclusive breastfeeding rate[e]	677	288	42.5	38.3, 46.8
Predominant breastfeeding rate[e]	677	188	27.7	24.0, 31.8
Full breastfeeding rate[e]	677	475	70.2	66.3, 73.9
Bottle-feeding rate[a]	1,263	283	22.4	19.6, 25.4
Timely complementary feeding rate[f]	401	249	62.3	56.6, 67.7
Median duration of any breastfeeding (mo)[g]			35.0	
Median duration of exclusive breastfeeding (mo) (0-6 months)			1.7	

a. Infants < 12 mo.
b. Children < 24 mo.
c. Children 12–15 mo.
d. Children 20–23 mo.
e. Infants < 6 mo.
f. Infants 6–9 mo.
g. Children < 36 mo.

TABLE 3. Rates of timely first suckling, ever-breastfed, current breastfeeding, and continued breastfeeding by individual-, household-, and community-level characteristics, Bangladesh 2004

Characteristic	Timely first suckling rate			Ever-breastfed rate			Current breastfeeding rate			Continued breastfeeding rate (1 yr)			Continued breastfeeding rate (2 yr)		
	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*
Individual-level factors															
Mother worked during past 12 mo															
No	27.5	24.5, 30.9		97.0	96.0, 97.7		99.9	99.9, 100.0	.702	96.4	93.6, 98.0		93.3	89.1, 95.9	
Yes	26.9	19.3, 36.1		98.8	96.2, 99.7		100.0			96.8	80.3, 99.6		98.0	89.4, 99.6	
Maternal education															
None	22.2	17.9, 27.3	*	100.0			98.3	96.9, 99.1	**	99.1	95.7, 99.8	*	95.5	88.1, 98.4	
Primary	27.1	22.4, 32.3		100.0	99.8, 100.0		98.0	96.6, 98.9		96.7	91.2, 98.8		94.9	87.6, 98.0	
Secondary or above	32.1	27.4, 37.1		100.0			95.6	93.8, 96.9		93.5	87.0, 96.8		91.7	85.0, 95.6	
Husband's education															
None	24.1	20.0, 28.8		100.0			98.3	97.0, 99.1	***	98.3	94.2, 99.5		95.7	88.3, 98.5	
Primary	28.2	24.5, 32.3		100.0	99.8, 100.0		97.4	95.7, 98.5		96.8	90.2, 99.0		92.2	84.2, 96.3	
Secondary or above	34.9	26.6, 44.2		100.0			96.2	94.4, 97.4		94.0	87.8, 97.2		93.7	87.5, 96.9	
Mother's age (yr)															
15–19	29.0	25.5, 32.7		0.0	0.0, 0.2		97.2	95.0, 98.4		93.9	85.3, 97.6		98.5	90.0, 99.8	
20–34	24.9	20.5, 30.0		100.0			97.4	96.4, 98.1		97.5	95.2, 98.8		93.5	89.5, 96.0	
35–49	22.3	13.4, 34.8		100.0			96.4	89.1, 98.8		93.5	65.7, 99.1		83.8	51.8, 96.1	
Mother's marital status															
Currently married	27.3	24.3, 30.4		100.0	99.9, 100.0		97.3	96.4, 97.9		96.4	93.8, 97.9		94.3	90.7, 96.5	
Formerly married (divorced, separated, or widowed)	45.1	18.5, 74.8		100.0			96.4	77.8, 99.5		100.0			73.2	22.2, 96.3	
Birth order of child															
1	29.1	24.4, 34.3	*	100.0			96.7	94.8, 98.0		93.6	86.7, 97.1		96.6	91.1, 98.8	
2–4	28.6	24.6, 33.0		100.0	99.9, 100.0		97.4	96.3, 98.2		97.2	93.7, 98.8		93.6	88.5, 96.5	
≥ 5	18.9	13.6, 25.7		100.0			97.7	95.3, 98.9		98.5	89.8, 99.8		87.7	71.2, 95.4	
Preceding birth interval															
No previous birth	29.1	24.4, 34.3		0.0	0.0, 0.2		96.6	94.7, 97.8		93.6	86.7, 97.1	*	95.6	89.8, 98.2	
0–14 mo	37.2	20.6, 57.5		100.0			94.6	76.6, 98.9		85.2	42.4, 97.8		100.0		
15–24 mo	30.9	23.2, 40.0		100.0			96.0	92.4, 97.9		93.4	79.9, 98.1		88.3	71.6, 95.8	
≥ 25 mo	25.6	21.8, 29.7		100.0			98.0	97.0, 98.6		98.9	97.0, 99.6		93.7	88.3, 96.7	
Sex of baby															
Male	28.8	24.8, 33.2		100.0	99.9, 100.0		96.9	95.5, 97.9		96.7	92.4, 98.6		94.7	89.3, 97.5	
Female	26.0	22.2, 30.2		100.0			97.6	96.5, 98.4		96.2	92.2, 98.2		93.3	87.9, 96.4	

Age of child (mo)															
0–5	27.5	23.8, 31.6	*	100.0			99.6	98.5, 99.9	***						
6–11	27.4	23.1, 32.1		100.0	99.9, 100.0		97.7	95.9, 98.8							
12–17							96.8	95.0, 98.0							
18–23							94.2	91.5, 96.0							
Place of delivery															
Home	26.4	23.4, 29.6	*	100.0		**	97.8	96.9, 98.4	***	97.5	95.1, 98.7	**	94.7	90.7, 97.0	
Health facility	35.5	27.1, 44.9		99.9	99.5, 100.0		93.4	89.7, 95.8		87.3	71.3, 95.0		90.1	78.2, 95.8	
Mode of delivery															
Noncesarean	27.8	24.8, 31.1		100.0			97.6	96.8, 98.2	***	96.9	94.3, 98.3	*	94.7	91.0, 96.9	
Cesarean section	20.7	11.9, 33.4		99.8	98.6, 100.0		91.2	85.4, 94.9		87.2	65.0, 96.2		82.7	61.7, 93.4	
Type of delivery assistance															
Health professional	33.7	25.4, 43.1		99.9	99.5, 100.0		93.7	90.1, 96.0	***	87.4	71.3, 95.1	*	93.6	83.5, 97.7	
Traditional birth attendant	37.6	24.6, 52.7		100.0			92.2	83.9, 96.4		94.7	74.0, 99.1		80.9	46.7, 95.3	
Other (friends or relatives)	25.5	22.2, 29.2		100.0			98.0	97.0, 98.7		97.9	95.1, 99.1		94.1	89.3, 96.9	
No. of antenatal clinic visits															
0	22.0	18.4, 26.2	***	100.0			98.3	97.1, 99.0	**	97.7	93.0, 99.3		95.9	89.1, 98.5	
1–2	28.0	22.9, 33.6		100.0	99.8, 100.0		97.7	96.2, 98.7		97.1	91.9, 99.0		93.2	85.7, 96.9	
3–6	35.5	29.4, 42.0		100.0			95.5	93.3, 97.1		94.0	85.6, 97.7		94.4	85.8, 98.0	
≥ 7	24.1	13.6, 39.0		100.0			94.3	84.0, 98.2		100.0			72.6	41.4, 90.8	
Timing of postnatal checkup															
0–2 days	27.5	19.2, 37.7		100.0			97.9	94.3, 99.2		95.5	79.1, 99.1		92.1	67.7, 98.5	
3–6 days	22.1	7.0, 51.7		100.0			94.3	68.9, 99.2		100.0			100.0		
≥ 7 days	31.2	19.9, 45.3		100.0			93.3	86.9, 96.7		91.9	72.9, 98.0		83.5	61.5, 94.1	
No checkups	27.3	24.2, 30.6		100.0	99.9, 100.0		97.5	96.6, 98.1		96.8	94.0, 98.4		95.0	91.1, 97.2	
Mother's BMI (kg/m^2)															
≤ 18.5	28.1	23.6, 33.2		100.0			98.5	97.3, 99.2	*	99.2	96.4, 99.8		99.4	95.8, 99.9	**
> 18.5	27.0	23.2, 31.1		100.0	99.9, 100.0		96.4	95.2, 97.4		94.3	90.0, 96.9		89.9	83.9, 93.8	
Mother reads newspapers															
No	26.8	23.7, 30.2		100.0	99.9, 100.0		97.6	96.7, 98.2	*	97.4	94.6, 98.7	*	93.6	89.1, 96.3	
Yes	30.7	24.1, 38.2		100.0			95.8	93.5, 97.3		91.0	80.7, 96.1		95.1	88.1, 98.1	
Mother listens to radio															
No	25.8	22.2, 29.7		100.0			96.9	95.6, 97.8		96.3	92.4, 98.2		94.9	90.4, 97.4	
Yes	29.3	25.0, 33.9		100.0	99.9, 100.0		97.7	96.5, 98.5		96.7	92.4, 98.6		92.7	86.4, 96.2	

continued

TABLE 3. Rates of timely first suckling, ever-breastfed, current breastfeeding, and continued breastfeeding by individual-, household-, and community-level characteristics, Bangladesh 2004 *(continued)*

Characteristic	Timely first suckling rate			Ever-breastfed rate			Current breastfeeding rate			Continued breastfeeding rate (1 yr)			Continued breastfeeding rate (2 yr)		
	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*
Individual-level factors															
Mother watches television															
No	24.2	20.5, 28.4		100.0			98.0	96.9, 98.7	***	98.4	95.1, 99.5		93.9	87.3, 97.2	
Yes	30.5	26.5, 34.9		100.0	99.9, 100.0		96.7	95.5, 97.6		94.5	89.9, 97.1		94.0	89.0, 96.8	
Household-level factors															
Household wealth index															
Poorest (lowest quintile)	18.3	13.7, 24.0	**	100.0			98.9	97.1, 99.6	***	97.6	91.0, 99.4		98.5	90.3, 99.8	*
Poorer	26.9	21.0, 33.6		100.0			98.0	95.8, 99.1		97.8	85.5, 99.7		98.1	87.3, 99.7	
Middle	27.4	21.9, 33.5		100.0			98.1	96.3, 99.0		98.1	92.8, 99.5		95.4	86.6, 98.5	
Richer	37.9	30.9, 45.4		100.0			96.9	94.1, 98.4		97.6	89.8, 99.5		91.6	78.2, 97.1	
Richest (highest quintile)	29.7	23.7, 36.5		100.0	99.6, 100.0		93.4	90.4, 95.5		89.8	78.6, 95.5		85.5	74.2, 92.3	
No. of categories of decisions in which women have final say															
0	36.1	27.8, 45.3		99.9	99.4, 100.0		97.8	95.1, 99.0	*	98.8	91.6, 99.8		89.6	70.3, 96.9	
1–2	26.2	19.2, 34.6		100.0			93.9	89.1, 96.7		90.2	75.5, 96.5		95.0	77.8, 99.0	
3–4	28.7	20.5, 38.7		100.0			97.4	94.0, 98.9		100.0			94.0	78.4, 98.6	
5	26.1	22.5, 30.0		100.0			97.7	96.7, 98.3		96.6	93.5, 98.3		94.3	90.1, 96.8	
Community-level factors															
Residence															
Urban	29.9	21.0, 40.5		99.9	99.7, 100.0	*	94.9	92.7, 96.5	***	94.3	87.6, 97.5		86.4	77.3, 92.2	**
Rural	39.9	33.6, 46.5		100.0			97.8	96.9, 98.5		96.9	93.8, 98.4		96.1	92.2, 98.1	
Geographic region															
Barisal	18.0	11.5, 27.1	***	100.0			99.0	97.0, 99.7	*	100.0			95.6	82.7, 99.0	
Chittagong	19.5	14.1, 26.4		100.0			97.6	95.9, 98.6		96.6	89.5, 98.9		92.6	82.8, 97.0	
Dhaka	26.7	21.3, 33.0		100.0			95.4	93.2, 96.9		93.9	86.7, 97.3		91.3	82.0, 96.0	
Khulna	34.3	26.2, 43.3		100.0			98.4	95.8, 99.4		97.7	91.1, 99.5		91.8	69.4, 98.2	
Rajshahi	33.3	26.6, 40.8		100.0			98.4	96.5, 99.2		96.8	89.8, 99.1		98.5	89.9, 99.8	
Sylhet	35.7	27.8, 44.5		99.9	99.2, 100.0		97.3	93.8, 98.9		98.9	92.1, 99.9		94.6	84.0, 98.3	

* $p < .05$; ** $p < .01$; *** $p < .001$ by chi-squared test.

TABLE 4. Rates of exclusive breastfeeding, predominant breastfeeding, full breastfeeding, bottle-feeding, and timely complementary feeding by individual-, household-, and community-level characteristics, Bangladesh 2004

Characteristic	Exclusive breastfeeding rate			Predominant breastfeeding rate			Full breastfeeding rate			Bottle-feeding rate			Timely complementary feeding rate		
	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*
Individual-level factors															
Mother worked during past 12 mo															
No	43.6	39.1, 48.3	*	39.2	28.2, 51.3	*	70.5	66.4, 74.3		21.1	18.2, 24.4	*	63.6	57.6, 69.2	
Yes	29.3	19.6, 41.2		26.0	22.2, 30.2		68.4	56.2, 78.5		30.5	23.0, 39.1		52.4	35.4, 68.9	
Maternal education															
None	48.2	40.0, 56.4		30.5	23.6, 38.4		78.7	71.4, 84.5	*	15.1	11.3, 20.0	***	56.9	47.0, 66.2	
Primary	40.4	33.4, 47.9		27.0	21.1, 33.8		67.4	60.1, 74.0		17.4	13.4, 22.3		60.9	51.1, 69.9	
Secondary or above	39.8	33.5, 46.6		26.1	20.6, 32.4		65.9	59.2, 72.1		32.3	27.6, 37.4		67.9	59.3, 75.4	
Husband's education															
None	40.8	33.7, 48.3		26.0	20.8, 32.1		66.8	60.1, 72.9		16.5	12.7, 21.2	***	69.4	60.0, 77.5	
Primary	41.7	34.4, 49.5		21.2	15.6, 28.1		62.9	55.1, 70.1		18.9	14.9, 23.8		78.7	68.9, 86.1	
Secondary or above	42.7	36.2, 49.5		22.6	17.3, 28.9		65.3	58.5, 71.5		31.1	26.5, 36.1		81.0	73.2, 86.9	
Mother's age (yr)															
15–19	44.3	39.1, 49.7		28.0	23.6, 32.8		72.3	67.5, 76.6		18.6	14.3, 23.9		62.0	55.0, 68.6	
20–34	41.1	34.1, 48.5		26.2	20.0, 33.5		67.3	59.7, 74.1		23.9	20.4, 27.7		64.3	54.4, 73.1	
35–49	24.5	11.9, 43.8		40.7	23.1, 61.1		65.2	44.5, 81.4		21.3	12.5, 34.0		54.0	33.6, 73.2	
Mother's marital status															
Currently married	42.6	38.4, 46.9		27.6	23.9, 31.7		70.2	66.3, 73.9		22.5	19.7, 25.6		62.6	56.9, 68.0	
Formerly married (divorced, separated, or widowed)	30.1	7.3, 70.3		36.7	9.0, 77.2		66.8	29.0, 90.8		6.7	1.4, 26.0		33.0	7.5, 74.8	
Birth order of child															
1	34.9	28.5, 41.8	*	32.5	26.0, 39.8		67.4	60.2, 73.8		29.8	24.9, 35.2	***	66.4	57.3, 74.5	
2–4	47.9	42.1, 53.8		24.2	19.6, 29.4		72.1	66.7, 76.9		18.9	15.7, 22.6		59.6	51.6, 67.2	
≥ 5	37.9	27.8, 49.3		31.0	20.7, 43.5		68.9	58.4, 77.8		19.6	13.9, 26.9		62.1	47.0, 75.1	
Preceding birth interval															
No previous birth	34.9	28.5, 41.8	**	32.5	26.0, 39.8		67.4	60.2, 73.9		29.9	25.0, 35.3	***	66.4	57.3, 74.5	
0–14 mo	79.8	55.0, 92.7		5.5	0.7, 31.4		85.3	61.8, 95.4		12.5	4.4, 30.7		67.4	28.1, 91.6	
15–24 mo	51.7	38.2, 64.9		21.3	11.9, 35.0		72.9	58.2, 83.9		15.7	10.0, 23.8		52.4	35.5, 68.7	
≥ 25 mo	43.7	38.0, 49.5		27.0	22.3, 32.2		70.7	65.5, 75.3		19.8	16.4, 23.6		61.6	53.8, 68.8	

continued

TABLE 4. Rates of exclusive breastfeeding, predominant breastfeeding, full breastfeeding, bottle-feeding, and timely complementary feeding by individual-, household-, and community-level characteristics, Bangladesh 2004 *(continued)*

	Exclusive breastfeeding rate			Predominant breastfeeding rate			Full breastfeeding rate			Bottle-feeding rate			Timely complementary feeding rate		
Characteristic	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*	%	95% CI	*p*
Sex of baby															
Male	37.9	32.8, 43.4	*	29.3	23.9, 35.3		67.2	61.5, 72.5		25.0	21.2, 29.2	*	63.8	56.2, 70.8	
Female	47.2	40.8, 53.8		26.1	21.0, 31.8		73.3	67.8, 78.2		19.6	16.0, 23.8		60.7	52.1, 68.6	
Age of child (mo)															
0–5	42.5	38.3, 46.8		27.7	24.0, 31.8		70.2	66.3, 73.9		22.1	18.6, 26.0		62.3	56.6, 67.7	
6–11										22.7	18.8, 27.1				
12–17															
18–23															
Place of delivery															
Home	42.7	38.2, 47.3		28.0	24.0, 32.3		70.7	66.5, 74.5		19.6	16.8, 22.7	***	62.1	55.9, 67.9	
Health facility	40.8	29.8, 52.9		25.6	16.5, 37.4		66.4	54.3, 76.6		42.8	34.2, 51.9		63.5	46.9, 77.4	
Mode of delivery															
Noncesarean	42.8	38.4, 47.2		27.4	23.6, 31.6		70.1	66.1, 73.9		21.4	18.7, 24.5	***	62.0	56.2, 67.5	
Cesarean section	38.8	24.0, 56.0		33.6	18.4, 53.3		72.4	55.4, 84.8		40.2	28.5, 53.2		69.0	43.5, 86.6	
Type of delivery assistance															
Health professional	42.8	31.6, 54.7		26.0	16.9, 37.6		68.7	56.8, 78.6		43.7	35.3, 52.6	***	58.5	42.4, 72.9	
Traditional birth attendant	51.0	26.9, 74.7		29.8	12.6, 55.5		80.7	58.1, 92.7		26.9	12.3, 49.1		40.5	13.1, 75.5	
Other	41.9	37.1, 46.9		27.6	23.4, 32.2		69.5	64.7, 73.9		18.9	16.0, 22.3		64.6	57.8, 70.8	
No. of antenatal clinic visits															
0	45.3	38.5, 52.3		29.1	23.0, 35.9	**	74.4	68.3, 79.6		14.2	11.0, 18.0	***	56.6	47.7, 65.2	
1–2	41.8	35.7, 48.1		26.8	20.8, 33.9		68.6	60.9, 75.3		23.0	18.5, 28.3		61.6	51.3, 71.0	
3–6	42.2	33.8, 51.0		20.8	15.0, 28.2		63.0	54.4, 70.8		33.9	27.7, 40.7		69.3	58.4, 78.4	
≥ 7	20.1	8.7, 40.1		66.6	46.0, 82.4		86.8	66.9, 95.5		34.6	19.1, 54.3		76.4	47.8, 92.0	
Timing of postnatal checkup															
0–2 days	47.0	35.6, 58.7		24.4	15.6, 36.1		71.4	59.7, 80.8		22.9	16.2, 31.3		60.4	54.0, 66.0	
3–6 days	24.7	5.0, 67.2		15.7	2.0, 63.2		40.5	10.4, 79.9		18.3	4.5, 51.5		75.9	59.0, 87.0	
≥ 7 days	31.9	16.5, 52.5		37.3	21.1, 57.0		69.2	48.9, 84.1		24.9	15.0, 38.2		61.6	19.0, 92.0	
No checkups	42.6	37.9, 47.4		27.8	23.6, 32.4		70.4	65.9, 74.5		22.2	19.1, 25.6		65.1	44.2, 81.4	

Mother's BMI (kg/m^2)														
≤ 18.5	36.3	29.1, 43.6		32.8	25.6, 40.9		69.1	61.6, 75.7		18.9	14.8, 23.8	**	57.9	49.0, 66.4	
> 18.5	44.9	39.9, 50.1		25.1	21.0, 29.7		70.0	65.1, 74.4		25.0	21.6, 28.8		65.6	58.4, 72.3	
Mother reads newspapers															
No	42.9	38.1, 47.8		27.3	23.2, 31.9		70.2	66.0, 74.2		19.3	16.5, 22.5	***	59.7	53.6, 65.5	*
Yes	40.4	31.3, 50.2		29.7	21.5, 39.4		70.1	59.6, 78.7		38.3	31.1, 46.1		76.0	63.9, 85.0	
Mother listens to radio															
No	46.1	40.6, 51.6		27.0	22.1, 32.4		73.0	67.6, 77.8		20.8	16.9, 25.2		60.7	53.0, 67.9	
Yes	38.4	32.5, 44.5		28.6	23.3, 34.5		66.9	61.0, 72.4		24.1	20.4, 28.3		63.8	56.0, 70.9	
Mother watches television															
No	46.1	40.2, 52.1		31.4	26.0, 37.4		77.5	71.7, 82.4	**	16.6	13.2, 20.7	***	61.5	52.9, 69.4	
Yes	39.2	33.5, 45.3		24.1	19.6, 29.2		63.3	57.7, 68.6		27.5	23.6, 31.8		62.9	55.2, 70.1	
Household-level factors															
Household wealth index															
Poorest (lowest quintile)	46.4	37.4, 55.6	**	26.5	19.0, 35.5		72.8	64.1, 80.1		12.6	8.6, 18.0	***	78.8	67.4, 86.9	
Poorer	36.3	27.9, 45.6		25.9	18.2, 35.5		62.2	52.4, 71.1		17.6	12.2, 24.7		66.9	55.0, 77.0	
Middle	50.9	42.3, 59.5		17.9	11.9, 26.0		68.9	59.9, 76.6		21.5	16.3, 27.7		80.1	67.5, 88.6	
Richer	43.7	34.4, 53.4		18.0	12.0, 26.3		61.7	51.9, 70.6		24.8	19.4, 31.2		71.6	58.2, 82.1	
Richest (highest quintile)	25.5	18.5, 34.1		31.5	24.0, 40.2		57.1	47.7, 66.0		39.6	32.2, 47.6		82.9	71.5, 90.3	
No. of categories of decisions in which women have final say															
0	47.4	35.8, 59.3		15.9	9.6, 25.0	*	63.3	50.9, 74.2		23.5	16.6, 32.1		62.8	44.9, 77.8	
1–2	47.9	35.7, 60.3		19.8	12.1, 30.6		67.7	55.5, 77.9		31.2	23.4, 40.2		64.4	49.0, 77.4	
3–4	43.8	31.8, 56.5		26.8	17.3, 39.0		72.5	59.0, 82.9		23.7	16.5, 33.0		59.8	42.9, 74.6	
5	40.5	35.4, 45.8		31.1	26.2, 36.4		71.5	66.6, 76.0		20.6	17.3, 24.3		62.1	55.4, 68.4	
Community-level factors															
Residence															
Urban	34.5	26.7, 43.1		26.3	19.9, 33.8		60.8	52.5, 68.5	*	33.7	27.2, 41.0	***	70.1	59.5, 79.0	
Rural	43.4	39.5, 49.4		28.0	23.7, 32.8		72.4	67.9, 76.5		19.7	16.7, 23.1		60.2	53.5, 66.4	
Geographic region															
Barisal	48.4	33.3, 63.8	***	33.8	21.0, 49.5	*	82.2	69.3, 90.4	***	13.3	8.4, 20.5	***	70.7	53.7, 83.4	
Chittagong	60.8	52.6, 68.3		17.8	12.1, 25.5		78.6	72.5, 83.7		20.1	15.9, 25.2		54.2	44.0, 64.1	
Dhaka	30.2	22.3, 39.5		31.1	23.7, 39.6		61.3	52.3, 69.6		30.6	23.9, 38.2		60.4	48.6, 71.1	
Khulna	34.9	25.1, 46.1		35.1	26.9, 44.4		70.0	58.8, 79.2		15.0	9.9, 22.2		70.4	50.4, 84.8	
Rajshahi	40.6	32.4, 49.4		21.4	13.9, 31.4		62.0	52.6, 70.5		23.4	17.8, 30.2		68.4	55.4, 79.0	
Sylhet	47.6	37.1, 58.4		41.5	30.3, 53.6		89.1	80.5, 94.1		13.6	8.5, 21.0		59.4	41.8, 74.8	

* $p < .05$; ** $p < .01$; *** $p < .001$ by chi-squared test.

risk of four adverse infant feeding outcomes: no timely initiation of breastfeeding, no exclusive breastfeeding, bottle-feeding, and no timely complementary feeding.

Risk factors for no exclusive breastfeeding

As shown in **table 5**, the multivariate analyses revealed that the following factors increased the likelihood of an infant's not being exclusively breastfed: mother with primary education compared with no schooling (adjusted OR = 2.23; 95% CI, 1.32 to 3.76; $p < .01$), maternal age 35 years or older (adjusted OR = 4.51; 95% CI, 1.42 to 14.29; $p < .05$), preceding birth interval more than 14 months (adjusted OR = 5.84; 95% CI, 1.30 to 26.19; $p < .05$), delivery assisted by friends or relatives rather than health professionals (adjusted OR = 3.22; 95% CI, 1.49 to 6.97; $p < .003$), mother from the richest household quintile (adjusted OR = 4.24; 95% CI, 1.92 to 9.40; $p < .001$), and mother from the Dhaka region (adjusted OR = 4.05; 95% CI, 1.76 to 9.31; $p = <$ .01). Higher birth order and female sex were also associated with increased exclusive breastfeeding rates.

Risk factors for bottle-feeding

Interestingly, women who had partners of higher educational level (OR = 2.17; 95% CI, 1.30 to 3.64; $p = <$ .01), who were in the upper age groups (OR for age ≥ 35 years = 2.32; 95% CI, 1.07 to 5.04; $p = <$ **.05**), or who were in the upper wealth quintiles (OR for the richest = 3.43; 95% CI, 1.88 to 6.25; $p < .001$) were more likely to bottle-feed their children (**table 5**). As expected, maternal working status influenced feeding status: working mothers were more likely than non-working mothers to bottle-feed (adjusted OR = 1.88; 95% CI, 1.19 to 2.98; $p < .01$) .

Risk factors for no timely initiation of breastfeeding

As shown in **table 6**, urban mothers were at higher risk for not initiating breastfeeding within the first hour after birth (adjusted OR = 1.61; 95% CI, 1.08 to 2.38; $p < .05$). Those who made three to six antenatal clinic visits were at lower risk for no timely initiation of breastfeeding (adjusted OR = 0.61; 95% CI, 0.41 to 0.90; $p < .05$). The rate of timely initiation was also higher in mothers from richer households (adjusted OR = 0.37; 95% CI, 0.23 to 0.59; $p < .01$) and in those who lived in the Khulna, Rajshahi, and Sylhet regions as compared with Barisal.

Risk factors for no timely complementary feeding

Mothers who made three to six antenatal visits had a marginally significant higher rate of timely complementary feeding than those with no antenatal visits (adjusted OR = 0.55; 95% CI, 0.31 to 1.00; $p < .05$) (**table 6**). As expected, increasing age of an infant increased the likelihood of the infant's being given complementary food.

Discussion

The results showed that many important feeding indicators need improvement in order to fulfill the goal of optimal feeding for all infants and young children in Bangladesh. This secondary data analysis shows that although breastfeeding is almost universal in Bangladesh, the rates of timely initiation are very low. The low prevalence of exclusive breastfeeding among children under 6 months of age is also cause for concern, and it has not improved since the Demographic and Health Survey in 2000. We also found large geographic and socioeconomic variation in the rates of infant and young child feeding indicators, which has implications for programs to promote better infant and young child feeding practices.

Optimal infant and young child feeding is especially significant for Bangladesh because of the high rates of infectious diseases. Recent studies have shown that the rate of diarrheal disease among children under 3 months of age is as high as 10%, and the prevalence of acute respiratory illness is over 30% in some regions. Breastfeeding, especially exclusive breastfeeding, has a highly protective effect against both of these illnesses [7].

Although almost all the infants studied had ever been breastfed, less than one-third were breastfed within 1 hour after birth. This low rate is a cause for concern and needs to be improved. Recent data have shown that the rate of timely initiation of breastfeeding is somewhat higher in Bangladesh (27.5%) than in India (24%) [8] but is lower than that in Nepal (35.4%) [9] and Sri Lanka (56%) [10]. In Bangladesh, women who lived in urban areas were less likely to initiate breastfeeding in a timely manner than were rural women; therefore it is clear that promotion of timely initiation of breastfeeding should be focused on urban women. The data presented here also suggest that women who had more antenatal clinic visits were more likely to initiate breastfeeding in a timely manner. This reemphasizes that increasing the utilization of antenatal care would have a positive effect on breastfeeding promotion. Further interventions to encourage women delivering at home to initiate early breastfeeding, possibly through education of key family members and traditional birth attendants and peer support, will be needed to improve rates of early initiation of breastfeeding, because the majority of deliveries in Bangladesh take place at home.

The prevalence of exclusive breastfeeding has decreased by 6 percentage points since the 2000 Demographic and Health Survey. Although this change is not statistically significant, it is important to find out the reasons for this lack of improvement to help with efforts to improve the rates of exclusive breastfeeding and reduce morbidity and mortality, and to contribute to achieving the child survival Millennium Development Goals. Exclusive breastfeeding rates were higher

TABLE 5. Univariate and multivariate analyses of the risks of being bottle-fed and of not being exclusively breastfed, Bangladesh 2004

	Bottle-fed						Not exclusively breastfed					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
Characteristic	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Individual-level factors												
Mother worked during past 12 mo												
No	1.00			1.00			1.00					
Yes	1.64	1.08, 2.49	*	1.88	1.19, 2.98	**	1.94	1.10, 3.44	.023			
Mother's marital status												
Currently married	1.00						1.00					
Formerly married (divorced, separated, or widowed)	0.25	0.05, 1.22					1.72	0.31, 9.50	.532			
Maternal education												
None	1.00						1.00			1.00		
Primary	1.18	0.75, 1.87					1.37	0.89, 2.11	.157	2.23	1.32, 3.76	**
Secondary or above	2.67	1.81, 3.95	***				1.40	0.90, 2.20	.139	1.82	0.94, 3.55	
Husband's education												
None	1.00			1.00			1.00					
Primary	1.37	0.97, 1.93		1.06	0.73, 1.54		0.90	0.61, 1.32	.587			
Secondary or above	4.39	2.90, 6.66	***	2.17	1.30, 3.64	**	1.44	0.77, 2.68	.25			
Mother's age (yr)												
15–19	1.00			1.00			1.00			1.00		
20–34	1.37	0.96, 1.96		1.76	1.14, 2.73	*	1.04	0.73, 1.49	.83	1.47	0.87, 2.50	
35–49	1.18	0.58, 2.40		2.32	1.07, 5.04	*	2.35	0.94, 5.84	.07	4.51	1.42, 14.29	*
Birth order of child												
1	1.00						1.00			1.00		
2–4	0.55	0.40, 0.76	***				0.58	0.40, 0.85	.005	0.07	0.02, 0.29	***
≥ 5	0.58	0.35, 0.94	*				0.88	0.52, 1.49	.624	0.21	0.05, 0.86	*
Preceding birth interval												
No previous birth	1.00			1.00			1.00	1.00,		1.00		
0–14 mo	0.35	0.11, 1.11		0.33	0.11, 1.00	*	0.14	0.04, 0.45	.001	NA	NA	
15–24 mo	0.44	0.25, 0.78	*	0.46	0.24, 0.88	*	0.50	0.27, 0.92	.026	5.84	1.30, 26.19	*
≥ 25 mo	0.58	0.42, 0.80	***	0.49	0.33, 0.73	***	0.69	0.48, 1.00	.051	6.93	1.90, 25.31	**

continued

TABLE 5. Univariate and multivariate analyses of the risks of being bottle-fed and of not being exclusively breastfed, Bangladesh 2004 *(continued)*

	Bottle-fed						Not exclusively breastfed					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
Characteristic	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Individual-level factors												
Sex of baby												
Male	1.00			1.00			1.00					
Female	0.73	0.54, 1.00	*	0.73	0.53, 1.00	*	0.68	0.49, 0.96	.030	0.62	0.41, 0.93	*
Age of child (mo)	0.99	0.96, 1.04					1.53	1.36, 1.71	< .001	1.76	1.52, 2.05	***
Place of delivery												
Home	1.00						1.00					
Health facility	3.07	2.04, 4.61	***				1.08	0.64, 1.82	.769			
Mode of delivery												
Noncesarean	1.00						1.00					
Cesarean section	2.46	1.43, 4.24	**				1.18	0.57, 2.43	.655			
Type of delivery assistance												
Health professional	1.00						1.00	1.00		1.00		
Traditional birth attendant.	0.47	0.17, 1.33					0.72	0.22, 2.30	.576	1.62	0.51, 5.12	
Other (friends or relatives)	0.30	0.20, 0.45	***				1.03	0.61, 1.76	.901	3.22	1.49, 6.97	**
No. of antenatal clinic visits												
0	1.00						1.00					
1–2	1.81	1.20, 2.74	*				1.16	0.79, 1.69	.45			
3–6	3.11	2.06, 4.70	***				1.14	0.72, 1.79	.58			
≥ 7	2.88	1.40, 5.91	***				3.28	1.19, 9.07	.02			
Timing of postnatal checkup												
Immediate (hospital birth)	1.00						1.00					
1–2 days	1.04	0.66, 1.63					0.84	0.49, 1.42	.51			
3–6 days	0.78	0.16, 3.81					2.25	0.36, 14.00				
≥ 7 days	1.16	0.60, 2.24					1.58	0.66, 3.83				
Mother's BMI (kg/m^2)												
≤ 18.5	1.00						1.00					
> 18.5	1.44	1.03, 2.00	*				0.70	0.47, 1.03				
Mother reads newspapers												
No	1.00						1.00					
Yes	2.59	1.80, 3.73	***				1.11	0.71, 1.74				

Mother listens to radio												
No	1.00						1.00					
Yes	1.21	0.88, 1.68					1.37	0.99, 1.89				
Mother watches television												
No	1.00						1.00					
Yes	1.90	1.37, 2.64	***				1.32	0.94, 1.86				
Household-level factors												
Household wealth index												
Poorest (lowest quintile)	1.00			1.00			1.00			1.00		
Poorer	1.49	0.91, 2.43		1.37	0.83, 2.24		1.39	0.82, 2.38		2.08	1.06, 4.06	*
Middle	1.91	1.10, 3.30	*	1.88	1.07, 3.32	*	0.80	0.49, 1.31		1.41	0.76, 2.64	
Richer	2.30	1.36, 3.91	**	2.09	1.20, 3.63	**	1.12	0.64, 1.94		1.72	0.85, 3.50	
Richest (highest quintile)	4.58	2.66, 7.86	***	3.43	1.88, 6.25	***	2.39	1.35, 4.23	***	4.24	1.92, 9.40	***
No. of categories of decisions in which women have final say												
0	1.00						1.00					
1–2	1.48	0.80, 2.72					0.98	0.50, 1.91				
3–4	1.02	0.56, 1.83					1.16	0.56, 2.40				
5	0.84	0.52, 1.37					1.33	0.78, 2.26				
Community-level factors												
Residence												
Rural	1.00						1.00					
Urban	2.07	1.43, 3.01	***				1.52	0.99, 2.33				
Geographic region												
Barisal	1.00			1.00			1.00			1.00		
Chittagong	1.64	0.91, 2.96		1.80	0.99, 3.27		0.61	0.30, 1.23		0.65	0.28, 1.49	
Dhaka	2.86	1.54, 5.29	***	3.10	1.65, 5.83	***	2.16	1.02, 4.58	*	4.05	1.76, 9.31	**
Khulna	1.15	0.57, 2.32		1.03	0.49, 2.19		1.75	0.80, 3.84		2.10	0.81, 5.44	
Rajshahi	1.99	1.07, 3.69	*	2.16	1.15, 4.06	*	1.37	0.67, 2.82		2.22	0.97, 5.08	
Sylhet	1.02	0.49, 2.12		1.09	0.50, 2.35		1.03	0.48, 2.22		1.38	0.49, 3.90	

NA, not available
* $p < .05$; ** $p < .01$; *** $p < .001$.

TABLE 6. Univariate and multivariate analyses of the risks of not receiving timely initiation of breastfeeding and not being given timely complementary foods, Bangladesh 2004

	No timely initiation of breastfeeding						Not given timely complementary foods					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
Characteristic	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Individual-level factors												
Mother worked during past 12 mo												
No	1.00						1.00					
Yes	1.03	0.66, 1.62					1.58	0.76, 3.32				
Mother's marital status												
Currently married	1.00						1.00					
Formerly married (divorced, separated, or widowed)	0.46	0.13, 1.66					3.40	0.56, 20.61				
Maternal education												
None	1.00						1.00					
Primary	0.77	0.53, 1.12					0.85	0.48, 1.50				
Secondary or above	0.61	0.44, 0.84	**				0.62	0.37, 1.06				
Husband's education												
None	1.00						1.00					
Primary	0.81	0.61, 1.07					0.57	0.35, 0.93	*			
Secondary or above	0.59	0.38, 0.92	*				0.59	0.29, 1.20				
Mother's age (yr)												
15–19	1.00						1.00					
20–34	0.91	0.68, 1.22					1.08	0.67, 1.74				
35–49	1.24	0.65, 2.37					1.51	0.63, 3.66				
Birth order of child												
1	1.00						1.00					
2–4	1.02	0.75, 1.39					1.34	0.81, 2.21				
≥ 5	1.76	1.13, 2.74	*				1.21	0.59, 2.48				
Preceding birth interval												
No previous birth	1.00						1.00					
0–14 mo	0.69	0.30, 1.59					0.96	0.18, 5.19				
15–24 mo	0.92	0.58, 1.45					1.80	0.83, 3.89				
≥ 25 mo	1.19	0.88, 1.63					1.24	0.75, 2.04				
Sex of baby												
Male	1.00						1.00					
Female	1.15	0.87, 1.52					1.15	0.72, 1.83				
Age of child (mo)	1.02	0.97, 1.06					0.60	0.48, 0.75	***	0.6	0.48, 0.74	***
Place of delivery												
Home	1.00						1.00					
Health facility	0.65	0.43, 0.98	*				0.94	0.46, 1.95				
Mode of delivery												
Noncesarean	1.00						1.00					
Cesarean section	1.48	0.75, 2.91					0.73	0.25, 2.15				
Type of delivery assistance												
Health professional	1.00						1.00					
Traditional birth attendant	0.84	0.42, 1.70					2.07	0.40, 10.73				
Other (friends or relatives)	1.48	0.95, 2.31					0.77	0.38, 1.57				

continued

TABLE 6. Univariate and multivariate analyses of the risks of not receiving timely initiation of breastfeeding and not being given timely complementary foods, Bangladesh 2004 *(continued)*

	No timely initiation of breastfeeding						Not given timely complementary foods					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
Characteristic	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
No. of antenatal clinic visits												
0	1.00			1.00			1.00			1.00		
1–2	0.70	0.5, 1.04		0.83	0.58, 1.20		0.81	0.46, 1.43		0.86	0.48, 1.55	
3–6	0.50	0.4, 0.73	***	0.61	0.41, 0.90	*	0.58	0.32, 1.04		0.55	0.31, 1.00	*
≥ 7	0.90	0.4, 1.88		0.95	0.44, 2.08		0.40	0.11, 1.51		0.36	0.11, 1.23	
Timing of postnatal checkup												
Immediate (hospital birth)	1.00						1.00					
0–2 days	0.99	0.61, 1.61					0.48	0.22, 1.08				
3–6 days	1.32	0.35, 5.03					0.95	0.14, 6.53				
≥ 7 days	0.83	0.45, 1.54					0.82	0.34, 1.99				
Mother's BMI (kg/m^2)												
≤ 18.5	1.00						1.00					
> 18.5	1.06	0.77, 1.45					0.72	0.45, 1.15				
Mother reads newspapers												
No	1.00						1.00					
Yes	0.83	0.58, 1.19					0.47	0.25, 0.86	*			
Mother listens to radio												
No	1.00						1.00					
Yes	0.84	0.64, 1.11					0.88	0.57, 1.34				
Mother watches television												
No	1.00						1.00					
Yes	0.73	0.55, 0.96	*				0.94	0.58, 1.51				
Household-level factors												
Household wealth index												
Poorest (lowest quintile)	1.00			1.00			1.00					
Poorer	0.61	0.37, 0.99	*	0.64	0.39, 1.03		0.86	0.44, 1.67				
Middle	0.59	0.38, 0.92	*	0.60	0.39, 0.93	*	0.78	0.37, 1.63				
Richer	0.37	0.23, 0.57	***	0.37	0.23, 0.59	***	1.01	0.50, 2.04				
Richest (highest quintile)	0.53	0.34, 0.84	**	0.52	0.30, 0.88	*	0.55	0.27, 1.12				
No. of categories of decisions in which women have final say												
0	1.00						1.00					
1–2	1.59	0.94, 2.70					0.93	0.36, 2.43				
3–4	1.40	0.76, 2.57					1.14	0.42, 3.09				
5	1.60	1.05, 2.44	*				1.03	0.49, 2.17	.93			
Community-level factors												
Residence												
Rural	1.00			1.00			1.00					
Urban	1.34	0.96, 1.88		1.61	1.08, 2.38	*	0.64	0.37, 1.10				
Geographic region												
Barisal	1.00			1.00			1.00					
Chittagong	0.91	0.47, 1.75		0.86	0.44, 1.69		2.04	0.88, 4.71				
Dhaka	0.60	0.33, 1.11		0.54	0.29, 1.02		1.58	0.66, 3.79				
Khulna	0.42	0.22, 0.81	**	0.46	0.24, 0.90	*	1.01	0.33, 3.11				
Rajshahi	0.44	0.24, 0.82	**	0.44	0.23, 0.85	*	1.12	0.45, 2.79				
Sylhet	0.40	0.21, 0.75	**	0.38	0.20, 0.74	**	1.65	0.59, 4.57				

* $p < .05$; ** $p < .01$; *** $p < .001$.

in children under 1 month of age in 2004 (a difference of approximately 10 percentage points from the year 2000); this improvement was encouraging and perhaps is due to a decrease in prelacteal feeding. Our finding that not having a baby delivered by a health professional was a significant predictor of absence of exclusive breastfeeding may indicate that traditional birth attendants and others may not be trained adequately for passing on the important messages regarding infant and young child feeding to mothers. This area urgently needs interventions, since most women in Bangladesh do not deliver in health facilities. An established approach to promoting appropriate breastfeeding practices in Bangladesh is through the use of local peer counselors to provide information and support to mothers [11]. A recent meta-analysis of individual peer counseling for the promotion of exclusive breastfeeding found that the odds of exclusive breastfeeding in mothers receiving the counseling was "substantially increased in the neonatal period (15 studies; odds ratio [OR] 3·45; 95% CI 2·20–5·42, $p < 0·0001$; random effects) and at 6 months of age (nine studies; 1·93, 1·18–3·15, $p < 0·0001$)" [12]. This approach needs to be scaled up in Bangladesh to support exclusive breastfeeding, especially for women who have limited contact with health services.

The large geographic variation in exclusive breastfeeding rates (especially low rates in Dhaka and high rates in Chittagong) may need to be studied further. Rapid urbanization and migration of the rural population to Dhaka for work may have had an impact on exclusive breastfeeding rates, as most women in urban settings have to start work soon after delivery. Similarly, there seems to be a trend toward more educated and wealthy mothers being less likely to exclusively breastfeed their babies than less educated and less wealthy mothers, which suggests that interventions should be targeted at these women. The population of Chittagong is also thought to be more conservative, and this may be a reason for the high prevalence of exclusive breastfeeding in this region. In comparison with other countries in the region, Bangladesh lags behind both India (46%) [8] and Nepal (53%) [9].

Similar rates of exclusive breastfeeding have also been found in other surveys conducted recently. The National Nutrition Programme baseline survey [13] conducted in 2005–06 showed the rates of exclusive breastfeeding up to 6 months to be only 16%, and in other surveys, including that of the Bangladesh Breastfeeding Foundation [14] and the Multiple Indicator Cluster Surveys [15], the rates of exclusive breastfeeding were similar.

The prevalence of bottle-feeding in Bangladesh is high, especially among families of higher socioeconomic status. Working mothers also have a significantly higher prevalence of bottle-feeding, and this indicates that legislation requiring employers to provide facilities for breastfeeding or expressing breastmilk may have a positive effect in Bangladesh. Marketing of breastmilk substitutes in private facilities in cities such as Dhaka and Chittagong is common. Although there is legislation to limit the marketing of breastmilk substitutes in Bangladesh, there have been many breaches in recent years and continued monitoring is necessary.

With respect to timely complementary feeding, women who had adequate antenatal care (indicated by a greater number of antenatal clinic visits) were more likely to give timely complementary foods. Bangladesh has an overall low prevalence of timely complementary feeding (62%); the prevalence is slightly better than that in India (57%) [8] but lower than that in Nepal (75%) [9] and Sri Lanka (93%) [10]. New and innovative approaches will be required to improve complementary feeding. Peer counseling to support appropriate complementary feeding is one such approach that needs urgent evaluation in rural and urban populations in Bangladesh.

In conclusion, the prevalence of most infant feeding indicators in Bangladesh were low and need improvement in order to gain the full benefits of breastfeeding and complementary feeding for child health and nutrition. Breastfeeding promotion programs should specifically target working mothers and families in the Dhaka region but need nationwide application because of the overall low rates of early initiation of breastfeeding and of exclusive breastfeeding. It is also important to understand the factors responsible for the low rates of important breastfeeding indicators in women with better education and higher socioeconomic status, as this information should guide the design of interventions for this target group of women. The use of peer counseling to support appropriate breastfeeding should be scaled up. Further research should be conducted on complementary feeding, including the nutritional adequacy, frequency, quality, and quantity of the foods. Furthermore, an evaluation of different sustainable approaches to improving complementary feeding, including peer counseling, should be undertaken.

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