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Association between Maternal Depression, Anxiety, and Infant and Young Child Feeding Practices in Bangladesh: A cross-sectional study.

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Abstract

Background: Maternal mental health is a vital factor related to both mother and child health. This study aimed to assess the association between maternal anxiety, depression, and infant and young child feeding practices in Bangladesh.

Methods: The data were obtained from the Bangladesh Demographic Health Survey (BDHS) 2022 is a large-scale, a nationally representative household survey that provides the information of the demographic and health indicators of Bangladesh. We employed bivariate analysis to evaluate the infant and young child feeding practice (IYCF) risk factor for anxiety and depression. Binary Logistic Regression was then employed for the assessment of numerous risk factors.

Result: Among 2,526 mother–child pairs, 15.62% of mothers had anxiety and 4.03% had depression. Overall, 63.98% of children met minimum meal frequency (MMF), 38.22% had early breastfeeding initiation, and 31.13% had good IYCF practice. In bivariate analysis, maternal anxiety was associated with lower MMF ($p < 0.001$) and reduced early breastfeeding ($p = 0.028$). Depression was also linked with lower MMF ($p = 0.007$). After adjustment, anxiety remained a significant predictor of lower MMF (AOR = 0.50; 95% CI: 0.33–0.76), indicating 50% lower odds. Depression was associated with lower odds of early breastfeeding initiation (AOR = 0.51; 95% CI: 0.29–0.87). Anxiety showed a slight positive association with early breastfeeding (AOR = 1.41; 95% CI: 1.01–1.97). Other factors also influenced outcomes. Children aged 12–23 months had higher odds of MMF (AOR = 1.87; 95% CI: 1.45–2.41), as did mothers with ≥4 antenatal care visits (AOR = 1.68; 95% CI: 1.27–2.23) and fathers with secondary schooling (AOR = 1.72; 95% CI: 1.09–2.70). No significant association was found between maternal mental health and overall IYCF practice after adjustment, while children aged 12–23 months had lower odds of good practice (AOR = 0.49; 95% CI: 0.36–0.66).

Conclusion: Maternal anxiety and depression were significantly associated with specific IYCF practices, principally minimum meal frequency and early breastfeeding. Several socioeconomic, reproductive, and child-related factors were also associated with IYCF outcomes. Addressing maternal mental health considerations into maternal and infant health programs may help support optimal feeding practices.

Contributions to the Literature

- This study contributes nationally representative evidence based on up-to-date data on the associations between maternal anxiety, depression, and infant and young child feeding practices in Bangladesh.
- This research states that woman's depression and anxiety are related with specific feeding practice, specifically early initiation of breast feeding and minimum meal frequency, rather than overall feeding practice.
- The study specificizes maternal mental health alongside antenatal care, paternal education, and delivery-related factors as important correlates of recommended feeding practices.
- The findings provide evidence that may inform the integration of maternal mental health into maternal and child nutrition programs and policies.

Introduction

Women experience multiple physical and psychological stressors during the perinatal period, and mental health problems can exacerbate their overall burden [1]. Subsequently, it can result from suboptimal physical, social, and mental development. Maternal mental health (MMH) issues, such as anxiety and depression, rank third in terms of disease problem for women aged 14 to 44 years [2]. It has a greater impact on the well-being of the both mother and child as well as strengthens the bond between them.

Globally, common perinatal mental health disorders are experienced by women approximately 10–20%, with prevalence estimates reaching 15–25% in few low- and middle-income countries (LMICs), particularly in South Asia [3,4]. Research from LMICs shows that delayed breastfeeding initiation, decreased exclusive breastfeeding, insufficient supplemental feeding, and less nutritional diversity in early children are all linked to maternal sadness and anxiety[5]. Such conditions, which impact 800,000 families annually in the United States, are the most prevalent pregnancy and delivery complications [6,7].

The major cause of infant and young child malnutrition is inappropriate and insufficient feeding practice [8]. Perinatal mental illness is not only harmful to the mother's physical and psychological condition but also has negative consequences on her infant's feeding practices and eventual progress in development. MMH has a direct impact on infant and young child feeding practice, which is essential for a child's physical and mental growth and long-term health outcome, and hinder mother's scope to engage in optimal feeding practice, potentially leading to less-than-ideal child growth and development [9,10]. Feeding anxiety is another aspect of postnatal anxiety that contribute to a shortened time of breastfeeding or a decline in exclusive breastfeeding. Studies from South Asia have reported that maternal anxiety and depressive symptoms are associated with lower odds of exclusive breastfeeding and recommended IYCF practices [11].

Postpartum depression is also associated with poor infant attachment, inadequate mother-child relation[12], and damage of various parental cares, such as sleep routines, child clinic visits, and vaccinations, additionally an increased risk of maternal and infant mortality [13], Evidence from cohort studies and randomized controlled trials(RCT) indicates that depressed mothers are inadequate carers [14,15]. Mothers with depressive symptoms are least interested in setting a boundary controlling child consumption or pressurizing children to eat more ostensibly or espousing forceful, indulgent, or uninvolved feeding style, and that kind of non-responsive feeding style is associated with child weighty & obesity [16]. Another study specified that family mealtime is also associated with children's health and development, and it has quite a lot of benefits to help children develop healthy eating patterns and weight status [17].

A 2017 Iranian study found a negative correlation between depression and a healthy dietary pattern [18], and so depressive symptoms were linked to low levels of dietary diversity among American knowledge workers [19]. Cross-national analyses have assessed the impact of infant and young child feeding (IYCF) indicators on the prevalence of malnutrition in Ethiopia and Zambia [20]. Although studies in Bangladesh have identified socioeconomic, educational, and rural–urban disparities in IYCF practices, the role of maternal mental health in shaping feeding behaviors remains underexplored[21,22]. As far as we comprehend, no prior research has used nationally representative data from Bangladesh to investigate the relationship between maternal mental health issues and IYCF practices. Therefore, in order to avoid its adverse effects on infant feeding behaviors and development, it is imperative to identify and alleviate maternal feeding anxiety. The Bangladesh Demographic and Health Survey (BDHS) 2022 provides a unique opportunity to address this gap because it is the most recent nationally representative survey containing comprehensive maternal and child health information from all administrative divisions of Bangladesh, enabling population-level assessment of this association.

Methodology

Data source and study population:

The data were obtained from the Bangladesh Demographic and Health Survey (BDHS) 2022. The dataset is publicly available and accessible upon request. The DHS program [23], which is primarily supported by USAID, assesses Bangladesh's general health and demographic balance. The study comprised a total of 2,526 mother-child pairs after excluding observations with missing information on maternal mental health, feeding indicators, and selected covariates. The study included mothers between the ages of 15 and 49 years and children between the ages of 6 and 23 months (Fig. 1). The survey decorum was permitted by institutional review boards (IRBs) at ICF and the Bangladesh Medical Research Council (BMRC) [24].

Outcome Variables:

The WHO standard was used to describe the IYCF practice indicators [25,26]. To assess overall infant and young child feeding practices, a composite Infant and Child Feeding Index (ICFI) was constructed following the simplified single-indicator approach[27]. For small-sample IYCF assessments. The approach combines breastfeeding status, dietary diversity, and meal frequency into a single composite measure of age-appropriate feeding practices. For children aged 6–23 months, age-specific scores were assigned based on three components: (i) breastfeeding status during the previous 24 hours, (ii) dietary diversity based on the number of food groups consumed during the previous 24 hours, and (iii) meal frequency during the previous 24 hours.

The ICFI was calculated as:

ICFI = Breastfeeding Score + Dietary Diversity Score + Meal Frequency Score

The total score ranged from 0 to 6. Children who achieved the maximum score of six were classified as receiving “good” infant and young child feeding, while those scoring below six were classified as having “not good” feeding practices (Table 1).

Table 1
Infant and Child Feeding Index

	Age Group in months					
	6–8	**Score**	**9–11**	**Score**	**12–23**	**Score**
Breastfed	Yes	+ 2	Yes	+ 2	Yes	+ 1
Food Groups	==1	+ 1	1 or 2	+ 1	2 or 3	+ 1
	>=2	+ 2	>=3	+ 2	>=4	+ 2
Meals	==1	+ 1	1 or 2	+ 1	==2	+ 1
	>=2	+ 2	>=3	+ 2	==3	+ 2
					>=4	+ 3

Using the 7 food groups score for "Food Groups" indicators.

Exposure variables:

Anxiety and depression were considered as the identifiers of maternal mental health as well as the exposure variables for this research. In clinical and research contexts, the commonly used screening instruments for anxiety and depression, GAD-7 (Generalized Anxiety Disorder-7) and PHQ-9 (Patient Health Questionnaire-9) were used to estimate the mental health of mothers [28]. These are easy self-administered assessments that offer information on a person's mental health. One of the most common anxiety disorders seen in general medical practice and in the general population is generalized anxiety disorder (GAD) [29]. The Respondents with a score of 6 or higher on the GAD-7 scale were assumed to face anxiety. The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria as “0” (not at all) to “3” (nearly every day) [30]. The Respondents with a score of 10 or higher on the PHQ-9 scale are taken to be depressive. Here, anxiety and depression are both dichotomous variables where category 0 = No, 1 = Yes.

Potential confounding variables:

Previous epidemiological studies and theoretical reasoning were considered to identify important confounding variables. Socio-economic and demographic factors, such as the wealth index (Poor, Middle, Rich) and toilet facilities (modern toilet vs. others), were included because they directly dictate household purchasing power and environmental pathogen exposure. To control for informational and structural variations, we included mass media exposure (access to TV and Radio) as a critical proxy for health literacy and behavioral awareness, alongside relevant child-related factors. Finally, geographic division and area of residence (urban or rural) were adjusted for to account for structural disparities in healthcare infrastructure and regional baseline risks in Bangladesh.

Data management and analysis:

Stata version 17.0 was used to clean, recode, combine, and analyze this dataset by DHS guidance 8 [31]. Sampling weight was used to determine the dataset's weight. To re-establish the representativeness of the survey, strata and the primary sample unit are taken into consideration before any statistical analysis is performed. We took into consideration a complicated survey design and utilized the Svyset command in Stata (StataCorp LP, College Station, Texas)[32]. The *Svyset* command uses the design parameters such as the primary sampling unit, strata, cluster, and sample weight. To determine the distribution of sampled respondents with symptoms of anxiety and depression. We performed a bivariate exploratory data analysis (EDA), and then reported the outcome in terms of frequency as well as individual row percentage. Initially, bivariate analyses and Chi-square tests were conducted to examine the association between maternal mental health conditions (anxiety and depression) and the infant and young child feeding (IYCF) indicators. Only those IYCF indicators that showed a statistically significant association with maternal mental health status were selected as outcome variables for subsequent analyses.

Thereafter, separate bivariate analyses were performed between the selected outcome variables and all potential explanatory variables at the individual and regional levels. Crude (unadjusted) logistic regression models were then fitted to assess the association between each explanatory variable and the selected outcome variables. Variables with a p-value less than 0.20 in the crude logistic regression analyses were considered for inclusion in the multivariable logistic regression models [33]. The use of this relatively liberal threshold helps avoid the premature exclusion of potentially important variables that may become significant after adjustment for confounding factors.

Finally, multivariable logistic regression models were fitted for each selected outcome variable to identify factors independently associated with infant and young child feeding practices while controlling for potential confounders. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported to quantify the strength of these associations.

Model performance:

The Hosmer-Lemeshow test was used to evaluate model calibration. An insignificant p-value ($p > 0.05$) was considered evidence of an acceptable fit between the observed and predicted outcomes[34]. The Area under the Receiver Operating Characteristic (AUROC) is also constructed, which is the indicator of sensitivity and specificity. Lower P-values in the ROC curve indicate that the model can differentiate between two groups, and the area under the curve is greater than 0.50.[35] Overall predictive power of the model reported using the classification test as the percentages of correctly classified cases[36].

Results

Table 2 presents the bivariate associations between maternal mental health and infant and young child feeding (IYCF) indicators. Maternal anxiety was significantly associated with minimum meal frequency ($p < 0.001$) and early breastfeeding ($p = 0.028$). Maternal depression was significantly associated with minimum meal frequency ($p = 0.007$). No significant associations were observed between maternal anxiety or depression and minimum acceptable diet, current breastfeeding, bottle feeding, ever breastfeeding, exclusive breastfeeding within two days, mixed milk feeding, minimum dietary diversity, or overall IYCF practice.

Table 2
Association Between Maternal Mental Health Status and Infant and Young Child Feeding Indicators

IYCF Indicators	Anxiety			Depression		
	No	Yes	P-value	No	Yes	P-value
	n (%)	n (%)		n (%)	n (%)	
Minimum Acceptable Diet						
No	1590 (84.12)	300 (15.88)	0.604	1814 (95.97)	76 (4.03)	0.928
Yes	579 (85.10)	101 (14.90)		653 (96.05)	27 (3.95)	
Minimum Meal Frequency						
No	739 (79.78)	187 (20.22)	< 0.001***	875 (94.47)	51 (5.53)	0.007**
Yes	1429 (86.97)	214 (13.03)		1591 (96.85)	52 (3.15)	
Currently Breast Feeding						
No	154 (84.37)	29 (15.63)	0.998	177 (96.64)	6 (3.36)	0.669
Yes	2014 (84.38)	373 (15.62)		2290 (95.94)	97 (4.06)	
Bottle feeding						
No	1679 (84.44)	309 (15.56)	0.892	1905 (95.84)	83 (4.16)	0.493
Yes	490 (84.16)	92 (15.84)		562 (96.50)	20 (3.50)	
Ever Breastfed						
No	29 (81.40)	7 (18.60)	0.656	34 (94.19)	2 (5.81)	0.600
Yes	2139 (84.42)	395 (15.58)		2433 (96.02)	101 (3.98)	
Early Breast Feeding						
No	795 (82.01)	174 (17.99)	0.028*	937 (96.71)	32 (3.29)	0.206
Yes	1345 (85.91)	221 (14.09)		1496 (95.59)	69 (4.41)	
Exclusively Breastfed within 2 days						
No	576 (83.50)	114 (16.50)	0.492	661 (95.76)	29 (4.24)	0.728
Yes	1563 (84.77)	281 (15.23)		1773 (96.11)	72 (3.89)	
Mixed Milk Feeding						
No	1596 (84.31)	297 (15.69)	0.896	1816 (95.97)	76 (4.03)	0.946
Yes	572(84.56)	105(15.44)		650(96.04)	27(3.06)	
Minimum Dietary Diversity						
No	1430 (84.95)	253 (15.05)	0.359	1619 (96.22)	64 (3.78)	0.457
Yes	739 (83.30)	148 (16.70)		848 (95.56)	39 (4.44)	
IYCF practice						
Not Good	1477 (83.43)	293 (16.57)	0.061	1692 (95.62)	78 (4.38)	0.189
Good	692 (86.48)	108 (13.52)		774 (96.82)	25 (3.18)	
Values are presented as n (row %).						
** p < 0.05, ** p < 0.01, *** p < 0.001*						

Table 3 summarizes the distribution of IYCF outcomes across socio-demographic, reproductive, child-related, and maternal mental health characteristics. Minimum meal frequency was significantly associated with place of residence, division, father's education, maternal employment, wealth index, toilet facility, antenatal care attendance, mode of delivery, place of delivery, child age, fever status, anxiety, and depression (all $p < 0.05$).

Table 3
Bivariate association between the covariates and infant and young child feeding indicators among children aged 6–23 months in Bangladesh, BDHS 2022.

Characteristics	Minimum Meal Frequency			Early Breast Feeding			IYCF practice		
	No	Yes	P-value	Yes	No	P-value	Not Good	Good	P-value
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Socio Demographic-Economic									
Mother Age									
15–24	484(38.07)	787(61.93)	0.188	460(36.75)	792(63.25)	0.215	836(69.44)	368(30.56)	0.758
25–34	375(33.97)	729(66.03)		425(38.95)	665(61.05)		768(68.15)	359(31.85)	
35+	68(34.73)	127(65.27)		84(43.77)	108(56.23)		132(67.69)	63(32.31)	
Marital status									
Married/Living Together	917(36.02)	1628(63.98)	0.694	963 (38.3)	1552 (61.7)	0.474	1716(68.59)	786(31.41)	0.121
Divorced/Separated/Widowed	10(40.09)	15(59.91)		6(30.4)	13 (69.6)		20(83.33)	4(6.67)	
Residence									
Urban	206(30.61)	467(69.39)	0.007**	217 (32.7)	446 (67.3)	0.004**	534(66.09)	274(33.91)	0.049**
Rural	720(377.99)	1176(62.01)		752 (40.2)	1120 (59.8)		1202(69.97)	516(30.03)	
Division									
Barisal	73(47.91)	79(52.09)	< 0.001***	62 (40.7)	90 (59.3)	< 0.001***	198(74.16)	69(25.84)	< 0.001***
Chittagong	287(50.35)	283(49.65)		230 (41.4)	326 (58.7)		327(75.69)	105(24.31)	
Dhaka	184(29.84)	434(70.16)		198 (32.4)	413 (67.6)		238(64.67)	130(35.33)	
Khulna	51(19.91)	206(80.09)		79 (31.0)	176 (69.0)		147(53.07)	130(46.93)	
Rajshahi	80(34.74)	150(65.26)		94 (40.8)	136 (59.2)		210(65.63)	110(34.38)	
Rangpur	82(30.83)	185(69.17)		94 (35.6)	171 (64.4)		165(65.22)	88(34.78)	
Sylhet	93(31.5)	203(68.5)		124 (42.0)	171 (58.0)		214(70.86)	88(29.14)	
Mymensingh	73(42.39)	99(57.61)		88 (51.8)	82 (48.2)		237(77.20)	70(22.80)	
Mother Education									
No education	58(41.92)	80(58.08)	0.115	58 (42.5)	79 (57.5)	< 0.001***	107(82.95)	22(17.05)	< 0.001***
Primary	229(39.76)	347(60.24)		256 (45.4)	308 (54.6)		438(75.52)	142(24.48)	
Secondary	489(35.04)	907(64.96)		495 (36.0)	882 (64.0)		909(67.99)	428(32.01)	
Higher	149(32.73)	307(67.27)		159 (34.9)	297 (65.1)		282(58.75)	198(41.25)	
Father Education									
No education	170(44.15)	215(55.85)	< 0.001***	169 (44.4)	212 (55.7)	< 0.001***	299(80.16)	74(19.84)	< 0.001***
Primary	268(35.70)	484(64.30)		324 (43.5)	421 (56.5)		522(70.64)	217(29.36)	
Secondary	328(36.53)	570(63.47)		313 (35.2)	576 (64.8)		592(68.52)	272(31.48)	
Higher	145(29.04)	356(70.96)		154 (31.1)	342 (68.9)		300(57.47)	222(42.53)	
Father Age									
<= 24	117(41.94)	162(58.06)	0.166	89 (31.9)	189 (68.1)	0.213	185(72.27)	71(27.73)	0.355
25–29	183(33.71)	361(66.29)		202 (37.8)	332 (62.2)		374(69.78)	162(30.22)	
30–34	236(37.58)	392(62.42)		249 (39.8)	376 (60.2)		423(68.78)	192(31.22)	
35+	377(34.69)	711(65.31)		424 (39.4)	653 (60.6)		733(67.00)	361(33.00)	
Mother work									

Characteristics	Minimum Meal Frequency			Early Breast Feeding			IYCF practice		
No	755(37.88)	1239 (62.12)	< 0.001***	728 (37.0)	1239 (63.0)	0.046*	1394(69.94)	599(30.06)	0.011*
Yes	170(29.74)	403 (70.26)		240 (42.4)	327 (57.6)		342(64.17)	191(35.83)	
Religion									
Islam	867(36.33)	1521 (63.67)	0.451	896 (38.0)	1461 (62.0)	0.467	1605(69.12)	717(30.88)	0.147
Others	58 (32.48)	122(67.52)		73 (41.2)	104 (58.8)		131(64.22)	73(35.78)	
Parents Schooling Type									
School	717 (34.62)	1354(65.38)	0.843	759 (37.1)	1288 (62.9)	0.587	1364(66.57)	685(33.43)	0.953
Madrasha	29 (33.31)	59(66.69)		35 (40.3)	52 (59.7)		53(66.25)	27(33.75)	
Household Head Sex									
Male	818 (35.90)	1461 64.10)	0.673	864 (38.4)	1385 (61.6)	0.642	1529(67.90)	723(32.10)	0.012*
Female	109 (37.34)	183 (62.66)		105 (36.8)	180 (63.2)		207(75.55)	67(24.45)	
Household head occupation									
Jobless	23 (49.36)	24 (50.64)	0.288	12 (26.4)	34 (73.7)	0.023*	35(74.47)	12(25.53)	0.093
Farmer	64 (32.13)	135 (67.87)		68 (34.3)	130 (65.7)		133(69.63)	58(30.37)	
Agriculture	80 (37.33)	135 (62.67)		97 (45.4)	117 (54.6)		163(75.46)	53(24.54)	
Businessman	158 (33.48)	314 (66.52)		156 (33.4)	311 (66.6)		313(65.34)	166(34.66)	
Others	587 (36.54)	1020(63.46)		629 (39.6)	958 (60.4)		1070(68.37)	495(31.63)	
Wealth index									
Poor	429 (39.81)	649(60.19)	0.014*	459 (43.2)	605 (56.9)	< 0.001***	787(74.60)	268(25.40)	< 0.001***
Middle	187(35.08)	346(64.92)		201 (38.3)	325 (61.8)		339(67.66)	162(32.34)	
Rich	309(32.37)	646(67.63)		308 (32.7)	636 (67.3)		610(62.89)	360(37.11)	
Family Members									
<= 3	105 (35.06)	194(64.94)	0.735	90 (30.9)	202 (69.1)	0.012*	190(70.11)	81(29.89)	0.603
> 3	822 (36.19)	1449(63.81)		879 (39.2)	1363 (60.8)		1546(68.56)	709(31.44)	
Type of Toilet Facility									
Modern Toilet	246 (31.72)	530(68.28)	0.011*	251 (32.8)	514 (67.2)	0.002**	507(64.83)	275(35.17)	0.005**
Other	680 (37.94)	1113(62.06)		718 (40.6)	1051 (59.4)		1229(70.47)	515(29.53)	
Reproductive Health									
ANC Visits									
Less4	605 (39.50)	927 (60.50)	< 0.001***	603 (40.0)	906 (60.0)	0.061	1066(72.32)	408(27.68)	< 0.001***
Above4	317 (31.22)	699 (68.78)		358 (35.6)	648 (64.4)		654(63.50)	376(36.50)	
C-section									
No	565 (39.51)	866 (60.49)	< 0.001***	689 (48.9)	720 (51.1)	< 0.001***	1024(73.78)	364(26.22)	< 0.001***
Yes	356 (31.95)	758 (68.05)		270 (24.5)	834 (75.5)		694(62.35)	419(37.65)	
Place of delivery									
Home	369 (39.93)	555 (60.07)	0.007**	476 (52.5)	431 (47.6)	< 0.001***	676(75.11)	224(24.89)	< 0.001***

Characteristics	Minimum Meal Frequency			Early Breast Feeding			IYCF practice		
Hospital Facility	554 (34.07)	1071(65.93)		486 (30.2)	1123 (69.8)		1044(65.09)	560(34.91)	
Child Information									
Birth order									
1	348 (34.96)	647 (65.04)	0.459	326 (33.4)	650 (66.6)	< 0.001***	644(67.65)	308(32.35)	0.741
2–3	485 (36.23)	854 (63.77)		533 (40.3)	791 (59.7)		935(69.57)	409(30.43)	
>=4	94 (39.74)	142 (60.26)		110 (46.8)	125 (53.2)		157(68.26)	73(31.74)	
Child Age									
6–11	234 (44.24)	295 (55.76)	< 0.001***	199 (37.6)	329 (62.4)	0.978	567(59.87)	380(40.13)	< 0.001***
12–23	246 (31.06)	547 (68.94)		291 (37.6)	483 (62.4)		1169(74.03)	410(25.97)	
Child Sex									
Male	440 (34.51)	835 (65.49)	0.165	474 (37.7)	784 (62.3)	0.587	882(69.50)	387(30.50)	0.397
Female	487 (37.58)	808 (62.42)		495 (38.8)	782 (61.2)		854(67.94)	403(32.06)	
Fever									
No	538 (33.85)	1052(66.15)	0.013*	583 (37.1)	988 (62.9)	0.167	1059(67.67)	506(32.33)	0.014*
Yes	386 (39.56)	590 (60.44)		386 (40.2)	574 (59.8)		675(70.46)	283(29.54)	
Cough									
No	595 (35.45)	1083(64.55)	0.487	634 (38.3)	1023 (61.8)	0.992	1121(68.02)	527(31.98)	0.054
Yes	330 (37.22)	557 (62.78)		334 (38.3)	539 (61.7)		609(69.84)	263(30.16)	
Diarrhea									
No	852 (35.88)	1522(64.12)	0.431	891 (38.1)	1447 (61.9)	0.684	1602(68.67)	731(31.33)	0.773
Yes	74 (38.99)	116 (61.01)		75 (40.0)	113 (60.0)		131(69.68)	57(30.32)	
Mass Media									
No	556 (37.59)	924 (62.41)	0.102	592 (40.4)	874 (59.6)	0.024	1047(71.96)	408(28.04)	< 0.001***
Yes	370 (33.98)	720 (66.02)		377 (35.3)	691 (64.7)		689(64.33)	382(35.67)	
Maternal Mental Health									
Anxiety									
No	739 (34.09)	1429(65.91)	< 0.001***	795 (37.1)	1345 (62.9)	0.028*	1445(67.94)	682(32.06)	0.061
Yes	187 (46.67)	214 (53.33)		174 (44.1)	221 (55.9)		291(72.93)	108(27.07)	
Depression									
No	875 (35.49)	1591(64.51)	0.007**	937 (38.5)	1496 (61.5)	0.206	1655(68.42)	764(31.58)	0.112
Yes	51 (49.74)	52 (50.26)		32 (31.6)	69 (68.4)		81(75.70)	26(24.30)	

Values are presented as n (row %).

** p < 0.05, ** p < 0.01, *** p < 0.001.*

Early breastfeeding was significantly associated with place of residence, division, maternal and paternal education, maternal employment, household head occupation, wealth index, family size, toilet facility, mode of delivery, place of delivery, birth order, media exposure, and maternal anxiety (all $p < 0.05$). Good IYCF practice was significantly associated with division, maternal and paternal education, maternal employment, household head sex, wealth index, toilet facility, antenatal care attendance, mode of delivery, place of delivery, child age, fever status, and media exposure (all $p < 0.05$).

Table 4 presents the crude associations between the explanatory variables and the three infant and young child feeding outcomes. Maternal anxiety was significantly associated with lower odds of achieving minimum meal frequency (COR = 0.59, 95% CI: 0.46–0.76) and higher odds of early breastfeeding

initiation (COR = 1.33, 95% CI: 1.03–1.73). Maternal depression was also significantly associated with lower odds of achieving minimum meal frequency (COR = 0.56, 95% CI: 0.36–0.86). In addition, several sociodemographic, maternal, child-related, and household characteristics showed associations with one or more IYCF outcomes at the crude level.

Table 4
Crude Logistic Regression Between the Covariates and Infant and Young Child Feeding Indicators Among Children Aged 6–23 Months in Bangladesh, BDHS 2022

Characteristic	Minimum Meal Frequency		Early Breast Feeding		IYCF practice	
	COR (95% CI)	P-value	COR (95% CI)	P-value	COR (95% CI)	P-value
Socio Demographic-Economic						
Mother Age						
15–24	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
25–34	1.19 (0.98, 1.45)	0.072	1.10 (0.91, 1.32)	0.321	1.09 (0.89, 1.34)	0.405
35+	1.16 (0.80, 1.67)	0.445	1.34 (0.94, 1.91)	0.104	0.94 (0.65, 1.36)	0.754
Marital status						
Married/Living Together	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Divorced/Separated/Widowed	0.84 (0.35, 2.00)	0.695	0.70 (0.27, 1.86)	0.477	0.42 (0.13, 1.29)	0.228
Residence						
Urban	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Rural	0.72 (0.57, 0.92)	0.008**	1.38 (1.10, 1.73)	0.005**	0.82 (0.65, 1.05)	0.116
Division						
Barisal	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Chittagong	0.91 (0.62, 1.32)	0.612	1.03 (0.69, 1.52)	0.894	0.97 (0.62, 1.53)	0.906
Dhaka	2.16 (1.48, 3.15)	< 0.001***	0.70 (0.47, 1.04)	0.079	1.69 (1.10, 2.61)	0.017**
Khulna	3.70 (2.41, 5.69)	< 0.001***	0.65 (0.42, 1.01)	0.049*	2.72 (1.78, 4.17)	< 0.001***
Rajshahi	1.73 (1.16, 2.57)	0.007**	1.00 (0.68, 1.48)	0.990	1.55 (0.99, 2.44)	0.057
Rangpur	2.06 (1.39, 3.06)	< 0.001***	0.81 (0.53, 1.23)	0.318	1.46 (0.94, 2.28)	0.096
Sylhet	2.00 (1.33, 3.00)	< 0.001***	1.05 (0.70, 1.60)	0.804	1.23 (0.78, 1.92)	0.375
Mymensingh	1.25 (0.82, 1.89)	0.293	1.56 (1.02, 2.40)	0.042*	0.97 (0.60, 1.54)	0.886
Mother Education						
No education	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Primary	1.09 (0.68, 1.76)	0.711	1.12 (0.74, 1.69)	0.580	1.49 (0.90, 2.46)	0.121
Secondary	1.34 (0.86, 2.09)	0.200	0.76 (0.50, 1.16)	0.202	2.22 (1.35, 3.66)	0.002**
Higher	1.48 (0.93, 2.37)	0.100	0.72 (0.47, 1.13)	0.154	3.42 (2.05, 5.70)	< 0.001***
Father Education						
No education	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Primary	1.42 (1.09, 1.87)	0.011*	0.96 (0.73, 1.27)	0.796*	1.54 (1.10, 2.15)	0.011*
Secondary	1.37 (1.04, 1.82)	0.026*	0.68 (0.51, 0.92)	0.011*	1.64 (1.18, 2.28)	0.003**
Higher	1.93 (1.41, 2.64)	< 0.001***	0.57 (0.41, 0.77)	< 0.001***	2.72 (1.95, 3.79)	< 0.001***
Father Age						
<= 24	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
25–29	1.42 (1.03, 1.95)	0.031*	1.30 (0.89, 1.89)	0.170	1.12 (0.79, 1.57)	0.531
30–34	1.20 (0.85, 1.69)	0.299	1.41 (1.05, 1.90)	0.024	1.23 (0.84, 1.79)	0.283
35+	1.36 (1.00, 1.84)	0.047*	1.39 (1.02, 1.88)	0.036*	1.25 (0.90, 1.74)	0.181
Mother work						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	

Characteristic	Minimum Meal Frequency		Early Breast Feeding		IYCF practice	
	COR (95% CI)	P-value	COR (95% CI)	P-value	COR (95% CI)	P-value
Yes	1.44 (1.16, 1.80)	< 0.001***	1.25 (1.00, 1.56)	0.047*	1.29 (1.03, 1.62)	0.028*
Religion						
Islam	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Others	1.19 (0.76, 1.85)	0.452	1.14 (0.80, 1.63)	0.468	1.25 (0.90, 1.72)	0.179
Parents Schooling Type						
Madrasha	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
School	0.94 (0.53, 1.69)	0.843	0.87 (0.54, 1.42)	0.588	0.94 (0.57, 1.54)	0.797
Household Head Sex						
Male	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Female	0.94 (0.70, 1.26)	0.674	0.93 (0.70, 1.24)	0.642	0.70 (0.49, 1.00)	0.051
Household head occupation						
Jobless	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Farmer	2.06 (0.93, 4.55)	0.074	1.46 (0.64, 3.34)	0.372	1.47 (0.62, 3.50)	0.380
Agriculture	1.64 (0.75, 3.56)	0.213	2.32 (1.03, 5.22)	0.042*	0.98 (0.40, 2.37)	0.957
Businessman	1.94 (0.92, 4.06)	0.080	1.40 (0.65, 3.02)	0.389	1.78 (0.77, 4.14)	0.180
Others	1.69 (0.84, 3.39)	0.137	1.83 (0.87, 3.88)	0.113	1.45 (0.64, 3.28)	0.371
Wealth index Status						
Poor	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Middle	1.22 (0.94, 1.59)	0.133	0.82 (0.64, 1.05)	0.111	1.36 (1.05, 1.77)	0.021*
Rich	1.38 (1.11, 1.71)	0.003**	0.64 (0.51, 0.79)	< 0.001***	1.70 (1.37, 2.12)	< 0.001**
Family Members						
<= 3	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
> 3	0.95 (0.71, 1.27)	0.736	1.44 (1.08, 1.92)	0.013*	1.04 (0.79, 1.38)	0.770
Type of Toilet Facility						
Modern Toilet	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Other	0.76 (0.61, 0.94)	0.012*	1.40 (1.12, 1.75)	0.003**	0.79 (0.64, 0.99)	0.037*
Reproductive Health						
ANC Visits						
Less4	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Above4	1.44 (1.18, 1.76)	< 0.001***	0.83 (0.68, 1.01)	0.061	1.39 (1.14, 1.70)	< 0.001***
C-section						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	1.39 (1.15, 1.68)	< 0.001***	0.34 (0.28, 0.41)	< 0.001***	1.77 (1.46, 2.16)	< 0.001***
Place of delivery						
Home	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Hospital Facility	1.29 (1.07, 1.55)	0.008**	0.39 (0.32, 0.47)	< 0.001***	1.61 (1.32, 1.98)	< 0.001***
Child Information						
Birth order						
1	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
2–3	0.95 (0.78, 1.14)	0.566	1.35 (1.11, 1.63)	0.002**	0.93 (0.75, 1.14)	0.466

Characteristic	Minimum Meal Frequency		Early Breast Feeding		IYCF practice	
	COR (95% CI)	P-value	COR (95% CI)	P-value	COR (95% CI)	P-value
>=4	0.82 (0.59, 1.13)	0.220	1.76 (1.25, 2.46)	< 0.001***	0.93 (0.66, 1.30)	0.656
Child Age						
6–11	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
12–23	1.76 (1.39, 2.23)	< 0.001***	1.00 (0.79, 1.26)	0.978	0.52 (0.39, 0.70)	< 0.001***
Child Sex						
Male	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Female	0.88 (0.72, 1.06)	0.166	1.05 (0.88, 1.24)	0.587	1.04 (0.86, 1.25)	0.702
Fever						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	0.78 (0.64, 0.95)	0.014*	1.14 (0.95, 1.37)	0.167	0.78 (0.64, 0.95)	0.014*
Cough						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	0.93 (0.75, 1.15)	0.487	1.00 (0.83, 1.21)	0.993	0.82 (0.67, 1.00)	0.055
Diarrhea						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	0.88 (0.63, 1.22)	0.432	1.08 (0.74, 1.57)	0.684	0.85 (0.59, 1.21)	0.363
Mass Media						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	1.17 (0.97, 1.41)	0.102	0.80 (0.67, 0.97)	0.024*	1.31 (1.08, 1.59)	0.006**
Maternal Mental Health						
Anxiety						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	0.59 (0.46, 0.76)	< 0.001***	1.33(1.03, 1.73)	0.029*	0.79 (0.61, 1.01)	0.062
Depression						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	0.56 (0.36, 0.86)	0.008**	0.74(0.46,1.18)	0.208	0.72 (0.43, 1.18)	0.191

COR = crude odds ratio, CI = confidence interval, Ref = reference category.

Results are from simple binary logistic regression models fitted separately for each predictor.

** p < 0.05, ** p < 0.01, *** p < 0.001.*

Table 5 presents the adjusted associations between maternal mental health and IYCF outcomes after controlling for potential confounders. Minimum meal frequency, mothers who attended more than four antenatal care visits had higher odds of achieving minimum meal frequency than those with fewer visits (AOR = 1.68, 95% CI: 1.27–2.23). Children aged 12–23 months had higher odds of meeting minimum meal frequency than children aged 6–11 months (AOR = 1.87, 95% CI: 1.45–2.41). Paternal secondary education was also associated with higher odds of meeting minimum meal frequency (AOR = 1.72, 95% CI: 1.09–2.70). Maternal anxiety was significantly associated with lower odds of achieving minimum meal frequency (AOR = 0.50, 95% CI: 0.33–0.76). For early breastfeeding, caesarean delivery was associated with lower odds of early breastfeeding initiation compared with vaginal delivery (AOR = 0.45, 95% CI: 0.35–0.57). Delivery at a health facility was also associated with lower odds of early breastfeeding compared with home delivery (AOR = 0.68, 95% CI: 0.53–0.88). Maternal depression was associated with lower odds of early breastfeeding (AOR = 0.51, 95% CI: 0.29–0.87), whereas maternal anxiety was associated with higher odds of early breastfeeding (AOR = 1.41, 95% CI: 1.01–1.97).

Table 5
Adjusted Logistic Regression Between the Covariates and Infant and Young Child Feeding Indicators Among Children Aged 6–23 Months in Bangladesh, BDHS 2022

Characteristic	Minimum Meal Frequency		Early Breast Feeding		IYCF practice	
	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value
Socio Demographic-Economic						
Mother Age						
15–24	1.00 (Ref)		1.00 (Ref)		—	—
25–34	1.14 (0.78, 1.67)	0.495	0.93 (0.72, 1.21)	0.581	—	—
35+	0.68 (0.37, 1.27)	0.227	1.04 (0.65, 1.65)	0.872	—	—
Marital status						
Married/Living Together						
Divorced/Separated/Widowed						
Residence						
Urban	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Rural	0.79 (0.55, 1.12)	0.177	1.00 (0.77, 1.30)	0.991	0.92 (0.64, 1.32)	0.639
Division						
Barisal	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Chittagong	0.97 (0.58, 1.62)	0.895	1.07 (0.70, 1.62)	0.760	1.13 (0.59, 2.15)	0.719
Dhaka	1.74 (0.99, 3.05)	0.053	0.88 (0.56, 1.37)	0.565	2.27 (1.20, 4.31)	0.012*
Khulna	3.45 (1.86, 6.41)	< 0.001***	1.00 (0.63, 1.60)	0.993	2.96 (1.56, 5.61)	< 0.001***
Rajshahi	1.24 (0.70, 2.19)	0.459	1.03 (0.67, 1.58)	0.894	1.91 (0.98, 3.74)	0.058
Rangpur	1.63 (0.89, 3.00)	0.113	1.04 (0.66, 1.63)	0.862	2.45 (1.23, 4.88)	0.011
Sylhet	1.65 (0.90, 3.03)	0.106	1.18 (0.76, 1.84)	0.458	1.64 (0.85, 3.16)	0.140
Mymensingh	1.14 (0.61, 2.11)	0.683	1.61 (1.03, 2.52)	0.036*	1.38 (0.68, 2.77)	0.371
Maternal Education						
No Education	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Primary	1.08 (0.55, 2.11)	0.815	1.13 (0.69, 1.83)	0.628	1.03 (0.48, 2.22)	0.932
Secondary	0.96 (0.49, 1.86)	0.893	1.00 (0.59, 1.68)	0.999	1.44 (0.66, 3.12)	0.359
Higher	0.66 (0.29, 1.50)	0.321	1.35 (0.75, 2.45)	0.319	1.57 (0.65, 3.82)	0.320
Father Education						
No Education	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Primary	1.41 (0.92, 2.15)	0.115	1.08 (0.79, 1.46)	0.643	1.21 (0.73, 2.01)	0.456
Secondary	1.72 (1.09, 2.70)	0.020*	0.93 (0.67, 1.30)	0.672	1.16 (0.69, 1.94)	0.569
Higher	1.73 (0.94, 3.20)	0.078	0.80 (0.53, 1.21)	0.293	1.26 (0.66, 2.41)	0.484
Father's Age						
< 25	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
25–29	1.56 (0.92, 2.66)	0.101	1.30 (0.90, 1.89)	0.160	1.33 (0.77, 2.28)	0.304
30–34	1.05 (0.63, 1.75)	0.864	1.45 (1.04, 2.03)	0.030*	1.31 (0.76, 2.28)	0.331
35+	1.26 (0.73, 2.18)	0.412	1.30 (0.86, 1.97)	0.209	1.48 (0.88, 2.49)	0.140
Mother Work						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	1.29 (0.92, 1.81)	0.138	1.22 (0.96, 1.56)	0.100	1.13 (0.80, 1.59)	0.499
Religion						

Characteristic	Minimum Meal Frequency		Early Breast Feeding		IYCF practice	
	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value
Muslim	—	—	—	—	1.00 (Ref)	
Others	—	—	—	—	1.48 (0.86, 2.56)	0.156
Parents Schooling Type						
Madrasha	—	—	—	—	—	—
School	—	—	—	—	—	—
Household Head Sex						
Male	—	—	—	—	1.00 (Ref)	
Female	—	—	—	—	0.90 (0.54, 1.49)	0.674
Household head Occupation						
Ref Category	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Farmer	2.40 (0.72, 8.06)	0.156	1.24 (0.49, 3.10)	0.652	0.92 (0.26, 3.19)	0.891
Agriculture	2.11 (0.64, 6.98)	0.223	1.61 (0.66, 3.96)	0.298	0.95 (0.28, 3.29)	0.938
Businessman	2.17 (0.69, 6.84)	0.185	1.39 (0.60, 3.24)	0.440	1.20 (0.39, 3.71)	0.752
Others	2.06 (0.67, 6.30)	0.207	1.81 (0.79, 4.16)	0.162	1.37 (0.45, 4.17)	0.575
Wealth Index						
Poor	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Middle	0.87 (0.59, 1.30)	0.506	1.14 (0.85, 1.53)	0.366	0.80 (0.50, 1.26)	0.334
Rich	0.82 (0.56, 1.21)	0.316	1.09 (0.81, 1.47)	0.564	0.82 (0.53, 1.29)	0.395
Family Members						
1–3 members	—	—	1.00 (Ref)	—	—	—
> 3 members	—	—	1.25 (0.91, 1.71)	0.167	—	—
Toilet Facility						
Improved	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Other	0.78 (0.53, 1.14)	0.200	1.12 (0.85, 1.48)	0.427	0.75 (0.51, 1.12)	0.164
Reproductive Health						
ANC Visits						
< 4	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Above4	1.68 (1.27, 2.23)	< 0.001***	1.15 (0.92, 1.43)	0.220	1.39 (1.00, 1.91)	0.047*
C-Section						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	1.24 (0.81, 1.88)	0.323	0.45 (0.35, 0.57)	< 0.001***	1.71 (1.13, 2.59)	0.011**
Place of Delivery						
Home	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Health Facility	0.86 (0.57, 1.30)	0.476	0.68 (0.53, 0.88)	0.004**	0.83 (0.54, 1.28)	0.392
Child Information						
Birth Order						
1st Birth	—	—	1.00 (Ref)		—	—
2–3	—	—	1.09 (0.84, 1.43)	0.505	—	—
>=4	—	—	1.08 (0.68, 1.72)	0.732	—	—
Child Age						
6–11	1.00 (Ref)		—	—	1.00 (Ref)	

Characteristic	Minimum Meal Frequency		Early Breast Feeding		IYCF practice	
	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value
12–23	1.87 (1.45, 2.41)	< 0.001***	—	—	0.49 (0.36, 0.66)	< 0.001***
Child Sex						
Male	1.00 (Ref)		—	—	—	—
Female	0.79 (0.58, 1.06)	0.118	—	—	—	—
Fever						
No	1.00 (Ref)	—	1.00 (Ref)		1.00 (Ref)	
Yes	0.75 (0.57, 1.00)	0.052	1.07 (0.87, 1.31)	0.512	0.93 (0.66, 1.31)	0.675
Cough						
No	—	—	—	—	1.00 (Ref)	
Yes	—	—	—	—	0.86 (0.61, 1.19)	0.358
Diarrhea						
No	—	—	—	—	—	—
Yes	—	—	—	—	—	—
Media Exposure						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	0.97 (0.72, 1.33)	0.871	1.04 (0.84, 1.28)	0.751	0.86 (0.63, 1.19)	0.362
Maternal Mental Health						
Anxiety						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	0.50 (0.33, 0.76)	< 0.001***	1.41 (1.01, 1.97)	0.044*	1.00 (0.66, 1.51)	0.998
Depression						
No	1.00 (Ref)		1.00 (Ref)		1.00 (Ref)	
Yes	1.14 (0.55, 2.37)	0.727	0.51 (0.29, 0.87)	0.014*	0.71 (0.30, 1.69)	0.442

AOR = adjusted odds ratio, CI = confidence interval, Ref = reference category.

Results are from multivariable logistic regression models fitted separately for each predictor.

** p < 0.05, ** p < 0.01, *** p < 0.001.*

Regarding overall IYCF practice, children aged 12–23 months had lower odds of receiving good IYCF practices than children aged 6–11 months (AOR = 0.49, 95% CI: 0.36–0.66). Residence in Khulna division was associated with higher odds of good IYCF practice in comparison of Barisal division (AOR = 2.96, 95% CI: 1.56–5.61). Mothers who attended more than four antenatal care visits had higher odds of good IYCF practice (AOR = 1.39, 95% CI: 1.00–1.91). Caesarean delivery was also associated with higher odds of good IYCF practice (AOR = 1.71, 95% CI: 1.13–2.59). No significant associations were observed between maternal anxiety or depression and overall IYCF practice after adjustment.

In the analysis, the AUC of the receiver operating characteristic curve (ROC) is 0.6852, 0.6809, and 0.6858 for child minimum meal frequency, early breastfeeding, and IYCF practice, respectively. Which is greater than 0.5, it indicates that the models have fair predictive performance. And the probability value of the Hosmer–Lemeshow test is 0.8899, 0.4881, and 0.4721 for child minimum meal frequency, early breastfeeding, and IYCF practice (Fig. 2–4) respectively. Which is greater than 0.05 suggests that the model fits the data well and the predicted values align with the observed values. And the classification table shows that the models for child minimum meal frequency, early breastfeeding, and IYCF practice can correctly classifies 65.94%, 65.35% and 69.36% cases, respectively (Table 6).

Table 6
Hosmer-Lemeshow Test, Area under ROC Curve, and Calibration test and classification accuracy for final logistic regression model

	Hosmer-Lemeshow Test		Area Under ROC Curve	Goodness of fit		Correctly classified
	Chi- square	P-value	AUC	Test-statistic	P-value	
Minimum Meal Frequency	3.62	0.8899	0.6852	1232.90	0.2550	65.94%
Early Breast Feeding	7.46	0.4881	0.6809	2415.94	0.2506	65.35%
IYCF practice	7.61	0.4721	0.6858	1227.18	0.2336	69.36%

Discussion

Using nationally representative data from Bangladesh, this study investigated the relationship between infant and young child feeding (IYCF) practices and maternal anxiety and depression in children aged 6–23 months. The prevalence of maternal anxiety and depression observed in this study is broadly consistent with estimates reported for South Asian low- and middle-income countries, where perinatal common mental disorders are highly prevalent[2].

In the adjusted analysis, maternal anxiety was independently associated with a significantly lower likelihood of children attaining minimum meal frequency. Psychological distress is known to impair a mother's caregiving capacity by reducing motivation, energy, and feeding self-efficacy, which may translate directly into less frequent and lower-quality complementary feeding[4]. This finding aligns with evidence from India showing that postpartum depression is associated with reduced minimum meal frequency and minimum dietary diversity[37]. Importantly, maternal depression did not reach statistical significance for minimum meal frequency in the adjusted model, suggesting that its bivariate association was largely mediated through socioeconomic pathways captured by other covariates in the model.

A notable finding was the divergent association between the two mental health conditions and early breastfeeding initiation. Maternal depression was independently associated with lower odds of early breastfeeding initiation, dependable with established evidence that psychomotor slowing, anhedonia, and disrupted mother-infant bonding in depressed mothers reduce the likelihood of timely breastfeeding[38]. By contrast, maternal anxiety was associated with higher odds of early breastfeeding initiation. This paradoxical finding may reflect hypervigilance in anxious mothers, who may be more likely to initiate breastfeeding promptly due to heightened concern for newborn wellbeing or stronger motivation to adhere to healthcare providers' instructions in the immediate postpartum period. These divergent effects underscore the status of distinguishing between anxiety and depression rather than treating them as a single composite of maternal psychological distress when investigating their impact on IYCF outcomes.

Neither anxiety nor depression was significantly associated with overall IYCF practice in the adjusted analysis, suggesting that the effects of maternal mental health on feeding are indicator-specific and may be obscured when practices are collapsed into a single composite measure. Beyond maternal mental health, several structural and sociodemographic factors were independently associated with IYCF outcomes. Adequate antenatal care attendance was positively associated with both minimum meal frequency and good overall IYCF practice, consistent with evidence that multiple antenatal contacts provide opportunities for nutritional counselling and health education that improve complementary feeding [39]. Caesarean delivery was strongly associated with delayed breastfeeding initiation, in line with well-documented physiological and logistical barriers to early skin-to-skin contact and breastfeeding following surgical birth [40], though it was positively associated with good overall IYCF practice, likely reflecting the higher socioeconomic profile of this subgroup. Paternal education was independently associated with higher minimum meal frequency, reflecting the role of household human capital in enabling more regular and adequate complementary feeding. Children in the older age band had higher odds of meeting minimum meal frequency but lower odds of achieving good overall IYCF practice, reflecting the more stringent age-specific standards of the composite feeding index for older children.

Significant divisional variation in IYCF outcomes persisted after full adjustment, with several divisions showing substantially higher odds of good IYCF practice compared with Barisal. These adjusted regional differences indicate that structural supply-side determinants operating at the divisional level - such as community nutrition program coverage, healthcare infrastructure, and community health worker density - contribute to IYCF disparities beyond individual-level socioeconomic factors. Maternal education was not independently significant in the adjusted models for any outcome, indicating that its bivariate association with IYCF indicators was attenuated by collinearity with correlated covariates including paternal education, wealth index, and division of residence.

Limitations and strengths:

The use of BDHS 2022 data, a nationally representative probability sample, allows findings to be generalized to Bangladeshi mothers with children aged 6–23 months. Clinically validated screening instruments (GAD-7 and PHQ-9) were used to measure maternal mental conditions, and the complex survey design was properly accounted for using sampling weights, strata, and PSUs throughout all analyses. The three-outcome analytical structure allowed the differential effects of anxiety and depression on specific IYCF indicators to emerge distinctly, which is a meaningful clinical contribution.

However, the cross-sectional nature of the BDHS 2022 limits causal inference because maternal anxiety, depression, and IYCF practices were assessed parallelly. As a result, the direction of the observed associations cannot be determined, and reverse causation cannot be ruled out. Longitudinal studies are needed to clarify the causal relationship between maternal mental health and infant feeding practices. GAD-7 and PHQ-9 are screening tools rather than diagnostic instruments, and social desirability bias in a household survey context may have led to underreporting of psychological distress. Recall bias is a concern for IYCF indicators, particularly early initiation of breastfeeding, which some mothers were asked to report up to 23 months after the event. The relatively low prevalence of depression limits the statistical power of depression-specific estimates, and several theoretically important confounders,

including household food security, social support, and postnatal care quality, were unavailable in the secondary dataset. Despite these limitations, the findings offer nationally representative evidence on a previously understudied relationship in Bangladesh and provide a basis for targeted policy action.

Conclusion

In Bangladesh, several IYCF practices are differently linked to maternal anxiety and depression. Anxiety was independently associated with decreased minimum meal frequency, but depression was linked to delayed breastfeeding initiation, underlining the necessity of treating them as discrete illnesses in both research and therapeutic practice. IYCF outcomes were also independently correlated with adequate prenatal care attendance, method of birth, paternal education, child age, and divisional location. These findings suggest that integrating maternal mental health screening into maternal and child health services may support efforts to improve selected infant and young child feeding practices. However, intervention studies are needed to determine whether such approaches improve feeding outcomes., along with nutritional counseling and breastfeeding assistance, especially after cesarean delivery. Increasing the scope of community nutrition programs in underperforming divisions should be a top priority in policy initiatives to address enduring regional inequities in IYCF. To validate the causal pathways found here, more longitudinal studies that include measures of social support, household food security, and postnatal care quality are required.

Abbreviations

AOR
Adjusted Odds Ratio
BDHS
Bangladesh Demographic and Health Survey
CI
Confidence Interval
GAD-7
Generalized Anxiety Disorder-7
PHQ-9
Patient Health Questionnaire-9
ICFI
Infant and Child Feeding Index
IYCF
Infant and Young Child Feeding
MMF
Minimum Meal Frequency
MDD
Minimum Dietary Diversity
MAD
Minimum Acceptable Diet.

Declarations

Ethics approval and consent to participate

The study was based on secondary analysis of data from the Bangladesh Demographic and Health Survey (BDHS) 2022. The survey was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval for the BDHS 2022 survey was obtained from the Institutional Review Board (IRB) of ICF and the Bangladesh Medical Research Council (BMRC). Written informed consent was obtained from all participants before data collection. Permission to use the anonymized BDHS 2022 dataset for this study was obtained from the DHS Program. As this study involved analysis of publicly available de-identified data, no additional ethical approval was required.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

T.J. performed the statistical analyses, interpreted the results, and drafted the manuscript. M.N.H. contributed to the study design, data interpretation, and critically revised the manuscript. S.T. assisted with writing and manuscript preparation. M.A.B.C. provided methodological input, contributed to the interpretation of the results, and revised the manuscript for important intellectual content. M.J.U. supervised the study, contributed to the study conception and methodology, interpreted the findings, critically revised the manuscript, and approved the final version. Each author read and approved the final manuscript prior to submission.

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Data Availability

The datasets analyzed during the current study are publicly available from the Demographic and Health Surveys (DHS) Program upon reasonable request through the DHS website (https://dhsprogram.com/data/available-datasets.cfm).

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Figures

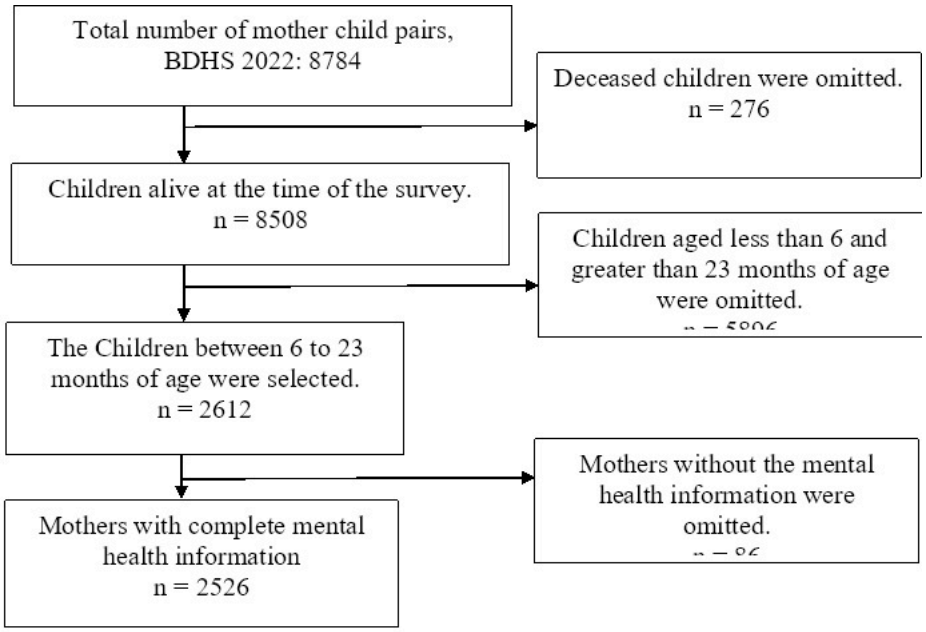


Figure 1

Flow chart of the selection process of the study population.

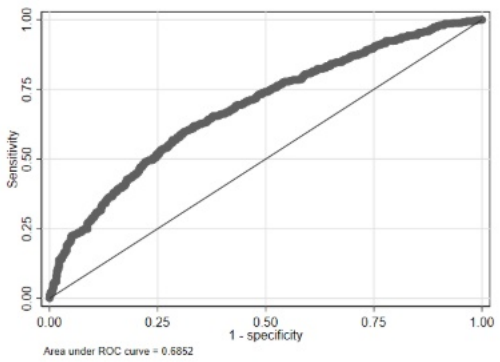


Figure 2

Receiver operating curve of Minimum Meal Frequency.

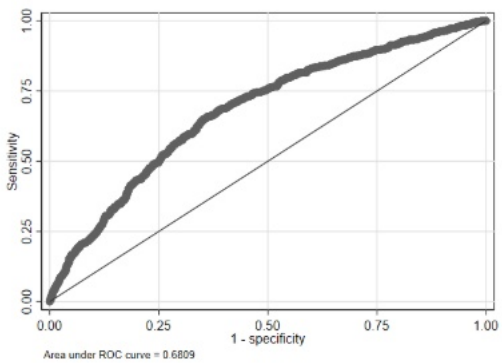


Figure 3

Receiver operating curve of Early Breast Feeding.

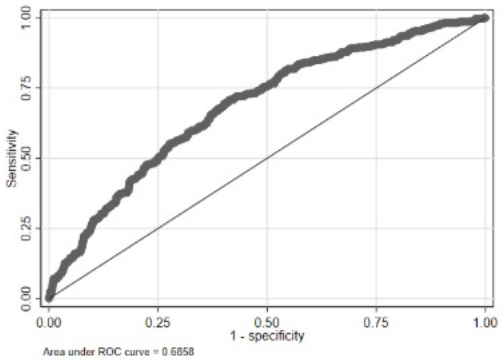


Figure 4

Receiver operating curve of IYCF Practice.