_____

Original scientific paper

Early initiation of breastfeeding and its determinants of mothers in Rajshahi district, Bangladesh: A cross-sectional study

U. Ayesha[1], A.S.M.A.Mamun[2], M. N. Islam[2], M.R. Hossain[2], S. A. Tasmia[2], M. G. Hossain[2*]

Authors
Ummay Ayesha[1],   E-mail: ayeshadu10@gmail.com
Abu Sayed Md. Al Mamun[2],   E-mail: mithun_stat@yahoo.com
Md. Nurul Islam[2],   E-mail: mnurul58@yahoo.com
Md. Ripter Hossain[2],   E-mail: ripter_ru@yahoo.com
Samme Amena Tasmia[2],   E-mail: jusi.stat14@gmail.com
Md. Golam Hossain[2*,]   E-mail:hossain95@yahoo.com
Affiliations
[1] Assistant Professor, Department of Mathematics, American International University - Bangladesh (AIUB) Bangladesh
[2]Health Research Group, Department of Statistics, University of Rajshahi, Rajshahi-6205, Bangladesh
*Corresponding author: Md. G. Hossain

Early initiation of breastfeeding and its determinants of mothers in Rajshahi district, Bangladesh: A cross-sectional study

U. Ayesha[1], A.S.M.A.Mamun[2], M. N. Islam[2], M.R. Hossain[2], S. A. Tasmia[2], M. G. Hossain[2*]

Authors
Ummay Ayesha[1],   E-mail: ayeshadu10@gmail.com
Abu Sayed Md. Al Mamun[2],   E-mail: mithun_stat@yahoo.com
Md. Nurul Islam[2],   E-mail: mnurul58@yahoo.com
Md. Ripter Hossain[2],   E-mail: ripter_ru@yahoo.com
Samme Amena Tasmia[2],   E-mail: jusi.stat14@gmail.com
Md. Golam Hossain[2*],   E-mail:hossain95@yahoo.com
Affiliations
[1] Assistant Professor, Department of Mathematics, American International University - Bangladesh (AIUB) Bangladesh
[2]Health Research Group, Department of Statistics, University of Rajshahi, Rajshahi-6205, Bangladesh

ABSTRACT *Early initiation of breastfeeding (EIBF) provides the first immunization for the newborns. This study aimed to identify the factors associated with EIBF among mothers in Rajshahi district, Bangladesh. A number of 421 mothers living in Rajshahi district who had at least one infant aged 6-24 months were considered as sample. Mothers were selected using multistage random sampling. This study was conducted from January 1 to March 31, 2019. The prevalence of EIBF among mothers in Rajshahi district was 88.4%. Eight factors associated with EIBF: (i) husbands' education level, (ii) husbands' occupation, (iii) monthly family income, (iv) mothers' age, (v) mothers' BMI, (vi) place of delivery, (vii) planned pregnancy and (viii) mothers taking advice regarding the benefit of breastfeeding during their pregnancy. This study identified several factors associated with EIBF. These factors could be considered to increase the rate of EIBF among mothers in Bangladesh.*

Keywords: Bangladesh; Breastfeeding; Early initiation; Newborn; Prevalence

INTRODUCTION

Breastfeeding is considered one of the most important factors for the growth and development of newborns (UNICEF, 2006). Early initiation of breastfeeding ensures skin-to-skin contact between the mothers and the newborns that helps to establish the bond between mothers and infants, and most importantly boosts the chances of increasing exclusive breastfeeding practice (WHO; 2014). First milk produced by the mothers during the first postpartum days contains at least ninety known components including amino acids, minerals and vitamins essential for the growth and development of the newborns (Tapa, 2005). EIBF also shows a significant protective role to mothers by reducing the risk of postpartum hemorrhage which is a leading cause of maternal mortality in low income countries (Berde and Yalcin, 2016). Child mortality is comparatively higher in those low and middle income countries where the prevalence of EIBF is low (Jones et al., 2003). In South Asia still more than 20 million newborns are not being breastfed within the first hour of birth (UNICEF, 2016). Among South Asian countries, Pakistan (18%) was the lowest EIBF (UNICEF, 2018) followed by Afghanistan (41%), Nepal (41.8%) (Bhandari et al., 2019) and India (42%) (Aguayo et al., 2016). There were some socio-economic, health-related and individual barriers to EIBF in South Asian countries found by Sharma and Byrne (Sharma and Byrne, 2016).

In Bangladesh, the trend of practicing EIBF among the lactating mothers has been increasing during the last two decades (NIPORT, 2014). Islam et al. (Islam et al., 2019) investigated the prevalence and factors associated with early initiation of breastfeeding among Bangladeshi mothers using a nationally representative samples collected by BDHS-2014. BDHS collected data in 2014, 8 years have already passed, and some indicators such as household wealth quintile, medical facilities and women education level have been increasing in Bangladesh during the last two decades; these factors are directly or indirectly related to EIBF (NIPORT, 2014). Rajshahi district is a part of the northern region of Bangladesh. BDHS-2014 did not find any significantly variation in the rate of EIBF among geographical locations (divisions) in Bangladesh (NIPORT, 2014).

Therefore, the aim of the present study was to determine the prevalence and associated factors of early initiation of breastfeeding in Rajshahi district, Bangladesh.

MATERIALS AND METHODS

Study area and population: This was a cross-sectional study, and Rajshahi district was the target area of the present study. It is one of the oldest districts of Bangladesh that belongs to the Northern region of the country under Rajshahi division (Rahman et al., 2012). The number of population was 22,868,74 among them 11,844,48 males and 11,024,26 females

(Elahi, 2016).Mothers who had at least one infant (age, 6-24 months) were considered as the study population.

Sample size determination: The required sample size was estimated using the formula given by Cochran (Cochran,1963):   n= $\frac{z^2 p(1-p)}{d^2}$, where n= the required sample size, p is the proportion of prevalence of early initiation of breastfeeding (here, p= 0.514) and z=1.96 at 95% confidence interval, and d is the margin of error, we considered d=0.05. The prevalence of initiation of breastfeeding (p-value) was taken from a previous publication (Islam et al., 2019). This formula provided that 384 sample was adequate for our present study. However, 440 samples (15% extra) were considered for allowing some failure cases.

Sampling: Multistage random sampling was utilized for this study. In the first stage, two Upazilas (sub-district) were selected randomly from nine Upazilas in Rajshahi district. In the second stage, two *unions* were selected from each selected Upazila randomly. Similarly, one ward was selected randomly from 30 wards of Rajshahi City Corporation. In final stage, 80 mothers were selected from each selected union and 120 mothers were selected from the selected ward randomly.

Data collection procedures: We collected data from the selected mothers using a self-administered questionnaire, data collectors filled up the questionnaire on behalf of illiterate women. This survey was conducted from January 1 to March 31, 2019. The questionnaire was drafted and sent to five experts in health sciences, and it was revised according to their comments/suggestions. The original questionnaire was in English, and the revised questionnaire was translated into Bangla (mother tongue of Bangladesh), and the Bangla questionnaire was checked by present authors. Before collecting data, we discussed with selected mothers and their husbands/guardians about our present study. Unfortunately, 19 selected mothers did not agree to provide their information. Finally, 421 mothers provided their information which was analyzed in this study. All necessary information of our respondents was collected from the respective ward councilor's office/union council. A pilot survey had been done for observing whether there was any lacking or drawback in the questionnaire. We did not get lacking or drawbacks.

Measurement of anthropometric data: Digital scales and a portable stadiometer were used to measure weight and height of our study participants respectively. Measurement of individuals was taken without shoes and wearing light clothes using the techniques of Martin and Saller (Martin and Saller, 1957). Height and weight were measured to the nearest 1 cm

and 0.1 kg, respectively, and body mass index (BMI) was calculated using the formula, BMI = weight (kg)/{height (m)}^{2}. BMI was classified into three classes: (i) underweight (18.5 kg/m^2<BMI), (ii) normal weight (18.5≤BMI<25kg/m^2) and (iii) overweight (BMI≥25kg/m^2) (Islam et al., 2019). In addition, mothers' age was calculated by the difference between the date of interview and their date of birth, and we considered the nearest higher integer.

Outcome variable: Early initiation of breastfeeding (EIBF) was the outcome variable in this study. It was measured by a question, "Did you provide your breast milk to your newborn within one hour after delivered? The outcome of the variable was two categories; (i) Yes (early initiation); code 1, and (ii) No (late initiation); code 0.

Independent variables: Some socio-economic, demographic and anthropometric factors were considered as independent variables for this study on the basis of previous studies (Islam et al., 2019; Pamarthi and Palli, 2019; Borah et al., 2019). All selected variables, their categories with codes were as follows, mode of delivery (Caesarean 1, Vaginal 2), place of delivery (Home 1, Public 2, Private 3), monthly family income (Taka) (<15000 1, 15000-25000 2, >25000 3), mothers and their husbands' education level (Uneducated or primary 1, Secondary 2, Higher 3), mothers' age (year) (15-19 1, 20-24 2, 25-29 3, 30-34 4, 35 and above 5), age at first birth (year) (<20 1, ≥20 2), mothers' nutritional status (Underweight 1, Normal weight 2, overweight 3), type of family (Nuclear 1, Joint 2), type of residence (Urban 1, Rural 2), gender of infants (Boy 1, Girl 2). We followed a previous Bangladeshi study to categorize the independent variable (Islam et al., 2019).

Statistical analysis: Frequency distribution (percentage) was used to determine the prevalence of EIBF. Chi-square test and binary multivariable logistic regression analysis was used to find the association of selected independent factors and EIBF. The magnitude of the standard error (SE) was utilized for detecting the multicollinearity problem among the independent variables, if the magnitude of the SE lies between 0.001 and 0.5; it was judged that there was no evidence of multicollinearity (Chan,2004). A value of $p<0.05$ was considered statistically significant in the analysis. All statistical analyses were performed using SPSS (IBM Version 21).

Ethics approval and consent to participate: We followed all rules and regulations of Institute of Biological Science (IBSc), University of Rajshahi, Bangladesh, and IBSc approved this study and provided an ethical clearance letter (Memo No: 69/320/IAMEBBC/IBSc). Written consent was taken from each participant. The information was kept in confidential. The consent was taken from the husband or guardian for participants under 16 years old.

RESULTS

We found that 88.40% of mothers provided their breast milk to their newborns within one hour after delivery (Table 1). Out of 421 samples, 7.6% and 11.2% mothers were uneducated and higher educated respectively while 7.8% of their husbands were uneducated and 14.7% got higher education. Most of the mothers (98.57%) were housewives. More than 68% of mothers were living in low-income families (below15000 Taka) and 71% in rural area. Around 50% mothers' age at first birth was below 20 years, and 25.7% mothers were underweight. 42% of mothers delivered their infant by C-section, and 47.5% delivered their infant in public hospitals. More than the 83% of the mothers planned for pregnancy, about 95% took advice during pregnancy regarding the benefit of breastfeeding from health providers and 75% received postnatal care services (Table 1). Chi-square test provided that mothers' and their husbands' education level, mothers' and their husbands' occupation, monthly family income, type of residence, mothers' age, mothers' BMI, respondents' age at first birth, mode of delivery, place of delivery, planned pregnancy and taking advice regarding the benefit of breastfeeding during pregnancy were significantly associated factors of initial breastfeeding. These factors were considered as independent variables in multivariable binary logistic regression models (Table 1).

Table 1: Association between early initial breastfeeding and socio-economic, demographic and anthropometric factors

| Variable | Group, N(%) | Early initiation of breastfeeding status | | Chi-square/ Fisher's exact value | p-value |
		No (11.60%), N(%)	Yes (88.40%), N(%)		
Mothers' educational level	Uneducated, 32(7.60)			53.336	p<0.001
		2(6.20)	30(93.80)		
	Primary, 169(40.14)	26(15.4)	143(84.6)		
	Secondary, 173(41.09)	56(32.4)	117(67.6)		
	Higher, 47(11.17)	30(63.8)	17(36.2)		
Husbands' educational level	Uneducated, 33(7.8)			74.013	p<0.001
		2(6.1)	31(93.9)		
	Primary, 167(39.7)	25(15.0)	142(85.0)		
	Secondary, 159(37.8)	44(27.7)	115(72.3)		

Variable	Group, N(%)	Early initiation of breastfeeding status		Chi-square/ Fisher's exact value	p-value
		No (11.60%), N(%)	Yes (88.40%), N(%)		
Mothers' occupation	Higher, 62(14.7)	42(68.9)	19(31.1)	8.709	0.023
	House wife, 415(98.57)	46(11.1)	369(88.9)		
	Others, 6(1.43)	3(50.0)	3(50.0)		
Husbands' occupation	Farmer, 235(55.82)	5(2.1)	230(97.9)	46.789	p<0.001
Monthly family income (Taka)				85.918	p<0.001
	<15000, 287(68.2)	6(2.1)	280(97.9)		
	15000-25000, 58(13.8)	14(24.1)	44(75.9)		
	>25000, 76(18.0)	29(38.2)	47(61.8)		
Type of residence	Urban, 122(28.98)	49(40.2)	73(59.8)	135.908	p<0.001
	Rural, 299(71.02)	0(0)	299(100)		
Mothers' age (year)	15-19, 17(4.04)	9(52.9)	8(47.1)	42.936	p<0.001
	20-24, 181(42.99)	11(6.1)	170(93.9)		
	25-29, 153(36.34)	20(13.1)	133(86.9)		
	30-34, 51(12.11)	3(5.9)	48(94.1)		
	35 and above, 19(4.52)	6(31.6)	13(68.4)		
Mothers' BMI	Underweight, 08(25.7)	1(0.9)	107(99.1)	28.629	p<0.001
	Normal weight, 85(67.7)	38(13.3)	247(86.7)		
	Overweight, 28(6.6)	10(35.7)	18(64.3)		
Age at first birth (year)	<20, 199(47.3)	14(7.0)	185(93.0)	7.777	0.005
	≥20, 222(52.7)	35(15.8)	187(84.2)		
Type of family	Nuclear, 346(82.19)	36(10.4)	310(89.6)	2.877	0.090
	Joint, 75(17.81)	13(17.3)	62(82.7)		
Gender of infants	Boy, 212(50.36)	21(9.9)	191(90.1)	1.248	0.264
	Girl, 209(49.64)	28(13.4)	181(86.6)		
	Others, 186(44.18)	44(23.7)	142(76.3)		
Number of children	One, 233 (55.34)	22(9.4)	211(90.6)	2.449	0.118
	More than one, 188(44.66)	27(14.4)	161(85.6)		

Variable	Group, N(%)	Early initiation of breastfeeding status		Chi-square/ Fisher's exact value	p-value
		No (11.60%), N(%)	Yes (88.40%), N(%)		
Mode of delivery	Cesarean, 177(42)	33(18.6)	144(81.4)	14.572	p<0.001
	Vaginal, 244(58)	16(6.6)	228(93.4)		
Place of delivery	Home, 45(10.7)	1(2.2)	44(97.8)	31.936	p<0.001
	Public, 200(47.5)	9(4.5)	191(95.5)		
	Private, 176(41.8)	39(22.2)	137(77.8)		
Planned pregnancy	Yes, 352(83.60)	37(10.5)	315(89.5)	2.655	p<0.0001
	No, 69(16.40)	12(17.4)	57(82.6)		
Taking advice during pregnancy	Yes, 399 (94.77)	39(9.8)	360(90.2)	25.810	p<0.0001
	No, 22(5.23)	10(45.5)	12(54.5)		
Postnatal care	Yes, 317(75.48)	287(90.54)	30(9.46)	3.890	0.356
	No, 103(24.52)	85(82.52)	18(17.48)		

Standard error (SE) showed that there was no evidence of multicollinearity problem among independent variables except the type of residence due to all rural mothers provided EIFB. Following adjustment for other variables, the logistic model demonstrated that educated mothers were likely to decrease the odds of EIBF by 76% (AOR=0.076, 95% CI: 0.009 -0.613; p<0.05) compared to uneducated mother's. Similarly, women whose husbands were educated had 95.2% decreased odds of EIBF (AOR=0.048, 95% CI: 0.006 -0.376; p<0.05) compared to uneducated husbands' wives. Women having a farmer husbands had a 13.568-fold higher chance to provide EIBF to their newborns (AOR=13.568, 95% CI: 5.237-35.154; p<0.01) than others professional husbands' wives. The odds of EIBF was decreased by 90.3% and 87.0% among mothers who were living in middle-income families (AOR=0.097, 95% CI: 0.030 -0.315; p<0.01) and rich families (AOR=0.130, 95% CI: 0.039-0.437; p<0.01) compared to mothers living in poor income families respectively. It was also found that the odds of EIBF was 7.133, 3.069 and 7.385 fold higher among mothers aged 20-24 years (AOR=7.133, 95% CI: 2.273-22.381; p<0.01), 25-29 years [AOR=3.069, 95% CI: 1.047-8.997; p<0.05), 30-34 years (AOR=7.385, 95% CI: 1.623-33.607; p<0.01) than mothers aged 35 years and above. It

was observed that the odds of EIBF was diminished by 89.2% and 92.8% among normal weight (AOR=0.108, 95% CI: 0.013-0.867; $p<0.05$) and overweight mothers (AOR=0.072, 95% CI: 0.008-0.692; $p<0.05$) compared to underweight mothers. It was found that caesarean delivery and delivery in private hospitals associated with 31% and 90 % decreased in the odds of EIBF respectively (AOR=0.090, 95% CI: 0.010-0.794; $p<0.05$). Planed pregnancy had 5.941 fold higher to provide EIBF (AOR=5.941, 95% CI: 2.237-15.780; $p<0.01$) than those who did not do it. Mothers who took advice regarding the benefit of breastfeeding during their pregnancy had 7.502 times (AOR=7.502, 95% CI: 2.877-19.559; $p<0.01$) higher to provide EIBF than mothers who did not get it. Hosmer and Lemeshow test demonstrated that our selected model was well fitted, and the model was able to explain the variation of outcome variable by 57.50% (Nagelkerke R^2- value =0.575) (Table 2).

Table 2: Effect of socio-economic and demographic factors on initial breastfeeding among mothers in Rajshahi district, Bangladesh

Variable with groups	B	SE	Wald	p-value	AOR	95% CI for AOR	
						Lower	Upper
Mothers, education level			21.204	0.001			
Primary Vs Uneducated[R]	-0.556	1.072	0.269	0.604	0.573	0.070	4.690
Secondary Vs Uneducated[R]	-1.656	1.039	2.540	0.111	0.191	0.025	1.463
Higher VsUneducated[R]	-2.577	1.065	5.854	0.016	0.076	0.009	0.613
Husbands' education level			43.556	0.001			
Primary VsUneducated[R]	-0.336	1.086	0.096	0.757	0.714	0.085	6.007
Secondary VsUneducated[R]	-1.275	1.049	1.478	0.224	0.279	0.036	2.183
Higher VsUneducated[R]	-3.033	1.049	8.363	0.004	0.048	0.006	0.376
Mothers' occupation, (House wife VsOthers[R])	1.221	.836	2.135	0.144	3.390	0.659	17.438
Husbands' occupation, Farmer VsOthers[R]	2.608	0.486	28.823	$p<0.001$	13.568	5.237	35.154
Monthly family income (Taka)			16.443	0.001			
15000-25000 Vs ≤15000[R]	-2.340	0.600	15.074	0.000	0.097	0.030	0.315
≥25000 Vs ≤15000[R]	-2.042	0.620	10.864	0.001	0.130	0.039	0.437
Mothers' age (year)			31.742	$p<0.001$			
15-19 Vs 35 and above[R]	-0.891	0.693	1.655	0.198	0.410	0.106	1.594
20-24 Vs 35 and above[R]	1.975	0.583	11.342	$p<0.001$	7.133	2.273	22.381
25-29 Vs 35 and above[R]	1.121	0.549	4.177	0.041	3.069	1.047	8.997
30-34 Vs 35 and above[R]	1.999	0.773	6.688	0.010	7.385	1.623	33.607
Mothers' BMI			5.208	0.044			

Variable with groups	B	SE	Wald	p-value	AOR	95% CI for AOR	
						Lower	Upper
Normal Vs Under weight[R]	-2.227	1.064	4.381	0.036	0.108	0.013	0.867
Overweight VsUnderweight[R]	-2.630	1.154	5.193	0.023	0.072	0.008	0.692
Mothers' age at first birth (year) (>20 Vs $\geq 20^R$)	0.262	0.448	0.341	0.559	1.299	0.540	3.125
Mode of delivery (Caesarean VsVaginal[R])	-1.183	0.323	13.451	0.001	0.306	0.163	0.576
Place of delivery			10.031	0.007			
Public Hospital Vs Home[R]	-1.024	1.126	0.827	0.363	0.359	0.040	3.263
Private Hospital VsHome[R]	-2.405	1.109	4.698	0.030	0.090	0.010	0.794
Planned pregnancy, Yes VsNo[R]	1.782	0.498	12.780	p<0.001	5.941	2.237	15.780
Taking advice during pregnancy, Yes Vs No[R]	2.015	0.489	16.986	p<0.001	7.502	2.877	19.559
Constant	7.601	1.548	24.110	p<0.001	2000.883		
	Nagelkerke R^2- value =0.575						
Hosmer and Lemeshow Test	Chi-sauare value=5.568 p-value=0.696						

N.B: R=Reference Category, B=Co-efficient, SE=Standard Error, AOR=Adjusted Odds ratio, CI=Confidence Interval

DISCUSSION

Our study found that the prevalence of EIBF among mothers living in Rajshahi district was 88.40%. BDHS 2017-2018 showed that 60% of infants were breastfeed within one hour after birth (NIPORT, 2020) which was markedly higher than that found in BDHS-2014 (NIPORT, 2020). BDHS-2014 found that 98% of infants born during the two years of their survey were breastfed at some point in their life in Bangladesh where breastfeeding was almost universal (NIPORT, 2014). The rate of breastfeeding for every stage has been increasing with increasing medical facilities in Bangladesh. Mothers can easily get advice about the benefit of breastfeeding from health providers and family planning workers. Also, the practice of providing EIBF was increasing with increasing literacy rate among women which enhanced the awareness regarding the benefit of EIBF especially among rural women in Bangladesh (NIPORT, 2014). BDHS-2014 conducted its survey about 6 years ago; some indicators such as mother education level, medical facilities, and household wealth quintile have continued to increase during the last two decades in Bangladesh which is ultimately helping to increase the rate of EIBF. The prevalence of early initiation of breastfeeding in some South Asian countries like India (42.0 %) (Aguayo et al., 2016), Pakistan (18.0 %) (UNICEF, 2018), Nepal (41.8) (Bhandari et al., 2019), Afghanistan (41.0%) (UNICEF, 2018), and others developing countries like Nigeria (34.7%) (Berde and Yalcin, 2016), Iran (32.2%) (Zarshenas et al., 2019) and South Sudan (48%) (Tongun et al., 2018). Most of the studies used nationally representative samples. One of the regional study was done in Ethiopia (Beyene et al., 2016) showed that the prevalence of EIBF among mothers in Dale Woreda 83.7% which was close to our finding.

We found that mothers who delivered at home were more likely to provide EIBF to their newborns than the mothers who delivered at private hospitals. It was reported in national survey of Bangladesh that all home delivered mothers were vaginal delivery while a remarkable number of mothers underwent C-section who delivered at hospital/clinic (NIPORT, 2020). Mothers undergoing vaginal delivery were more likely to provide EIBF to their newborns than mothers having cesarean delivery (Islam et al., 2019). The present finding coincided with a Chinese study (Wu et al., 2018). It was noted that mothers living in poor-income families were more interested to provide initial breast milk to their newborns than those of middle- and high-income families, and the rate of EIBF was decreasing with increasing family income. The same results had been found in another Bangladeshi study that used BDHS-2014 data (Islam et al., 2019).

This study found that uneducated mothers had more chance to give initial breast milk to their newborns than higher educated mothers. Same results had been found in another Bangladeshi study that used BDHS-2014 data (Islam et al., 2019). Similarly, we found that uneducated husbands' wives were more likely to provide their breast milk to their newborns than higher educated husbands' wives. Sharma et al. (2016) disagreed with our present findings. They reported that wives having husbands with some schooling were more likely to provide their breast milk to their newborns than the wives having husbands with no schooling. This discrepancy may happen due to the category of husband's educational level.

The BMI of mothers was an important predictor of initial breastfeeding, and it was observed that underweight mothers were more likely to provide their breast milk to their newborns than normal weight and overweight mothers. A similar observation was also mentioned by several studies (Wu et al., 2018; Kiani et al., 2018; Krause et al., 2011; Liu et al., 2010; Baker et al., 2007). This study found that mothers aged 20-34 years were more likely to provide EIBF to their infants than mothers aged 35 years and above.In 2015, almost similar result was found from a study in Nepal. They reported that infants who were born to mothers of older age *i.e.*, 30–45 years were less likely to be breastfed within one hour of birth (Khanal et al., 2015). Again, in this study, it was found that husbands' occupation is an important factor for EIBF, i.e. farmers' wives had a higher chance to give EIBF to their infants than other professional husbands' wives. Recently, Hassan et al. (2018) found that employed husbands' wives had a higher chance to give EIBF to their infants than unemployed husbands' wives.

In this study, we have found that, husbands' education level, family income, mothers' BMI and place of delivery are important factors for providing initial breast milk to newborn among mothers in Rajshahi district. These four factors are very much related to each other in developing countries like Bangladesh. Most of the home delivered mothers are living in poor families. In Bangladesh, the wife is dominated by her husband, and most of the females are dependent on their husbands' income, and income is dependent on education level. Usually, uneducated or primary educated husbands are farmers or day labors living in rural or slum areas, their income is not sufficient to maintain their family. Therefore, they cannot provide sufficient food to their family members, consequently, they become underweight. Mothers living in poor families cannot go to hospitals/clinics for delivery, and most of them deliver at home in the presence of their close relatives without proper nursing. Traditional customs and culture in the society of

Bangladesh are that, after delivery, the mother immediately provides her breast milk to the newborn, especially for mothers having vaginal delivery. It is also mentionable that all home deliveries are vaginal. On the other hand, mothers living in middle or rich families usually deliver at hospitals/clinics under proper nursing. But now a days most of the hospital/clinic deliveries are caesarian, and after the delivery, mothers stay at the operation theatre for more than one hour, and cannot provide breast milk to them in time (within one hour of delivery). Normal weight and overweight mothers usually live in rich families, and most of them underwent caesarean section. It might create a higher risk of cephalo-pelvic disproportion and relatively poor progress due to maternal fatigue (Yu et al., 2013). This is one of the most important reasons for the differences seen in the practice of EIBF between underweight and overweight   mothers. Normal weight and overweight mothers should be the focus of education on the potential benefits of EIBF. We found that mothers getting pregnant with proper planning and taking advice regarding the benefit of EIBF were more likely to provide EIBF than their counterparts. Family planning workers closely working with pregnant mothers and healthcare providers can play a good role to increase the rate of EIBF and exclusive breastfeeding in Bangladesh.

The predictors of EIBF were: husbands' education level and occupation, monthly family income, mothers' age, mothers' BMI, place of delivery, planed pregnancy and taking advice regarding the benefit of EIBF. These findings would help the health authorities of Bangladesh government and non-government organizations working with mothers and infant's health and nutrition for improving their strategies to increase the rate of EIBF.

Strength and limitations of this study: This was the first time we considered two new factors; (i) getting pregnant with planning and (ii) mothers taking advice regarding the benefit of breastfeeding during their pregnancy for Bangladeshi EIBF study. However, there are several limitations of our present project. Firstly, we considered only Rajshahi district as which is a small part of Bangladesh. Secondly, we used a quantitative study which cannot possible to do research in-depth. Thirdly, some important factors such as parity, gestational age at delivery, maternal obstetric complications, and newborn status were not considered. Finally, mothers were asked about providing EIBF using recall bias method. We may proclaim that further researches are required on breastfeeding among Bangladeshi mothers.

REFERENCES

Aguayo VM, Gupta G, Singh G, Kumar R 2016. Early initiation of breast feeding on the rise in India. BMJ Global Health, 1(2):e000043. doi: 10.1136/bmjgh-2016-000043.

Baker JL, Michaelsen KF, Sørensen TI, Rasmussen KM 2007. High prepregnant body mass index is associated with early termination of full and any breastfeeding in Danish women. *American Journal* of *Clinical Nutrition*, 86: 404–411.

Berde AS, Yalcin SS 2016. Determinants of early initiation of breastfeeding in Nigeria: a population-based study using the 2013 demographic and health survey data. BMC Pregnancy Childbirth, 2016; 16:32.

Berde AS, Yalcin SS 2016. Determinants of early initiation of breastfeeding in Nigeria: a population-based study using the 2013 demographic and health survey data. BMC Pregnancy Child birth, 16(32). doi: 10.1186/s12884-016-0818-y.

Beyene MG, Geda NR, Habtewold TD, Assen ZM 2016. Early initiation of breastfeeding among mothers of children under the age of 24 months in Southern Ethiopia. *International Breastfeeding Journal,* 12 (1). doi: 10.1186/s13006-016-0096-3.

Bhandari S, Thorne-Lyman AL, Shrestha B, Neupane S, Nonyane BAS, Manohar S, Klemm RDW, West KP Jr 2019. Determinants of infant breastfeeding practices in Nepal: a national study. *International Breastfeeding Journal,*14:14. doi: 10.1186/s13006-019-0208-y.

Borah M, Baruah J, Baruah R, Baruah M 2019. Prevalence and factors affecting early initiation of breastfeeding in rural areas of Dibrugarh district, Assam. *InternationalJournal* of *Community Medicine* and *Public Health,* 6:2176-81.

Bruno Tongun J, Sebit MB, Mukunya D, Ndeezi G, Nankabirwa V, Tylleskar T, Tumwine JK 2018. Factors associated with delayed initiation of breastfeeding: a cross-sectional study in South Sudan. *International Breastfeeding Journal*, 13:28. doi: 10.1186/s13006-018-0170-0.

Chan YH 2004. Biostatistics 202: logistic regression analysis. Singapore Medical Journal, 45(4):149-53.

Cochran WG 1963. Sampling Techniques. 2nd Ed., New York: John Wiley and Sons, Inc.

Elahi KM 2016. (Book Chapter) Climate Change and Health Impacts in Bangladesh. Climate Change and Human Health Scenario in South and Southeast Asia, 2016.ISBN : 978-3-319-23683-4.

Hassan AA, Taha Z, Ahmed MA, Ali AA, Adam I 2018. Assessment of initiation of breastfeeding practice in Kassala, Eastern Sudan: a community-based study. International breastfeeding journal, 2018; 13(1):34.

Islam MA, Mamun A, Hossain MM, Bharati P, Saw A, Lestrel PE, Hossain MG 2019. Prevalence and factors associated with early initiation of breastfeeding among Bangladeshi mothers: A nationwide cross-sectional study. PLoS One, 14(4):e0215733. doi: 10.1371/journal.pone.0215733.

Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS 2003. How many child deaths can we prevent this year? The Lancet, 362(9377):65-71.

Khanal V, Scott JA, Lee AH, Karkee R, Binns CW 2015. Factors associated with Early Initiation of Breastfeeding in Western Nepal. *International Journal of Environmental Research* and *Public Health, 12*: 9562-9574.

Kiani SN, Rich KM, Herkert D, Safon C, Pérez-Escamilla R 2018. Delivery mode and breastfeeding outcomes among new mothers in Nicaragua. Maternal and child nutrition,14(1):e12474. https://doi.org/10.1111/mcn.12474.

Krause KM, Lovelady CA, Østbye T 2011. Predictors of Breastfeeding in Overweight and Obese Women: Data From Active Mothers Postpartum (AMP). *Maternal* and *Child Health Journal* ,15(3):367-375.

Liu J, Smith MG, Dobre MA, Ferguson JE 2010. Maternal obesity and breast-feeding practices among white and black women. Obesity, 18:175–182.

Martin R, Saller K 1957. Lehrbuch der anthropologie. Gustav Fischer Verlag, Stuttgart.

NIPORT 2014. National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International. Bangladesh Demographic and Health Survey 2014: Dhaka, Bangladesh, and Rockville, Maryland, Mitra and Associates, and ICF International.

NIPORT 2020.National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International. Bangladesh Demographic and Health Survey 2017-

2018: Dhaka, Bangladesh, and Rockville, Maryland, Mitra and Associates, and ICF International.

Pamarthi K, Palli JK 2019. Factors influencing early initiation of breast feeding among mothers in North Coastal Andhra Pradesh, India. *International Journal* of *Community Medicine* and *Public Health,* 6:4316-21.

Rahman, MM 2012. Rajshahi District. Islam, S, Ahmed AJ. (eds.). Banglapedia: National Encyclopedia of Bangladesh (Second ed.). Asiatic Society of Bangladesh.

Sharma A, Thakur PS, Tiwari R, Kasar PK, Sharma R, Kabirpanthi V. Factors associated with early initiation of breastfeeding among mothers of tribal area of Madhya Pradesh, India: a community based cross sectional study. Int J Community Med Public Heal. 2016; 3: 194–9.

Sharma IK, Byrne A 2016. Early initiation of breastfeeding: a systematic literature review of factors and barriers in South Asia. *International Breastfeeding Journal*, 11:17. doi: 10.1186/s13006-016-0076-7.

Tapa BR 2005. Health factors in colostrum. Indian Journal of Pediatric, 72(7):579–581.

UNICEF 2016. From the First Hour of Life: Making the Case for Improved Infant and Young Child Feeding Everywhere. UNICEF: New York.

UNICEF 2018.Every Child Alive.The Urgent Need to End Newborn Deaths. UNICEF: New York.

United Nations Children's Fund 2006. 1990–2005: Celebrating the Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding: Past Achievements, Present Challenges and Priority Actions for Infant and Young Child Feeding, 2nd ed. UNICEF Innocenti Research Centre, Florence, Italy.

WHO 2014. World Health Organization e-Library of Evidence for Nutrition Actions (eLENA), Early Initiation of Breastfeeding.

Wu Y, Wang Y, Huang J, Zhang Z, Wang J, Zhou L 2018. The association between caesarean delivery and the initiation and duration of breastfeeding: a prospective cohort study in China. European Journal of Clinical Nutrition, 72:1644–1654.

Yu Z, Han S, Zhu J, Sun X, Ji C, Guo X 2013. Pre-Pregnancy Body Mass Index in Relation to Infant Birth Weight and Offspring Overweight/Obesity: A Systematic Review and Meta-Analysis. PLoS One, 8(4):e61627. doi: 10.1371/journal.pone.0061627.

Zarshenas M, Zhao Y, Binns CW, Scott JA 2019. Determinants of in-hospital feeding practices in Shiraz, Iran: Results of a prospective cohort study. Birth, 46(1):137-145.

234