

## Characteristics of Mothers who Born Low Birth Weight Newborn in Bangladesh

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### Abstract

**Background and Objective:** In Bangladesh, at least 22.6% of babies are born with less than 2500 grams that is the highest incidence in Asia. The purpose of the study was to examine the characteristics of mothers who had low birth weight babies.

**Methods:** A descriptive cross-sectional study design was conducted. Using G\*power analysis the total 108 postnatal mothers were recruited conveniently. However, the final 91 participants were used to analyze the data. Three sets of questionnaire including (1) socio-demographic characteristics, (2) maternal pregnancy related characteristics, and (3) newborn birth weight <2500 grams were used to collect the data. Content validity of the instruments was done by the experts. This study was approved from the Institutional Review Board, NIANER. Informed consent was obtained from each participant prior to the study. Both descriptive and inferential analysis was performed to determine the characteristics of mothers who had low birth weight babies.

**Results:** The mean age of mother was 25.71±6.21 years. The average birth weight of low birth weight babies was 1967.03±339.95 grams ranging from 1100-2400grams. Among the socio-demographic and maternal pregnancy related characteristics, a significant association was found between those factors including maternal age, education, anemia, number of antenatal care visit, maintain personal hygiene, period of amenorrhea (PoA), and low birth weight of newborn. Multiple regression analysis revealed that maternal education, period of amenorrhea, maintain personal hygiene, and number of antenatal care visit together explained that there was 27% of the variance in the low birth weight of newborn ( $R^2=.273$ ,  $F(4, 86) = 8.055$ ,  $p < 0.001$ ).

**Conclusion:** The findings of this study provided information that could be used in a further intervention study to evaluate the effect of intervention on maternal and child health outcomes.

**Keywords:** Low Birth Weight; Newborn; Mothers

### Introduction

Low birth weight (LBW) has been defined as birth weight < 2500 grams (2.5kg) at the time of birth [1], predicts normal growth during infancy and childhood [2]. Globally, more than 20 million infants are born with low birth weight [3], and more than 95 % of are born in developing countries [4]. The rate of low birth weight in Bangladesh is 33 per 1000 live births [5]. National low birth weight survey reported that about 22.6% low birth weight in Bangladesh [6]. LBW is the most important cause of infant mortality in the past 2 decades [7].

The infant mortality rate is about 20 times higher for all low birth weight babies than other babies [8]. Moreover, LBW is a higher risk of morbidity and disability during early life and infancy [9]. It has

been established that low birth weight infants are at increased risk for certain diseases such as cardiovascular and metabolic disease in adulthood [10]. Low birth weight is an important indicator in determining child survival, future physical growth, and mental development [11]. Therefore, LBW is one of the most serious challenges for mothers and child health.

LBW babies are linked to maternal socio-demographic characteristics and health status of mothers [12]. Maternal characteristics have been variously shown to impact on the birth weight [13], such as maternal socio-demographic characteristics and medical conditions including maternal age, education, income, heavy

work, nutritional status, multiple pregnancies, anemia, placenta previa, gestational age  $\leq 37$  weeks, and parity  $\geq 2$  are strongly associated with low birth weight [14-16].

There is a considerable works done on this topic in others area of developing countries. The majority of previous studies have primarily focused on the rates and predictors of impaired outcomes. In addition, limited evidence has shown that maternal characteristics such as postnatal depression and maternal eating habits influence infant weight gain [17]. A little research related to examine the relationship between characteristics of mothers and low birth weight of babies in Bangladesh. That is why it is important to study this phenomenon. Eventually, this may help to decrease the incidence of low birth weight and improve mothers and newborn health and achieve the Sustainable Development Goals (SDGs).

## Methods

### Study Design

The present cross-sectional study was undertaken at Dhaka Medical College Hospital (DMCH) situated in the central Dhaka. As the biggest and tertiary hospital, the majority of the mothers come to receive postnatal care.

### Participants and Sampling

The participants of the study were the postpartum mothers admitted in the DMCH. The sample size for the study was calculated using G\*power analysis for multiple regression at the level of significance ( $\alpha$ ) .05, power .80, and a medium effect size  $f^2=0.15$  [18]. It was suggested that 86 participants were required for the study. By considering the rate of elimination 20%, the number of total participants was 108 postpartum mothers. The participants of this study were selected using convenient sampling technique. The inclusion criteria were mothers who delivered babies with birth weight less than 2500 grams at post natal ward in the selected hospital.

A total of 108 neonate/mother pairs participated in the study constituting a response rate of 84%. A total of 17 clients were excluded due to having delivered more than 2500 grams of baby's birth weight.

### Instruments

#### Data were collected by using three questionnaires:

- (1) The Socio-demographic Characteristics and
- (2) Maternal Pregnancy related Characteristics,
- (3) Newborn Birth Weight  $<2500$  grams.

**The Socio-demographic Characteristics:** The socio-demographic characteristics questionnaire was developed by the researchers based on the literature reviewed. The socio-demographic characteristics consisted 8 items including mothers' age, living place, religion, educational level, occupation, monthly family income, and type of family and newborn birth weight.

**Maternal Pregnancy related Characteristics:** Maternal pregnancy related characteristics were developed by the researchers based on the literature reviewed. It consisted maternal anemia, number of received antenatal care visit, iron and vitamin supplementation, smoking or chewing, maintain personal hygiene, proper water supplementation, and proper sanitation, parity, previous low birth weight of babies, previous miscarriages, period of amenorrhea (POA) at delivery, multiple pregnancies, inter pregnancy interval, medical conditions during pregnancy.

**Newborn Birth Weight:** Newborn birth weight  $<2500$  grams was collected from the postpartum mothers' record file.

The content validity of the instruments was confirmed by referring to the standard literature and by the three experts (PhD holder nursing faculties) from NIANER and Obstetric & Gynecologist.

### Data Collection

This study was conducted from September to December 2018 at inpatients department for child birth care delivery. This study was approved from the institutional review board (IRB) (Exp.NIA-F-2018-8), NIANER, Dhaka. After getting permission from the Directors, Dhaka Medical College Hospital, the researcher met with the nurse incharge (Head Nurse) of the selected ward and the participants. After getting written consent form the participants the researchers asked to provide answers in accordance with the questions being asked. All mothers' received sufficient information about the purpose of the study, the methods, and data collection procedure. Mothers were informed that they had the right to withdraw from the study at any time. Moreover, mothers were assured that their refusal to participate or withdrawal from the study would not affect the care provided to their children. All participants were received small gifts as an acknowledgement of their participations. The interview time was 30-40 minutes.

### Data Analysis

Descriptive statistics were used to analyze the characteristics of the postpartum mothers. Continuous variables were presented as mean and standard deviations (SD), and categorical data were presented based on frequency and percentage. T-test, ANOVAs, Pearson's product moment correlation coefficients, and multiple regression analysis were used to identify the characteristics of mothers who had low birth weight of babies.

## Results

### Socio-demographic and Pregnancy related Characteristics of the Mothers who had Low Birth Weight of Babies

Table 1 summarizes the socio-demographic characteristics of mothers who had low birth weight of babies. The mean age of mothers was  $25.71 \pm 6.21$  years. Most of the mothers (81.3%) were below 30 years of old. Majority of mothers (60.4%) were lived at urban area. Around seventy nine percent of mothers (78.7%) had below secondary education. Almost all of them (97.2%) were Muslim. A large number of mothers (93.5%) had no paid employment. The average monthly family income of mothers was  $15670.33 \pm 8948.07$  taka. The mean birth weight of babies was  $1967.03 \pm 339.95$  grams ranging from 1100-2400gms.

**Table 1.** Distribution of general characteristics of mothers who had low birth weight of newborn (N =91)

Characteristics	Categories	n	%	M±SD
Age(years)	18-25 years	47	51.6	25.71±6.21 (min=18, max=40)
	26- 30 years	27	29.7	
	≥ 30 years	17	18.7	
Living place	Urban	55	60.4	
	Rural	36	39.6	
Religion	Muslim	88	96.7	
	Non-Muslim	3	3.3	
Education level	Illiterate	9	9.9	
	≤ secondary	26	28.6	
	≥ secondary	56	61.5	
Employment status	Employed	5	5.5	
	Housewife	86	94.5	
Monthly family income (TK)				15670.33±8948.07 (min=5,000, max=50,000)
	≤ 15000	45	49.5	
	15000+	46	50.5	
Type of family	Nuclear family	48	52.7	
	Joint family	43	47.3	
Birth weight (gm)				1967.03±339.95 (min=1100, max=2400)

Table 2 summarizes the maternal pregnancy related characteristics of mothers who had low birth weight of babies. Above half of the mothers (58.2%) had no anemia. Majority of them (73.6) received antenatal care visits more than two times. Around seventy two percent of mothers (71.4%) took iron and vitamin supplementation during antenatal period. Most of the mothers (95.6%) did not smoke. Almost all of them (98.9%) had maintained personal hygiene. More than half

of them (54.1%) were multiparous mothers. Almost all of them (89%) had no multiple pregnancies. Around fifty three percent of mothers' (52.7%) period of amenorrhea at delivery (POA) had <37 weeks. About half of the mothers' (51.6%) inter pregnancy interval were >2 years. Around half of mothers (52.7%) had medical problems.

**Table 2.** Distribution of maternal pregnancy related characteristics (N=91)

Characteristics	Categories	n	%	Characteristics	Categories	n	%
Maternal anemia	Yes	38	41.8	Parity	Primipara	41	45.1
	No	53	58.2		Multiparous	50	54.9
Number of antenatal visit	≤ 2visits	24	26.4	Previous LBW babies	Yes	14	15.4
	≥ 2 visits	67	73.6		No	77	84.6
Iron and vitamin supplementation	Yes	65	71.4	Multiple pregnancies	Yes	10	11
	No	26	28.6		No	81	89
Smoking or chewing	Yes	4	4.4	Previous miscarriages	Yes	21	23.1
	No	87	95.6		No	70	76.9
Maintain personal hygiene	Yes	90	98.9	Period of amenorrhea at delivery (PoA)	≤ 37 weeks	48	52.7
					37–40weeks	41	45.1
					≥ 40weeks	2	2.2
Proper water supply	Yes	86	94.5	Inter pregnancy interval	≤ 2 years	44	48.4
					≥ 2 years	47	51.6
Proper sanitation	Yes	86	94.5	Medical conditions/ problems	Yes	48	52.7
					No	5	5.5

### Differences in Maternal Socio-demographic Characteristics, Pregnancy related Characteristics, and Baby's Birth Weight

Table 3 showed the relationship between maternal characteristics and baby's low birth weight. The results of bivariate analysis indicated a significant association with maternal socio-demographic characteristics and maternal pregnancy related characteristics. There was a statistically significant difference between maternal age, education, and low birth weight of newborn. The mothers who were above 30 years old had higher trend of low birth weight of newborn ( $t=1.88$ ,  $p=0.04$ ). Illiterate mothers had greater tendency of low birth weight than those of literacy

mothers ( $t=.164$ ,  $p=0.01$ ). There was a significantly mean difference between maternal anemia and low birth weight. Anemic mothers had higher trend of low birth weight ( $t=-3.181$ ,  $p=0.002$ ). A statistically significant association was found between mothers who received antenatal visit than those of did not ( $t=-2.77$ ,  $p=0.009$ ). Mothers who maintained personal hygiene had greater tendency of increased birth weight of their babies which was statistically significant ( $t=2.006$ ,  $p=0.04$ ). There was a statistically significant difference between mothers who had multiple pregnancies than those of not ( $t=-3.032$ ,  $p=0.003$ ).

### Influencing Effects of Maternal Socio-demographic

**Table 3.** Relationship between maternal characteristics and baby's low birth weight (N =91)

Related Factors	Categories	Low Birth Weight (gm)			Related Factors	Categories	Low Birth Weight (gm)		
		M±SD	t/f/r/2	p			M±SD	t/f/r/2	p
<b>Maternal socio-demographic characteristics</b>									
Age in years	≤30years	1998.65±319.87	-0.107	0.31	Proper water supply	Yes	1981.40±328.10	1.689	0.09
	≥30years	1829.41±398.06	1.88	0.04		No	1720.±481.664		
Living place	Urban	2000.00±343.18	-1.145	0.25	Proper sanitation	Yes	1969.77±346.77	0.317	0.75
	Rural	1916.67±333.38				No	1920.00±204.93		
Religion	Muslim	1971.59±344.40	0.691	0.49	Parity	Primipara	1914.6±369.16	-1.337	0.18
	Non-Muslim	1833.33±115.47				Multiparous	2010.00±311.19		
Education level	Illiterate	1711.11±437.16	0.164	0.01	Previous LBW babies	Yes	1935.71±300.27	-0.373	0.71
	Literate	1995.12±318.52				No	1972.73±348.17		
Employment status	Housewife	1962.79±346.07	-0.492	0.62	Multiple pregnancies	Yes	1830.00±424.395	-1.357	0.18
	Employed	2040.00±219.90				No	1983.95±327.28		
Monthly income	≤ 15000 taka	1917.78±339.98	0.114	0.28	Previous miscarriages	Yes	1895.24±310.60	-1.105	0.27
	≥15000 taka	2015.22±336.63	-1.374	0.17		No	1988.57±347.47		
Type of family	Nuclear family	1958.33±338.55	-0.257	0.79	Period of Amenorrhea at delivery	≤37week	1875.00±326.49	-3.032	0.003
	Joint family	1978.74±344.92				≥37week	2080.49±309.20		
<b>Maternal pregnancy related characteristics</b>									
Maternal anemia	Yes	1839.47±358.33	-3.181	0.002	Inter pregnancy interval	≤ 2 years	1936.36±348.47	-0.831	0.41
	No	2058.49±297.06				≥ 2 years	1995.74±332.74		
Number of antenatal care visit	≤ 2visit	1783.33±406.11	-2.77	0.009	Medical condition/Problems during pregnancy	Yes	1965.38±312.41	-0.053	0.96
	≥ 2visit	2031.84±288.88				No	1969.23±377.77		
Iron and vitamin supplement	Yes	1990.77±344.02							
	No	1907.69±328.54							
Smoking or chewing	Yes	1950.00±173.20	-0.102	0.92					
	No	1967.82±346.24							
Maintain personal hygiene	Yes	1974.44±334.38	2.006	0.04					
	No	1300.00±00.00							

### Characteristics and Maternal Pregnancy related Characteristics on Baby's Low Birth Weight

After testing the assumption of regression analysis and it was found that all of the variables were acceptable, low birth weight of newborn was regressed on socio-demographic characteristics and maternal pregnancy related characteristics. Multiple regression analysis was performed to identify the main factors affecting including maternal socio-demographic characteristics, pregnancy related characteristics, and low birth weight of newborn. The model included the variables that had p-value less than 0.05 including maternal age, education, maternal anemia, period of amenorrhea (POA), maintain personal hygiene, number of antenatal care visit, and low birth weight of newborn. The results indicated that maternal

socio-demographic characteristics and maternal pregnancy related characteristics explained that there was 27% of the variance in the low birth weight of newborn ( $R^2=0.273$ ,  $F(4, 86)=8.055$ ,  $p<0.001$ ). It was found that number of antenatal care visit, maintain personal hygiene, period of amenorrhea (POA) at delivery, and maternal education independent and significant predictors of low birth weight of newborn. The regression coefficient of number of antenatal care visit was  $\beta=0.272$  ( $t=2.898$ ,  $p=0.005$ ), maintain personal hygiene  $\beta=-0.260$  ( $t=-2.809$ ,  $p=0.006$ ), Period of amenorrhea (POA)  $\beta=0.267$  ( $t=2.841$ ,  $p=0.006$ ), and Maternal education  $\beta=0.251$  ( $t=2.680$ ,  $p=0.009$ ) (Table 4).

**Table 4.** Factors related to baby's low birth weight (N=91)

Independent Variables	B	$\beta$	t(p)	R2	F(p)
Number of antenatal care visit	208.926	0.272	2.898 (0.005)	0.273	8.055 p<0.001)
Maintain personal hygiene	-843.633	-0.26	-2.809 (0.006)		
Period of amenorrhea (PoA)	166.413	0.267	2.841(0.006)		
Maternal education	284.195	0.251	2.680(0.009)		

Adjusted R Square=0.239

## Discussion

The general profile the sample comprised mothers with a mean age of 25.71 years and most of them were housewives comparable with the earlier studies [19,20]. The majority of mothers family income had less than the average income of Bangladeshi people (<15,988 BDT [21] which was found in the prior research [12].

In the bivariate analysis, among the socio-demographic and maternal pregnancy related characteristics, a significant association was found between those factors including maternal age, education, anemia, number of antenatal care visit, maintain personal hygiene, period of amenorrhea (PoA), and low birth weight of newborn. The findings of the study were agreement with those of many similar studies [12,14,16,20], After performing the hierarchical multiple regressions, number of antenatal care visit, maintain personal hygiene, period of amenorrhea (PoA) at delivery, and maternal education were independently and significantly predicted newborns low birth weight. Consistent with other studies [12,22,23]. Nonetheless, the other potential factors included in the study failed to be predicted with low birth weight of newborn which is comparable with the prior research [24].

### Maternal Education

The study results established that the newborn low birth weight was statistically significantly predicted by maternal education. It was found that newborn birth weight increases with higher maternal education [12], showed that mothers who had low level of education had higher tendency to LBW. Another study reported that mothers having low birth weight babies had no education [25]. On the other hand, the result of this study is incongruent with other studies showed that maternal education did not establish any significant association with the babies low birth weight [14,26].

### Number of Antenatal Care Visit

The number of antenatal care (ANC) visit had a strong influence on baby's low birth weight. Mothers with less than two antenatal care visits had almost two times higher risk of having a low birth weight of baby in comparison to mothers who had more than two antenatal care visits. Similar results have been reported in various studies [20,22,23,27], showed that proportion of LBW was maximum in mothers who received ANC less than 2 before birth. This result inconsistent with the study of [19], found that number of ANC visit did not show any significant relationship with LBW.

### Maintain Personal Hygiene

The results of this study showed that maintain personal hygiene significantly associated with low birth weight of newborn. Mothers who maintained personal hygiene 2.8 times more increases baby's birth weight.

### Period of Amenorrhea (PoA) at Delivery

Babies low birth weight was significantly influenced by period of amenorrhea (PoA) at delivery. Mothers whose period of amenorrhea at delivery had <37 weeks were more prone to deliver a low birth weight of newborn. This finding is inconsistent with the study of [16].

In the bivariate analysis showed there was a significant relationship between maternal age and low birth weight of newborn. Nevertheless, after applying multivariate analysis maternal age was found to be insignificant with the low birth weight is similar to the prior studies [14,28]. In the present study, maternal anemia did not showed any significant association with baby's low birth weight comparable with a study of [29]. Incongruent with another study showed that anemia contributed with high prevalence of LBW [16, 30]. Other studies reported that maternal hemoglobin status shows associated with the prevalence of LBW neonates [27,31].

The study experienced a number of limitations. Being a cross-sectional study, it was not possible to show seasonal variation in low birth weight of newborn. This study was conducted at one tertiary level hospital, and therefore it was not possible to generalize the results to a particular population as compared to population based studies. The instruments of the study were developed by the researchers based on the literature reviewed.

## Conclusion

The objective of the study was to identify the factors affecting low birth weight of newborn. It can be implicated in maternity care in nursing practice and used to enhance the current knowledge of health care providers especially through nursing and midwifery education. The results provide further scientific evidence that healthcare workers and public health professionals will be able to use for introducing intervention programs to increasing birth weight of infants in Bangladesh. Further study will be recommended by using the present instruments with the mothers who admitted at postpartum ward in diverse setting and culture.

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