Factors Related to Birth Weight in an Urban Maternity Centre of Bangladesh

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Introduction

Birth weight is a reliable index of intrauterine growth and a major factor determining survival, physical growth and mental development of a child. A relationship exists between the environment where the pregnant mothers live and the growth of the fetus.

Birth weight is a recognized factor that reflects maternal nutrition and the socio-economic status of the mother during the pre-pregnancy and gestational period in Bangldesh. A very few studies on determinants of birth weight have been performed. A study conducted by UNICEF in 1992 has identified a few factors that have been found to influence birth weight, but important factors like maternal education, height and income were not included in that study. This study reports a cross-sectional observation of the factors related to birth weight in Dhaka city.

The findings of the study may help develop a strategic programme to reduce child morbidity and mortality in Bangladesh.

Materials and Methods

The study was conducted at Azimpur Maternity Centre, Dhaka, from February 1992 to November 1992, on 274 live-born babies including caesarian babies. Excluded from the study were handicapped babies with major congenital abnormalities, erythroblastosis fetalis, chromosomal disorder, twin babies, etc.

Data were collected two and a half hours after birth with a pre-tested questionnaire composed of structured and non-structured questions. The questionnaire included socio-economic status, clinical condition of mothers of the newborn babies, birth weight, birth height, mid-upper arm circumference (MUAC), head circumference, mothers' anthropometry, etc.

A non-elastic measuring tape was used to measure head circumference and mid-upper-arm circumference of the neonates. An infantometer was used for measuring the length of the babies. Weight was measured by an infant-weighing scale, with an accuracy of 10 g and that of mothers with a foot-scale-type weighing machine with an accuracy of 100 g. Maternal height was measured by a

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stadiometer on the day following delivery. The neonates were examined by physicians just after birth.

One-way analysis of variance (ANOVA) was performed to find out the effect of each maternal factor on birth weight.

Results

Table 1 describes the epidemiological characteristics and clinical parameters of the study population. Majority of the mothers belonged to 20-24-year age category. 30% of mothers were uneducated. A short gestation period (<37 weeks) was observed in 40% of the mothers. 13% of the mothers had previous history of still-birth.

The mean birth weight of the 274 newborns was 2.70 kg (SD. 0.24). Twenty-three of the newborns were <2,500 g. Male babies accounted for 48.0% of the newborns while 52.0% were females. Male babies, on an average, were 147 g heavier than the female babies. The mean birth weight of male newborn was significantly different cmpared to female babies. (P=<.05) (Table -2).

Table 1. Epidemiological characteristics of mothers (n=274) and their clinical condition.

Parameters	Nos.	Percentage (%)
Age of mother		
<20	57	20.8
20—24	127	46.3
25—29	64	23.4
>30	36	9.5
Mother's weight (kg)		
<40	31	11.31
40.00-44.99	71	25.91
45.00-49.99	80	29.20
50.00-54.99	48	17.52
55.00 kg +	44	16.06
Mother's height (cm)		
<145.00	49	18.22
145.00-149.99	84	31.23
150.00-154.99	93	34.57
>155.00	43	15.99
Mother's education		
Uneducated	82	30
Primary	80	29
VI-X	54	20
SSC	35	13
HSC+	23	8
Gestational period (week)		
<37	110	40.1
>37	164	59.9

Table 1 Contd.

	Nos.	Percentage (%)
Fever	115	42.0
Jaundice	30	10.9
Anaemia	170	62.0
Oedema	130	47.4
Drug intake	230	83.9
Immunization given	254	92.7
Antenatal care taken	200	94.9
Previous history of M.R.	10	3.6
Previous history of abortion	17	6.2
Previous history of still-birth	35	12.7

Table 2. Anthropometric measurement of newborn babies according to sex

	Male		Female	
	Mean	(SD)	Mean	(SD)
Birth weight (kg)	2.79*	(0.46)	2.64*	(0.37)
Birth length (cm)	48.2	(2.70)	47.1	(4.4)
Head circum-ference (cm)	34.2	(2.01)	33.7	(1.6)
MUAC (cm)	10.3	(1.1)	10.2	(0.8)

* p=<.05

Table 3. Relationship between father's education and mean birth weight of neonates

Father's education	Nos.	Mean birth weight (kg)	Standard deviation
Illiterate	42	2.60	.37
Up to class V	65	2.57	.46
Class VI-X	49	2.73	.37
S.S.C.	42	2.70	.36
≥H.S.C.	76	2.83	.42

p< .001, F=16.02

The effect of parents' literacy level on the mean birth weight of the newborn was also analyzed. Higher educational level of fathers was accompanied by increased mean birth weights of the newborn. This difference was statistically significant (F=16.02, p=<. 01). (Table 3).

Table 4. Relationship between mother's education and mean birth weight of neonates*

Mother's education	Nos.	Mean birth weight (kg)	Standard deviation
Illiterate	82	2.62	.41
Up to Class V	80	2.68	.44
Class VI-X	54	2.76	.37
S.S.C.	35	2.73	.43
≥H.S.C.	23	2.88	.34

*p <.01 F=8.03

With regard to maternal education a linear trend was observed and increasing educational status was related to an increased birth weight. The differences in the mean birth weight by maternal education were also statistically significant (F= 8.03, p<.05)' (Table 4).

Table 5. Relationship between mothers age and mean birth weight of neonate (n=274)*.

Mother's age group	Nos.	Mean birth weight (kg)	Standard deviation
<20 yrs	57	2.58	.334
20-24 yrs	127	2.68	.426
24-29 yrs	64	2.81	.419
30 +	26	2.81	.449

*F=11.3, p<.01

Table 5 shows reletationship between maternal age and birth weigth of their babies. Mothers aged below 20 years produced smaller babies who were on an average 100 g lighter than those aged 20-24 years. There was linear trend, i.e. with an increase in maternal age there was an increase in the mean birth weight (F=11.3, p<.01).

Table 6. Relationship between birth weight (kg) and parity of mother

Parity of mother	Nos.	Mean birth weight (kg)	Standard deviation
1	133	2.57	.394
2	81	2.86	.376
3	33	2.735	.426
4	13	2.892	.368
5+	14	2.703	.501

The mean birth weight increased with parity up to fourth parity and decreased at subsequent parities (F=9.95, p< .01) (Table 6).

Table 7. Relationship between birth weight (kg) and gestational period of mother

Gestational period (week)	Nos.	Mean birth weight (kg)	Standard deviation
<30	8	2.15	.608
31—32	7	2.36	.509
33—35	56	2.60	.402
36—37	164	2.76	.392
38+	39	2.79	.348

Table 7 shows the relationship between birth weight and gestational period of mothers. A linear trend with an increase in gestational age reflecting an increase in mean birth weight was observed (F=25.27, p= <.01).

Table 8. Relationship between mean birth weight (kg) and total family income

Income group of family (taka monthly)	Nos. (n=274)	Mean birth weight (kg)	Standard deviation ±
<3000	134	2.628	.399
3000—5999	102	2.759	.427
6000+	38	2.801	.411

F = 7.87, p = <.01.

The relationship of birth weight to family income is shown in table 8. There was a tendency towards birth weight increase with an increase in income. Women of higher socio-economic group delivered heavier babies than those of the lower socio-economic group. (F=7.87, p= <.01).

Discussion

This is a prospective study performed in an urban maternity centre to find out the determinants of birth weights and associated factors in Bangladesh. A one-way bivariate analysis of factors influencing birth weight shows that maternal age, sex of newborns, educational status of parents, parity, maternal weight, family income and gestational period are strongly related to birth weight.

Our findings demonstrate that male babies are heavier than female babies and this corroborates the other findings[1,7] The mean birth weight of male and female babies was 2,787 g and 2,640 g respectively (Table 2), which is consistent with the UNICEF study[6]. The underlying factors concernd with increased birth weight of male babies in comparison to female ones is still not known.

A tendency of increase in birth weight with an increase of maternal age up to 30 years was also observed. A previous study has also found a similar trend, with an inter-relation between birth weight and maternal age.[3,7,8] The effect of maternal age on birth weight has been found to be attributed to parity rather than age of the mother in other studies[1,3,4]. The increased birth weight of babies in elderly and multiparus mother may be related to better knowledge and better self-care practice which has been achieved over time.

After attaining maximum weight at fourth parity, a decrease in birth weight with subsequent parity has been observed in several studies[2,7]. We also found similar results (Table 7). The underlying factors associated with low birth weight of babies of mothers of above 30 years of age are not fully known. However, the effect of declined hormonal activity, which may occur after the age of 35, cannot be ruled out as a possible cause of decreased birth weight.

Birth weight has a tendency to increase with advancing maternal gestational period. Our results also indicate that the relationship between birth weight and gestational period is linear. The finding is consistent with that of Wilcox *et al*[5].

Mother's level of education had a significant independent effect on birth weight. There is a tendency towards an increase in birth weight with an increase in the level of mother's education. This may be due to the relatively better understanding of the mother of public health knowledge in public health and self-care.

Father's educational status also influences birth weight. Our results demonstrated that literate fathers performed to have bigger babies than illiterate ones. Makheja *et al*[7] strongly suggest that the father's educational

status is a very important significant determinant of birth weight. Better understanding of health care awareness of nutritional support to pregnant wives may be related to bigger babies of educated fathers. This study shows a strong association between socio-economic condition and birth weight. Mother's nutritional status is influenced by the socio-economic conditions of the family. Birth weight was found to be strongly related to the family income (Table 8). The solvent family with higher income has bigger babies, as found in this study. The underlying factors associated with the bigger babies of solvent families may be related to better maternal care, education, personal hygiene and also nutritional support during gestational period.

Low birth weight has been recognized as a major nutritional problem in Bangladesh. It is however, estimated that low birth weight accounts for 38% of all neonatal deaths[9]. The present study has identified major factors related to this important problem in Bangladesh. Hence, strategic plans should be developed to alleviate the problems associated with low birth weight to reduce infant mortality in Bangladesh.

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