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Low birth weight and associated factors among newborn delivered in health facilities in Dhaka, Bangladesh

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Abstract

Introduction: Birth weight is the most important predictor of newborn health and survival. It is also a significant determinant of post neonatal, infant and childhood mortality as well as morbidity. LBW Child (birth weight < 2500 gm) who survive, have a higher incidence of diseases, retardation in cognitive development and under nourishment. The causes of LBW are multifactorial including complication during pregnancy, genetic, environmental, social-cultural, demographic, and nutritional variables. In Bangladesh, low birth weight (LBW) rate is quite high even in urban areas. However, there is a lack of data on maternal characteristics that influence birth weight among the high-income urban population in Bangladesh. Therefore, the purpose of this study is to identify the status of low birth weight and associated factors among newborn delivered in different health facilities in Bangladesh.

Method: A cross-sectional and descriptive type of study was carried out through a Systematic sampling method in 354 mothers of neonates who had delivered their babies and the mothers aged above 18 years in a few selected health facilities in Dhaka, Bangladesh. The samples were selected in a specific pre-determined interval. The data were collected from the respondents using a pre-tested and semi-structured questionnaire by face-to-face interview, after taking verbal consent from the participants. Data entry and analysis were done by using Statistical Package for Social Sciences (SPSS) statistical software version 20. The anonymity and confidentiality of the respondents were maintained strictly and study participants were informed that they can be able to leave the study at any stage of data collection.

Results: The finding revealed that a total of 20.9% children were LBW whereas 79.1% had normal birth weight. Among all the LBW children, 76% children had mild low birth weight, 20% had very low birth weight and 4% children had extremely low birth weight. A significant association of birth weight was found with maternal age, occupation and weight gain during pregnancy.

Conclusion: This study concluded that still one-fifth of children born with LBW among all live birth in urban areas although the majority of LBW children were mild low birth weight. Effective awareness programme needs to be taken among urban mothers to improve the overall nutritional status of neonates. Also, similar type of study should be conducted with a larger sample size to generalize the findings.

Keywords: Birth weight, newborn, maternal factors, Dhaka, Bangladesh

Introduction

A baby's weight at birth is a key predictor of its immediate outcome and an indirect indicator for later development. Birth weight is strongly associated with the risk of mortality during the first year of life and, to a lesser extent, with developmental problems in childhood and the risk of various diseases in adulthood. Low birth weight is a major public health issue that needs to be addressed.

Birth weight is the fetus or newborn's first weight obtained after birth, preferably within the first hour of life before significant postnatal weight loss has occurred. South Asian babies have an average birth weight of 3.26 kilograms (Janssen *et al.*, 2007) ^[10]. Weight at birth is classified into three categories, that is normal (birth weight 2.5 kg to 4.0 kg), too light (birth weight 2.5 kg) and too heavy (birth weight 4.0 kg). The last two conditions have a negative impact on the infant's life (Barker *et al.*, 2002) ^[21]. The World Health Organization (WHO) defines low birth weight (LBW) as a birth weight of less than 2500 gm (WHO, 2015). Bangladesh had an LBW rate of 22.6 percent in 2015 (Shaheen *et al.*, 2020) ^[20]. LBW is directly or indirectly responsible for half of all perinatal deaths. In 2015, nearly 21 million newborns had low birth weight, accounting for 14.6 percent of all babies born worldwide that year (UNICEF, 2019). In comparison to their normal-weight peers, LBW survivors have significant growth retardation, as evidenced by lower body weights, heights, and head circumferences. Although there is some tendency for catch-up growth, deficits persist even up to the age of 14 years. In children aged 6 to 10 years, there is evidence of delayed skeletal growth and maturation. While delayed puberty in LBW children has been reported (Mavalankar *et al.*, 1992) ^[15]. Infants with low birth weight are born either prematurely (37 weeks gestation at birth) or as a result of intrauterine growth retardation (Zohdi *et al.*, 2012) ^[26]. The shorter the gestation and the smaller the baby, the higher the risk of morbidity and mortality. Low birth weight due to restricted fetal growth (IUGR) has a worse prognosis than preterm birth (Padilha *et al.*, 2009) ^[19]. LBW babies are associated with maternal socio-demographic characteristics as well as mothers' health status (Viengsakhone *et al.*, 2010) ^[24]. Maternal characteristics, particularly those related to birth weight and perinatal mortality, have been shown to have an impact on the progress and outcome of pregnancy in a variety of ways. The causes of LBW are multifactorial including complication during pregnancy, education level, genetic endowment, environmental, social-economic, demographic, nutritional variables and medical conditions (e.g., hypertension, malaria, urinary tract infections, malnutrition and anemia) that are strongly associated with fetal complications especially low birth weight, prematurity and birth asphyxia all of which act individually or in concert with each other to increase neonatal and infant mortality. Women who had previously had a child, were educated, and had a higher level of wealth were less likely to have a baby with a low birth weight (Shiferaw *et al.*, 2018) ^[22]. Giving birth to a child at an early or late age (younger than 15 or older than 35) increases the mother's risk of having a low-birth weight baby. Multiple births, in which a mother has more than one child at the same time, can also influence birth weight because each baby is likely to be outside the AGA (appropriate for gestational age) (Dhar *et al.*, 2010) ^[5]. Multiple births put children at a higher rate to have low birth weight (56.6%) compared to children born in a single birth (6.2%). Low birth weight can also vary by maternal age. In 2008 the rate of low birth weight was the

highest in babies born to women younger than 15 years old (12.4%). Women aged 40–54 had a rate of low birth weight at 11.8 percent. The lowest rates of low birth weight happened among babies whose mothers were between the ages of 25–29 years (4.4%) and 30–34 years (7.6%) (Khatun and Rahman, 2008) ^[12]. In Bangladesh the factors which are considered to affect birth weight are biological, education level, financial condition, socio-cultural and service related. Among these factors, maternal malnutrition, adolescent pregnancy, inadequate antenatal care, and nutrition education may play important roles in the development of LBW. The beneficial effects of prenatal care on pregnancy outcome have been described in many observational studies over several decades. Many studies have found a link between a lack of antenatal care and adverse pregnancy outcomes such as maternal mortality, perinatal mortality, low birth weight, and premature delivery (Coria-soto *et al.*, 1996 and Munjanja *et al.*, 1996) ^[4]. Antenatal care is recognized as an essential element for the screening, primary or secondary prevention and treatment of pregnancy complications. However, there is scarcity of information on maternal characteristics which are influencing birth weight among the high-income urban population in Bangladesh. Therefore, this study was an attempt to identify the associated factors influencing birth weight in urban community in Bangladesh.

Materials and Methods

The study was a cross-sectional and descriptive type of study which was carried out through a systematic sampling method. The study population was selected mothers of neonates who are above 18 years and had delivered their babies in different health facilities in Dhaka, Bangladesh. Mothers with serious sickness were excluded from the study. The Sample size was determined using the appropriate statistical formula ($n = z^2 pq / d^2$). The sample size was calculated in 95% confidence interval and 5% level of significance. The calculated sample size was 354. The data were collected from the respondents using a semi-structured questionnaire by face-to-face interview, after taking verbal consent from the participants. Some data was also collected from the hospital record book. After data collection, all interviewed questionnaires were checked for completeness, correctness, and internal consistency to exclude missing or inconsistent data. Corrected data were entered into Statistical Package for Social Sciences (SPSS) statistical software version 20 for the analysis. The anonymity and confidentiality of the respondents were maintained strictly.

Results

The study was conducted among 354 respondents. The findings shows that most of the mothers (54.0%) were aged in between 20 to 30 years. Among all, nearly two-third of the respondent mothers were housewives followed by non-govt. service holders (19.0%). More than eighty percent (82.0%) of the respondents were permanent residents of the urban area (Table 01).

Table 1: Socio-demographic information of the respondents (n=354)

Variables	Frequency	Percentage
Age group of the Respondents		
<20 years	74	21.0
20-30 years	191	54.0
>30 years	89	25.0
Mother's Occupation		
Housewife/ Homemaker	216	61.0
Govt. service holder	46	13.0
Non-govt. service holder	67	19.0
Business	7	2.0
Others	18	5.0
Permanent residence of the respondent		
Urban	290	82.0
Rural	64	18.0

Table 02 is displaying a few maternal factors of the study populations. Findings show that 38.0% were pregnant for first time, followed by 54.0% who were pregnant for 2nd or 3rd time. Among all the respondents, 63.0% had adequate weight gain during pregnancy and 37% had not. Findings from mother's blood group show that 21.0% respondent's blood group was A+, followed by 3.0% A-, 32.0% B+, 4.0% B-, 16.0% O+, 3.0% O-, 16.0% AB+, 5.0% AB- and father's blood group shows that 20.0% father's blood group was A+, followed by 1.0% A-, 27.0% B+, 3.0% B-, 12.0% O+, 21.0% AB+ and 16.0% didn't know their blood group. A total of 17.0% parent's blood group were same (Table 02).

Table 02: Maternal factors of the respondents (n=354)

Variables	Frequency	Percentage
No. of pregnancy		
Primigravida	135	38.0
2nd/3rd pregnancies	191	54.0
more than 3rd pregnancies	28	8.0
Gestational weight gain		
Adequate (> 12kg)	223	63.0
Inadequate (< 12kg)	131	37.0
Blood group of Mother		
A+	74	21.0
A-	11	3.0
B+	113	32.0
B-	14	4.0
O+	57	16.0
O-	11	3.0
AB+	57	16.0
AB-	18	5.0
Blood group of Father		
A+	71	20.0
A-	4	1.0
B+	96	27.0
B-	11	3.0
O+	42	12.0
AB+	74	21.0
Don't know	57	16.0
Similarity in the blood group of the parents		
Same blood group	60	17.0
Different blood group	294	83.0

The birth weight pattern of the children shows that 20.9% children were LBW (<2.5 Kg) whereas 79.1% had normal birth weight. Among all the LBW children, 76.0% children were mild low birth weight, 20.0% were very low birth

weight and 4.0% children were extremely low birth weight (Table 03).

Table 3: Distribution of children according to their birth weight (n=354)

Variables	Frequency	Percentage
Birth weight category		
Low Birth Weight (LBW) Child (<2.5 Kg)	74	20.9
Normal Birth Weight (NBW) Child (≥2.5 Kg)	280	79.1
Low Birth Weight (LBW) Category		
Mild low birth weight (1500 g - <2500 g)	56	76.0
Very low birth weight (<1500 g - ≥ 1000 g)	15	20.0
Extremely low birth weight (<1000 g)	3	4.0

Discussion

It was a descriptive type of study identifying the factors associated with the birth weight of neonates in Bangladesh. The findings revealed that the age of the mothers, their occupation and weight gain during pregnancy are significantly associated with the birth weight of the children (Table 04).

Table 4: Association of different factors with the birth weight of the neonates

Risk factors	LBW (74)	NBW (280)	P value
Age group			
<20 years	11	63	0.032
20-30 years	41	150	
>30 years	22	67	
Occupation of the respondents			
Housewife/ Homemaker	18	198	0.017
Govt. service holder	20	26	
Non-govt. service holder	30	37	
Business	2	5	
Others	4	14	
Residence			
Rural	29	35	0.054
Urban	45	245	
No. of pregnancy			
Primigravida	31	104	0.069
2nd/3rd pregnancies	35	156	
more than 3rd pregnancies	8	20	
Weight gain during pregnancy			
Adequate (≥ 12 Kgs)	15	208	0.026
Inadequate (<12 Kgs)	59	72	
Similarity of blood group			
Same blood group	48	12	0.076
Different blood group	26	268	

The findings also reveal that 20.9% newborns were LBW, which is lower than that of the NLBWS 2004 and NLBWS 2015. This rate was 43.7 percent in 2004 and 24.5 percent in 2015, according to Bangladesh's first and second National LBW Surveys (Hussain, 2016)^[8]. In comparison to our study, a more recent cross-sectional study in urban Bangladesh found a lower LBW rate (Nahar *et al.*, 2017)^[17]. In comparison to global 2015 data, the prevalence of LBW in our neighboring country, India, was 16.4 percent (IIPS and ICF, 2017), 7 percent in high income regions (North America, Europe, Australia, and New Zealand), and 26.4 percent in Southern Asia (Blencowe *et al.*, 2019)^[3]. Southern Asia is one of the regions with the highest burden of LBW. Being a country in this region, the LBW rate is high in Bangladesh compared to developed countries. The findings of this study showed a significant relationship of birth weight with maternal age group, occupation of the respondent, and weight gain during pregnancy. It was also found that maternal age (20-30 years and >30 years) was associated with an increased risk of LBW which is in accordance with prior studies (Kirchweger *et al.*, 2018; Shaikh *et al.*, 2021)^[13, 21]. Another recent Canadian study found similar results, indicating that both younger maternal age (20–24 years) and advanced maternal age (40 years and older) were associated with an increased risk of preterm birth (Fuchs *et al.*, 2018)^[6]. In this study, maternal occupation had a significant association with birth weight. Non-govt. service holders found to give birth to LBW child compared to govt. service holder and housewives as they get less time for self-care. The finding was consistent with some other studies (Nahar *et al.*, 1998; Karim and Mascie-Taylor, 1997)^[18, 11]. The findings of this study revealed that inadequate weight gain during pregnancy (<12 kg) was significantly associated with LBW baby. Inadequate weight gain during pregnancy is also associated with IUGR. Mean gestational weight gain in the 3rd trimester in Bangladesh is 5–6 kg, which is lower than recommended weight gain and a known cause of LBW. This result is in-line with some recent studies (Nahar *et al.*, 2019; Akter *et al.*, 2012; Hasan *et al.*, 2019)^[1, 7]. In this study, birth weight was not significantly associated with other maternal and socio-economic factors.

Conclusion

Birth weight can be affected by socio-demographic factors and maternal factors during pregnancy. Findings from this study revealed that about one-fifth of all live births in Bangladesh's urban areas are still LBW. According to the findings, low birth weight was found to be primarily associated with the mother's occupation, inadequate weight gain during pregnancy, and mother's age group. In conclusion, this study suggests that several factors interact to cause LBW children. Socio-demographic factors (maternal age, educational level, residential area and economic status) and proper weight gain during pregnancy are more important. This study showed that the prevalence of LBW in Bangladesh is still high and has not decreased over time. Proven interventions need to be implemented to reduce this health burden.

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Mondal, Afsana Anwar and Sabina Yesmin assisted to collect data, literature & report review, and ensure the quality. Abu Ansar Md. Rizwan was responsible for reviewing the manuscript, overall supervision, and quality assurance. We would like to acknowledge W A N Research & Consultancy for supplying consultancy assistance to design the study and evaluate the item.

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Conflict of interest

The authors declared no conflict of interest for this study.

Consent for publication

All authors have given their consent to publish this article.

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