Original article:

Association of Parents' Educational Factor with Low Birth Weight of Children in Bangladesh: Analysis from A Nationwide Cross-Sectional Data

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Abstract

Background: Low birth weight (LBW) is a leading public health problem especially in a developing country like Bangladesh. ***Objective:*** To identify the extend of low birth weight and its associated factors among Bangladeshi children with a countrywide data. ***Methods:*** Data were used from Bangladesh demographic and health survey (BDHS) 2017. A total of 2204 child data has been observed and descriptive analyses were performed to determine various social and demographic characteristics. Logistic regression model was used to present Parents' Education associated with low birth weight and results were described in terms of odds ratio (OR) with 95% CI for both adjusted (aOR) and unadjusted (uOR) models. ***Results:*** Prevalence of low birthweight is 21.26% vs 14.11% among the unwanted and wanted children in the rural area and this difference is statistically significant. uOR and aOR of having low birthweight is lower among the children from higher educated mother (aOR=0.48, 95% CI= 0.24, 0.98) and children from richest economic group (aOR=0.52, 95% CI= 0.31, 0.89). This odd is significant in 95% CI (p-value= <0.05) for both adjusted and unadjusted model. Odds of having low birthweight in child is 37% higher (aOR=1.37, 95% CI= 0.75, 2.46) among the unplanned children. This association is statistically significant for both unadjusted and adjusted model (p-value= <0.05). ***Conclusion:*** To summarize, the prevalence of low birthweight among children is high in the rural areas in comparison to urban areas in Bangladesh. Children of uneducated and low educated parents are at risk of having low birth weight. Special antenatal care should be given to the mothers who have less educational qualifications.

Keywords: Low birth weight, children, parents' education, Bangladesh

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Introduction

Low birth weight (LBW) is still a serious public health problem, particularly in emerging economies[1] , but it is also linked to cardio metabolic illnesses, psychiatric conditions, and mortality in both childhood and adulthood in both developed and developing countries [2,3,4,5].

Between 15% and 20% of all deliveries globally are projected to be LBW (defined by the World Health Organization (WHO) as <2500 g) or extremely low birth weight (defined as 1500 g), resulting in a minimum of 20 million children worldwide. The 2500 g cut point is based on epidemiologic research that suggests newborns weighing less than 2500 g are 20 times more likely to die in infancy [6,7,8].

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The large majority of LBW births (95.6%) take place in poor and middle-income nations[9] . The rate of LBW births in South Asia is almost doubles that of the rest of the world. Around 70% of all infants with LBW are born in Asia, with central and south Asia having the highest prevalence (28%) of any area globally[10] . During the most recent national survey, LBW prevalence was high in Bangladesh, even in established urban regions, which are generally linked with lower frequency. According to Bangladesh's National Low Birth Weight Survey (NLBWS), around 23% of infants were born with LBW[11] . Still now, the prevalence of children underweights, stunting, and wasting are high in Bangladesh is comparably high than the other Asian countries[12] . These nutritional statuses are directly associated with the birthweight of the child[11] . To meet the Sustainable Development Goals, a significant reduction in the prevalence of LBW is required, taking into account the implications for child mortality (SDGs). To assess and identify the determinants of LBW, a significant amount of research has been done. Mother's age, food habit and fetal growth during pregnancy and pregnancy weight gain, mother's body composition before conception, early and let pregnancy are associated with low birth weight[12,13,14,15,16] .

Methods

BDHS 2017-18 based on a cross-sectional study design, covers entire population taking a nationally representative sample using stratified two-stage random sampling procedure and used a sampling frame [complete list of enumeration areas (EAs)] of 2011 Population and Housing Census of the People's Republic of Bangladesh, provided by the Bangladesh Bureau of Statistics (BBS). In the first stage, 600 EAs with 207 EAs in urban areas and 393 in rural areas were selected and made of household list in all the selected EAs. In the second stage, 30 households per cluster were selected with an equal probability of systematic sampling procedure from the newly generated household list. A total of 20,376 ever-married women age 15-49 were selected and with a 98.4% response rate a total of 20,127 interviews were successfully conducted. Further explanation about sampling design and other related issues of the 2017-18 BDHS are accessible elsewhere[17].

If the birth weight of a child is less than 2500 gram, it was considered as low birth weight, while a child weighing 2500 grams or more at birth was considered as having normal birth weight. This cut off has been defined by world health organization (WHO).

Results

Table 1 shows that prevalence of low birthweight is comparatively high among the rural child (15.29%) compared to the children from urban area (14.45%). Almost 97.7% of mother have attended formal education among them 15.52% completed primary education and 50.86% completed secondary education. Prevalence of completing primary education is higher among urban women compared to rural women but this rate is reverse for secondary education. Majority of the urban family are from richer (24.82%) and richest (55.18%) economic quartile in this research while majority of the rural families are from poorer (20.82%) and middle (23.3%) economic quartile. 66.02% of the women do not involve in any formal work and this rate is almost the same in the urban (72.15%) and rural (61.33%) areas. Among the working groups, majority of the mothers are working as agriculture-based workers or skilled or unskilled workers. Fathers from the rural household are mostly passed secondary 35.44% or higher education (32.76%). 50.28% fathers' occupation is skilled or unskilled worker in rural areas and 18.82% are involved agriculture base profession. Frequency of the fathers' profession as skilled or unskilled worker is also similar in urban areas (49.63%). In our study 88% of the household is headed by the father. Table 2 shows that prevalence of low birthweight is higher in both urban and rural areas of Chittagong and Sylhet division in Bangladesh. Prevalence of low birthweight 20.34% and 20% in urban and rural areas of Chittagong division and 21.95% and 17.86% in Sylhet division respectively. Prevalence of low birthweight is higher among those children whose mothers are less educated. Prevalence of low birthweight is 34.38% among those children whose mother has no educational attainment compare to that, children whose mother are highly educated, prevalence is 12.93% among them in the rural area. This prevalence follows same track for urban area also, but this differences among various group of educational status is statistically significant for rural area also. Moreover, the prevalence of low birthweight is associated with father's education in the same way. Table 3 shows the results of bi-variate and multivariable analysis of low birthweight of children in Bangladesh.

Unadjusted and adjusted odds ratio (uOR and aOR) of having low birthweight of children have been presented in the table. Odds of having low birthweight for children reduce with the increase of educational status. aOR of having low birthweight for children is 50% less (aOR= 0.5, 95% CI= 0.27, 0.95) when mother have completed at least secondary education and 52% less (aOR= 0.48, 95% CI= 0.24, 0.98) when mother have higher education qualification compared to the women who have no education. Both of the association is statistically significant for both adjusted and adjusted model (p-value=<0.05). Odds of having low birthweight are also associated with father's educational status. Odds of having low birthweight are lower among the children when father has completed higher education. This association is statistically significant in the unadjusted model, but not significant for the adjusted model.

Table 1: Sociodemographic characteristics of the participants

Variables	Urban N (%)	Rural N (%)	Total N (%)
Mother's education level			
No education	28 (2.93)	32 (2.56)	60 (2.72)
Primary	151 (15.81)	191 (15.29)	342 (15.52)
Secondary	412 (43.14)	709 (56.77)	1121 (50.86)
Higher	364 (38.12)	317 (25.38)	681 (30.9)
Father's Education level			
No education	66 (6.91)	99 (7.93)	165 (7.49)
Primary	194 (20.31)	342 (27.38)	536 (24.32)
Secondary	311 (32.57)	470 (37.63)	781 (35.44)
Higher	384 (40.21)	338 (27.06)	722 (32.76)
Wealth Index			
Poorest	32 (3.35)	209 (16.73)	241 (10.93)
Poorer	53 (5.55)	260 (20.82)	313 (14.2)
Middle	106 (11.1)	291 (23.3)	397 (18.01)
Richer	237 (24.82)	285 (22.82)	522 (23.68)
Richest	527 (55.18)	204 (16.33)	731 (33.17)
Mother's Occupation			
Not working	689 (72.15)	766 (61.33)	1455 (66.02)
Agriculture based profession	88 (9.21)	372 (29.78)	460 (20.87)
Skilled or unskilled workers	78 (8.17)	67 (5.36)	145 (6.58)
Professional And technical	100 (10.47)	44 (3.52)	144 (6.53)
Father's Occupation			
Agriculture based profession	31 (3.25)	235 (18.82)	266 (12.07)
Skilled or unskilled workers	474 (49.63)	628 (50.28)	1102 (50)
Service holders or Businessman	215 (22.51)	128 (10.25)	343 (15.56)
Small business	227 (23.77)	238 (19.06)	465 (21.1)
Others	8 (0.84)	20 (1.6)	28 (1.27)
Birthweight			
Normal Birthweight	817 (85.55)	1058 (84.71)	1875 (85.07)
Low Birthweight	138 (14.45)	191 (15.29)	329 (14.93)
Sex of HH head			
Male	856 (89.63)	1074 (85.99)	1930 (87.57)
Female	99 (10.37)	175 (14.01)	274 (12.43)

Discussion

The cross-sectional study aimed to provide evidence on determinants of low birthweight using nationally representative data. The major objective of this study was to examine the association between low birthweight with parent's educational status, household economic status, parent's occupation. LBW is a public health problem linked to a wide range of possible predictors. Despite efforts to decrease the proportion of newborns with LBW, success has been quite limited and the problem persists in both developing and developed countries.

One of the predictors of LBW is parent's educational status. Women's and her partner's educational status is associated with child birthweight. Women who are comparatively higher educated gives less low birthweight childbirth. Also female employment creates more conscious about health and nutritional condition for them and their children; Also women employment is an obstacle for childbearing within the household which is identified as another cause for less childbirth for working women[18] . Studies from Bangladesh and Estonia also have found similar association with parent's education and child low birthweight status[4,19]. These results are aligned with our study result. Also, several studied from India and Botswana mentioned that there are no association of low birthweight with

Table 2: Urban and rural distribution of low-birth-weight children

Variable	Urban			Rural		
	Child birth weight		p-value	Child birth weight		p-value
	Normal	Low		Normal	Low	
Mother's education level						
No education	22 (78.57)	6 (21.43)	0.058	21 (65.63)	11(34.38)	0.01
Primary	124 (82.12)	27(17.88)		157 (82.2)	34 (17.8)	
Secondary	346 (83.98)	66(16.02)		604(85.19)	105(14.81)	
Higher	325 (89.29)	39(10.71)		276(87.07)	41 (12.93)	
Father's Education level						
No education	59 (89.39)	7 (10.61)	0.032	78 (78.79)	21 (21.21)	0.024
Primary	159 (81.96)	35(18.04)		283(82.75)	59 (17.25)	
Secondary	257 (82.64)	54(17.36)		395(84.04)	75 (15.96)	
Higher	342 (89.06)	42(10.94)		302(89.35)	36 (10.65)	
Division						
Barisal	62 (83.78)	12(16.22)	0.047	105 (87.5)	15 (12.5)	0.17
Chittagong	94 (79.66)	24(20.34)		164 (80)	41 (20)	
Dhaka	215 (84.98)	38(15.02)		123(86.62)	19 (13.38)	
Khulna	118 (90.08)	13 (9.92)		144(83.24)	29 (16.76)	
Mymensingh	81 (88.04)	11(11.96)		146(90.68)	15 (9.32)	
Rajshahi	83 (85.57)	14(14.43)		123(83.11)	25 (16.89)	
Rangpur	100 (92.59)	8 (7.41)		161(85.64)	27 (14.36)	
Sylhet	64 (78.05)	18(21.95)		92 (82.14)	20 (17.86)	

Table 3: Logistic regression of low birthweight with parents' education level

Variables	uOR (95% CI)	p value	aOR (95% CI)	p-value
Mother's education level (ref: No education)				
Primary	0.55(0.29,1.03)	0.061	0.54(0.28,1.03)	0.063
Secondary	0.46(0.25,0.82)	**0.008**	0.5 (0.27, 0.95)	**0.033**
Higher	0.34(0.18,0.62)	**<0.001**	0.48(0.24,0.98)	**0.043**
Father's Education level (ref: No education)				
Primary	1.04(0.65,1.65)	0.866	1.22 (0.75, 2)	0.423
Secondary	0.97(0.62,1.52)	0.887	1.23(0.75,2.03)	0.41
Higher	0.59(0.37,0.95)	**0.029**	0.9 (0.5, 1.61)	0.726

mother's educational attainment, and studies from Ghana also found same result [20,21,22]. This finding contradicts with our result. Our result shows that children from Chittagong and Sylhet division are at more risk of being low birthweight compare to the other division of Bangladesh. Bangladesh demographic and health survey 2017 indicates that prevalence of wasting, stunting and child malnutrition is also high in these divisions[17] .

Family income and economic status is another

determinant of LBW. Previous study has mentioned that women from poorer economic condition gives birth of more LBW child compare to the women from middle or rich economic condition[22]. Our study result also identified that risk of LBW is lower among the child from richer and richest family compare to the children from poorer and poorest family. The findings show a strong association between birth weight and socioeconomic status which is consistent with other studies which showed that higher socioeconomic status reduced the risk of LBW[23,24,25,26.] This shows that poverty is an important determinant of birth weight as shown in other contexts[26,27]. Low birth weight could be due to poor maternal nutritional intake among mothers with lower socioeconomic status as found in other studies[28,29].

Limitations of this study include the main exposure variable i.e., LBW. Since the BDHS 2017 collected information retrospectively and actual birth weight measurements were unavailable, LBW was defined based on mother's perception of the size of child at birth. Underreporting is therefore expected since most mothers would be able to recall whether the baby was underweighting only if the baby was very small in size (i.e., << 2500gm). Thus, the prevalence of LBW was found to be 14.93% in our study, which is much lower than 23% obtained by recent National Low Birth Weight Survey which measured LBW from actual birth weights.

Conclusion

In conclusion, the results showed that the prevalence of LBW is still high among the children in Bangladesh. Risk of being LBW is higher among the children whose parents are less educated. Nevertheless, the burden of LBW is still high among the children of skilled or unskilled worker mother and child from poorer economic quartile. The existence of LBW may leads to adverse clinical consequences in later stage of life as well as to an unfavorable growth of the future generation. Our results emphasize the necessity of effective public health approaches to address the issue of malnutrition among the children in Bangladesh.

Recommendations

1. Special consideration for maternal health and nutrition should be given for Chittagong and Sylhet division
2. Special attention on health, nutrition and education should be given for the mother from lower economic condition and who are less educated.
3. Nutrition education should be given emphasize for adolescent girls and pregnant women.
4. Vitamin A and IFA supplementation should be ensured for every pregnant woman.
5. Nutritional status of the mother should be given concern.

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Author's contribution: All authors were equally involved in conception, study design, data collection, statistical analysis, writing, editing, and final approval of the manuscript.

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