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Risk factor associated with low birth weight in Delhi: What does data suggest?.

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Abstract

Objective: World Health Organization (WHO) has defined "Low Birth Weight (LBW) as the birth weight <2.5 kg or 2500 gm". In the developing countries, the neonatal and infant mortality is principally associated with Low Birth Weight (LBW). The objective of the study was to assess the risk factors of low birth weight in Delhi, the capital of India.

Methods: In the present study the birth weight is categorized in the binary category which is Low Birth Weight (LBW) and Normal Birth Weight (NBW). Multivariable logistic regression model was used for seeking the impact of predictors through unadjusted and adjusted odds ratio with a 95% confidence interval was calculated.

Results: According to the data set, the prevalence of low birth weight was 27% in Delhi, which was higher than compared to other states of India. Those mothers who were having a primary level of education among them they had 51% prevalence of low birth weight.

Conclusion: Poverty, age of mother, religion, body mass index, birth order and educational level were the factors associated with the high prevalence of the low birth weight.

Keywords: Low birth weight, Anemia, Body mass index, Education, Delhi.

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Introduction

World Health Organization (WHO) has defined "Low Birth Weight (LBW) as the birth weight <2.5 kg or 2500 gm" [1]. In the developing countries, the neonatal and infant mortality is principally associated with Low Birth Weight (LBW) [2]. LBW has been an important public health concern and socio-economic and nutritional determinants associated with India [3]. Biological, demographic and socio-economic factors are more dominating factors that have increased the prevalence of Low Birth Weight (LBW) over the last decade in India [4]. The single main factor in infant disease and mortality is low birth weight [5]. In order to minimize the incidence of LBW, adequate diet and nutritional requirement for women during pregnancy is important [6]. The strong determinants associated with low birth weight are education and nutrition. The women who are less educated need to be sensitized regarding the importance of nutrition and its effect on the unborn baby [7]. In rural areas, the high prevalence of LBW babies can be attributed to the illiterate teenage mothers, anaemic mothers, and short inter-pregnancy intervals [1]. Quality and frequency of ANC-checkup is one of the important key possibilities of low birth weight babies [8]. Thus, the prevalence of LBW among urban underprivileged mother of Delhi is associated with mothers age, parity in weight and height are important determinants [9,10]. Considering the published research at state, national and international level the following questions those raised for this study includes "What are the risk factors of Low Birth Weight (LBW) in the capital of India? What does data suggest? Objectives of this study was to assess the risk factors of low birth weight in the capital of India [11,12]. In addition, to identify the highest frequency of birth weight reporting at cut-off of the birth weight (say; LBW or NBW)?.

Methods

The analytical study was conducted using the data from the fourth round of the national family health survey [9]. Here, birth weight was categorized in the binary categories, which were Low Birth Weight (LBW) and Normal Birth Weight (NBW). Descriptive statistics were examined for each predictor, to understand the prevalence of LBW in Delhi, the capital of India. At the outset, binary logistic regression was applied to obtain the unadjusted odds ratios (or) between outcome and predictors. Thereafter a multivariable logistic regression model was applied. Where, all variables were entered into the final model to identify the risk factors through adjusted or between the predictor variables and LBW. To establish the association between the categories of variables, the odds ratio (or) with 95% Confidence Intervals (CI) was computed. Where, birth weight category (LBW)/(NBW) was used as outcome variable and poverty, age, religion, education, birth order, body mass index, place, anemia were considered as predictor variables [11,10].

Results

According to the data, in India, the Low Birth Weight (LBW) rate that was reported was 18.2%. In Delhi, total 2526 birth were reported and among them, 1855 (73.4%) were Normal Birth Weight (NBW) and 671 (26.6%) were Low Birth Weight (LBW). In Delhi, the prevalence of Low Birth Weight (LBW)

was higher than the other state of India. The majority of the population in Delhi is urbanized. It was observed that in the middle-class the prevalence of LBW was highest, which was around 42% followed by rich (24%) and poor (22%). Among the age group, 15-24 occurrence of LBW was higher in comparison to age group 25-49, which was 37% and 23% respectively. Those belonging to the Hindu religion had the maximum prevalence rate of low birth weight than Muslim, Christians and others which were 27%, 25%, 33.3% and 8.3% respectively. The child who was born first or fourth was having more prevalence of LBW compared to the second and third child in the birth order *i.e* 29% and 31% compared to 24% and 22% respectively. Among the non-anaemic group, LBW was higher when compared to the anaemic group *i.e.* 33% and 24% respectively. The mother who had a normal body mass index: had the highest prevalence of LBW compared to underweight or overweight mothers *i.e.* 35%, 24% and 15%. Across the state, it was observed that the highest occurrence of LBW was among the primary educated than uneducated, secondary and higher school educated (Table 1).

Predictors	N	Binary outcome of birth weight	
		NBW	LBW
Living Place			
Urban	2505	1839 (73.4)	666 (26.6)
Rural	22	17 (77.3)	5 (22.7)
Wealth index			
Poor	50	39 (78.0)	11 (22.0)
Middle	405	236 (58.3)	169 (41.7)
Rich	2071	1580 (76.3)	491 (23.7)
Age			
15-24	685	431 (62.9)	254 (37.1)
25-49	1841	1424 (77.3)	417 (22.7)
Religion			
Hindu	2060	1501 (72.9)	559 (27.1)
Muslim	421	315 (74.8)	106 (25.2)
Christian	9	6 (66.7)	3 (33.3)
Others	36	33 (91.7)	3 (8.3)
Birth Order			
First order	1051	743 (70.7)	308 (29.3)
Second order	930	706 (75.9)	224 (24.1)
Third order	338	263 (77.8)	75 (22.2)
Fourth and above order	208	144 (69.2)	64 (30.8)
Anemia			
Anemic	1215	918 (75.6)	297 (24.4)
Not-anemic	903	602 (66.7)	301 (33.3)
BMI			
Underweight	202	154 (76.2)	48 (23.8)
Normal weight	1339	865 (64.6)	474 (35.4)
Overweight	985	836 (84.9)	149 (15.1)
Educational level			
No education	386	295 (76.4)	91 (23.6)
Primary	332	160 (48.2)	172 (51.8)

Secondary	1294	976 (75.4)	318 (24.6)
Higher	514	424 (82.5)	90 (17.5)
Total	2526	1855 (73.4)	671 (26.6)

Table 1. Represents the distribution and determinants for the birth weight of Delhi.

Table 2 represents statistical analysis which was bivariate and multivariable logistic regression models. Odds ratio was given through individual predictors with 95% confidence interval for unadjusted (crude) and adjusted analysis. Here in unadjusted analysis, single predictor was considered at a time for analysis purpose to identify the risk factors associated with the occurrence of the LBW. In another way, the adjusted analysis was carried out including all the predictors at a time. The risk factors of LBW were ascertained by considering controlling the effect of other variables. Using unadjusted predictors; taking the reference of those respondents who belonged to the poor background than others having high risk of LBW. In the age group, 25-49 years were 50% less likely to have the prevalence of an LBW in comparison to early age group. The occurrence of LBW among muslim, christians, and others were more likely to have an LBW than the Hindu religion. Higher birth order of the babies had fewer propensities to be LBW than first order. Among the mothers who were not anaemic were having 50% more likely to have LBW than the anaemic group. In mothers with normal body mass index were 77% more likely to have LBW than underweight. Those mothers having primary educations were more than 3 times likely to have LBW than those who were uneducated. It was found in Adjusted predictors; controlling the effect of the other variables at a time, the middle and higher-level standard of living was having more likely to have an LBW than poor. Age group 25-49 years was having less likely to have LBW than early age group. Christians were having around 3 times more likely to LBW than Hindu religion. Higher birth order of the babies had fewer propensities to be LBW than first birth order of the babies. Among the mothers who were not anaemic were more likely to have LBW compared to anaemic. Those mother having normal body mass index were twice more likely to have LBW compared to underweight BMI. Mothers having primary level of education were 3 times more likely to have LBW than the uneducated group. Various differences could be seen in adjusted and unadjusted analysis.

Predictors	**Unadjusted**		**Adjusted**	
Living place	Odds ratio	95% CI	Odds ratio	95% CI
Urban®	1			
Rural	0.79	(0.29-2.21)	0.5	0.11-2.26
Wealth index				
Poor®	1			
Middle	2.47	(1.24-4.92)	1.83	0.88-3.79
Rich	1.07	(0.55-2.09)	1.62	0.79-3.32
Age				
15-24®	1			
25-49	0.5	(0.41-0.60)	0.65*	0.51-0.84
Religion				
Hindu®	1			
Muslim	3.88	(1.22-12.37)	0.72	0.54-0.95
Christian	3.51	(1.08-11.39)	2.71	0.48-15.37
Others	4.42	(0.69-28.33)	0.39	0.12-1.30
Birth order				
1st order®	1			
2nd order	0.93	(0.67-1.28)	0.72**	0.57-0.92
3rd order	0.71	(0.51-0.98)	0.65	0.45-0.93

4th and above order	0.63	(0.43-0.94)	0.92	0.60-1.39
Anemia				
Anemic®	1			
Not-anemic	1.55	(1.28-1.87)	1.41*	1.15-1.75
BMI				
Underweight®	1			
Normal weight	1.77	(1.26-2.50)	2.06*	1.42-3.00
Overweight	0.57	(0.39-0.83)	0.78	0.51-1.20
Educational level				
No education®	1			
Primary	3.49	(2.54-4.81)	2.73	1.88-3.95
Secondary	1.06	(0.81-1.38)	1.03	0.73-1.45
Higher	0.69	(0.49-0.96)	0.64	0.42-0.99

Table 2. Represents unadjusted and adjusted logistic regression model with 95% confidence interval to estimate the risk of low birth weight through predictors.

Figure 1 represents the birth weight reporting in grams/Kg. It was reported in multiple of 500 g. The cut-off of LBW/NBW was less than 2500 g/ greater than equal to 2500 g. It was reflected in the figure that the highest reporting of LBW at 2500 g, which seems heaping of the data during reporting of the birth weight. Therefore, due to heaping of birth weight reporting the actual prevalence of the birth weight (LBW/ NBW) may be underestimated. It may reduce due to actual reporting of birth weight when the birth occurred.

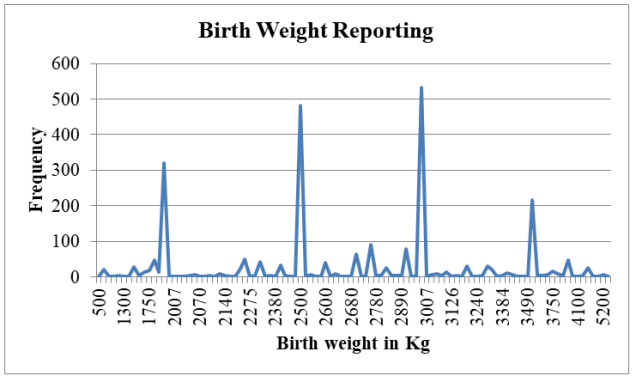

Figure 1. Shows the pattern of birth weight reporting in Delhi state of India.

Discussion

The alarmingly high rate of mortality among the population is due to preterm delivery. If extreme prematurity and morbidity and mortality have to be reduced of all newborns weighing <1000 g at birth then effective steps are required to be taken [13]. "For better health risk assessment or case management related to mother, the factors such as educational level, urban or rural, occupation, nutritional status, alcohol and tobacco consumption during pregnancy need to be comprehensively documented. Health institutions can play a vital role by providing data of public health to public health researchers and environmental scientists and play a robust role in public health tracking system" [11,14]. "The factor that affects the most neonatal infant and childhood mortality and morbidity remain the low birth weight during pregnancy. Low birth weight babies are faced with the risk like disabilities, delayed development, poor growth and mental disabilities. The prevalence of low birth weight can be reduced by having a focused public health strategy on better health education and maternal nutrition [9].

Conclusion

It was observed that Delhi has the highest prevalence rate of low birth weight compared to other states in India. Poverty, age of mother, religion, body mass index, birth order and educational level are the factors associated with the high prevalence of the low birth weight. All the factors were found to be interrelated and exposure to one factor has the propensity to increases the likelihood of exposure to a collection of other related factors thereby further increasing the risk. The immediate action is warranted in those groups who are at the highest risk and where the risk factors are more prevalent. In Delhi, the reduction in the prevalence of LBW is possible if the key determinants like maternal education, nutritional status and antenatal care are addressed in time. Continuous and multifaceted health promotion interventions and strategies need to be implemented to address these risk factors effectively.

Strengths and Limitations of the Study

In this study, the major strength is robust sampling methods was applied during data collection. The sample size is large. Findings of this study can be generalized for Delhi, which is known as the capital of India. During data collection, the study sample had minimal selection bias. The self-reporting data

collected from mother's (mother memory recall) should be noted as one of the limitations and this study is focused only on the capital of India (Delhi state).

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Conflict of Interests

Not applicable

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Not applicable

Reference

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