



# A Study of Low Birth Weight and Associated Maternal Factors in A Rural Field Practice Area of a Medical College at Ahmedabad City of Gujarat

Kamleshkumar Jain<sup>1</sup>, Rujul Shukla<sup>2</sup>, Bhavik Rana<sup>3</sup>, Vasu Rathod<sup>4</sup>

<sup>1-4</sup>GCS Medical College, Hospital and Research Centre, Ahmedabad

## ABSTRACT

**Introduction:** In developed countries, about 50% of all Low-Birth-Weight new born are preterm. Low birth weight is also a leading cause of neonatal death and major risk factor for infant and under-five morbidity and mortality.

**Objectives:** To find out prevalence of low birth weight & to determine the association of socio-demographic variables, maternal medical and obstetric risk factors with low birth weight.

**Methodology:** Across sectional community-based study was conducted in a rural field practice area of a medical college. A total of 600 participants (mothers who delivered within 3 months) were included in the study.

**Results:** The prevalence of LBW was found to be 17% in the current study. Statistically significant association was obtained between age, education, occupation, socio-economic class of participants and birth weight of the child. The prevalence of LBW was found to be significantly high (51.7%) amongst children of those participants who consumed/used tobacco in any form.

**Conclusion:** The prevalence of the LBW was found to be 17%. Extremes of reproductive age group, illiteracy, occupation of labourer, SEC class IV, grand-multiparity, inadequate IFA consumption, short stature, weight of mother and use of tobacco were found to be significantly affecting the birth weight and associated with low birth weight.

**Keywords:** Low Birth Weight, Maternal Factors, Rural Area

## INTRODUCTION

Children's Health is nation's wealth. When mother is healthy, child will be healthy too.<sup>1</sup> Low birthweight (LBW) is one of the major public health problems; in developed countries, about 50% of all LBW infants are preterm while in developing countries, most of LBW infants are born at term and are affected by intrauterine growth restriction that may begin early in pregnancy.<sup>2,3</sup> Low birth weight has been defined by WHO as weight at birth of <2500 grams.<sup>4</sup> Low birth weight is more frequent in developing than developed countries. However, data on low birth weight in

developing countries is often limited because a major portion of deliveries occur in homes or small health facilities, where cases of infants with low birth weight often go unreported. These cases are not reflected in official figures and may lead to a significant underestimation of the prevalence of low birth weight.<sup>4</sup> Low birth weight (LBW) (birth weight <2.5kg) is a major challenging public health problem because it is a leading cause of neonatal death and major risk factor for infant and under-five morbidity and mortality.<sup>5,6</sup> More than 95% of LBW infants are born in developing countries.<sup>7</sup> The magnitudes of LBW in developing countries (16.5%) tended to be

**How to cite this article:** Jain K, Shukla R, Rana B, Rathod V. A Study of Low Birth Weight and Associated Maternal Factors in A Rural Field Practice Area of a Medical College at Ahmedabad City of Gujarat. Natl J Community Med 2022;13(7):473-477. DOI: 10.55489/njcm.130720222099

**Financial Support:** None declared

**Conflict of Interest:** None declared

**Date of Submission:** 15-03-2022

**Date of Acceptance:** 26-05-2022

**Date of Publication:** 31-07-2022

**Correspondence:** Dr. Kamleshkumar G Jain (Email: medico\_22981@yahoo.com)

**Copy Right:** The Authors retain the copyrights of this article, with first publication rights granted to Medsci Publications.

double than that of developed countries (7.0%).<sup>7</sup>

The causes of LBW are several and complicated. It depends on complex interactions of numerous factors like reproductive, socio-demographic, cultural and surrounding physical environmental conditions and regional factors. The causes of LBW are maximally related to maternal<sup>8,9,10</sup> and socioeconomic and psychological factors.<sup>11</sup> Weight at birth is a good indicator for the new-born's chances of survival, growth, long-term health and psychological development.<sup>12</sup>

## OBJECTIVES

The objectives of this study were to find out prevalence of low birth weight and to determine the association of socio-demographic variables, maternal medical and obstetric risk factors with LBW.

## METHODOLOGY

This was cross sectional Community Based study conducted at Village Dabhoda -rural field practice area of a Medical College located at Ahmedabad city of Gujarat from 1<sup>st</sup> January 2017 to 31<sup>st</sup> December 2019. Study was started after taking Ethical permission from the institute.

Mother with at least one new born baby was considered as a participant for the study. All mothers registered at Primary Health Centre (PHC) who had delivered within 3 months were included in the study. List of all such registered and delivered mothers was obtained from the records of PHC and were contacted to participate in the study. Recruitment of Partici-

pants was done until pre-decided number of sample size was not achieved.

Study Sample Size: With Prevalence of LBW baby considered as 40% in India<sup>13</sup> and using sampling calculation method  $4pq/l^2$ , sample size was calculated as 600 women for the study. In the current study all mother were included who gave informed consent and willingness to take part in the study. Data collection was performed using pre tested questionnaire. Questionnaire used to take information regarding Socio demographic, anthropometric and Risk factor for Low Birth Weight. As a definition Baby weight less than 2500 gm considered as a Low-birth-weight baby.<sup>4</sup> Tobacco addiction was considered by authors as consumption/smoking of tobacco/tobacco products for at least one previous year with history of daily consumption. Birth weight of the new-borns were noted as mentioned in the MAMTA Card. Data were collected by trained Medical Social Worker by face-to-face interview (for average duration of 15 minutes). Data entry was done in MS Excel and was analyzed by using Epi Info statistical software v7.

In present study along with frequency, Chi-Square Test was also used to establish association between various risk factor and Low Birth Weight.

## RESULTS

A total of 600 participants were interviewed for the study. Socio-economic characteristics of study participants are given in table 1. Out of 600 participants, 102 (17.0%) had birth of low weight babies while remaining 498 (83.0%) had birth of normal weight babies.

**Table 1: Socio-Economic characteristic of study participants and their association with Birth weight of the child (n=600)**

Characteristics	Low BW* (N = 102)	Normal BW* (N = 498)	Total	OR (95% CI)	Chi Square Value	P value
<b>Age of Participant</b>						
Mean ± SD	(29.22 ± 6.79)	(26.99±5.43)				
<20	14(40)	21(60)	35	<b>Ref</b>	38.277	(<0.0001)
21-25	30(11)	243(89)	273	0.19 (0.09-0.4)		
26-30	28(16)	147(84)	175	0.29 (0.13-0.63)		
31-35	11(16.4)	56(83.6)	67	0.29 (0.12-0.75)		
36-40	14(34.1)	27(65.9)	41	0.78 (0.31-1.98)		
41-45	5(55.6)	4(44.4)	9	1.88 (0.43-8.22)		
<b>Educational Status of participant</b>						
Illiterate	24(38.1)	39(61.9)	63	<b>Ref</b>	25.518	<0.0001
Primary	44(17.5)	207(82.5)	251	0.35 (0.19-0.63)		
Secondary	22(12.3)	157(87.7)	179	0.23 (0.12-0.45)		
Higher Secondary	6(9.7)	56(90.3)	62	0.17 (0.07-0.47)		
Graduate or above	6(13.3)	39(86.7)	45	0.25 (0.09-0.68)		
<b>Occupation of participant</b>						
House-maker	38(10.3)	330(89.7)	368	<b>Ref</b>	33.638	<0.0001
Laborer	62(28.8)	153(71.2)	215	3.52 (2.25-5.5)		
Self Employed	1(8.3)	11(91.7)	12	0.79 (0.1-6.28)		
Service	1(20)	4(80)	5	2.17 (0.24-19.93)		
<b>Socio-Economic Class# of Family</b>						
I	4(8.2)	45(91.8)	49	<b>Ref</b>	21.225	<0.0001
II	12(11.8)	90(88.2)	102	1.5 (0.46-4.91)		
III	25(11.8)	186(88.2)	211	1.51 (0.5-4.56)		
IV	61(25.6)	177(74.4)	238	3.88 (1.34-11.23)		

\*BW- Birth Weight; #Modified B. S. Prasad Classification (All India Consumer Price Index considered for January 2020)

**Table 2: Obstetric and anthropometric characteristics of study participants and their relation with Birth weight of the child (n=600)**

Characteristics	Low BW* (N = 102)	Normal BW* (N = 498)	Total	OR (95% CI)	Chi Square Value	P value
<b>Parity of the participant</b>						
Primi Gravida	71 (19.5)	294 (80.5)	365	<b>Reference</b>	5.996	0.04
Multi Gravida (2-3)	25 (12)	184 (88)	209	0.56 (0.34-0.92)		
Grand Multi Gravida (>=4)	6 (23.1)	20 (76.9)	26	0.41 (0.17-1)		
<b>ANC Visit</b>						
No ANC visit	2 (28.6)	5 (71.4)	7	<b>Reference</b>	1.475	0.47
4-Jan	69 (17.95)	317 (82.1)	386	0.54 (0.1-2.86)		
>4	31 (15)	176 (85)	207	0.44 (0.08-2.37)		
<b>Consumption of IFA Tablet during pregnancy</b>						
0-60 days	42 (70)	18 (30)	60	<b>Reference</b>	152.255	<0.0001
61-120 days	39 (21)	147 (79)	186	0.11 (0.06-0.22)		
>120 days	21 (5.9)	333 (94.1)	354	0.03 (0.01-0.05)		
<b>Mother's Weight Gain</b>						
<6 Kg	41 (30.1)	95 (69.9)	136	2.85 (1.81-4.49)	21.543	<0.0001
>6 Kg	61 (13.1)	403 (86.9)	464	<b>Reference</b>		
<b>Height of the participant</b>						
<140 cm	14 (66.7)	7 (33.3)	21	<b>Reference</b>	61.751	<0.0001
140-150	56 (23.9)	178 (76.1)	234	0.16 (0.06-0.41)		
150-160	22 (8)	253 (92)	275	0.04 (0.02-0.12)		
160-170	8 (17.4)	38 (82.6)	46	0.11 (0.03-0.34)		
170-180	2 (8.3)	22 (91.7)	24	0.05 (0.01-0.25)		
<b>Weight of the participant</b>						
<50kg	46 (36.8)	79 (63.2)	125	4.36 (2.76-6.89)	43.87	<0.0001
>50kg	56 (11.8)	419 (88.2)	475	<b>Reference</b>		
<b>Tobacco Addiction (in any form)</b>						
Yes	46 (51.7)	43 (48.3)	89	<b>8.69(5.27-14.33)</b>	89.102	<0.0001
No	56 (11)	455 (89)	511	<b>Reference</b>		

\*BW- Birth Weight

**Table 3: Outcome of pregnancy amongst study participants and its statistical relation with birth weight of the child (n=600)**

Outcome of Pregnancy	Low birth weight	Normal birth weight	Total	OR (95% CI)	Chi Square Value	P value
Preterm	56 (100)	0 (0)	56	-	301.603	<0.0001
Full Term	45 (8.4)	490 (91.6)	535	<b>Reference</b>		
Post Term	1 (11.1)	8 (88.9)	9	1.36 (0.17-11.13)		

Most of the participants were of 21-25 age group (45.5%), having primary education (41.8%), house-maker by occupation (61.3%) & belonging to Class IV of Modified Prasad classification (39.7%). Statistical association was obtained between age, education, occupation, socio-economic class of participant and birth weight of the child which is given in table 1. Participants who were labourer by occupation had 3.52 times more risk of Low birth weight and those who belonged to Class IV of Modified Prasad SEC had 3.88 times more risk of delivering low birth weight babies.

Most of the participants were primi-gravida (60.8%), had undertaken 1-4 number of visits (64.3%), consumed IFA >120 days (59.0%), had gained more than 6 kg weight during pregnancy (77.3%), had height of 150-160 cm (45.8%) and had weight >50 kg at time of delivery (79.2%). Statistical relation was obtained between Parity, Consumption of IFA tablet, mother's weight gain, height-weight of participant and birth weight of the child, detail about which can be found

in table 2. Also, statistical association was obtained between tobacco consumption and birth weight of the child. Mothers who had gained less than 6 kg weight during pregnancy were at 2.85 times more risk of having low birth weight baby. Similarly, those whose weight were <50 kg and had tobacco addiction before and/or during the pregnancy were at 4.36 & 8.69 times more at risk of delivering low birth weight baby respectively.

Pregnancy outcome in most of the study participants was Full term delivery (89.2%). More over outcome of pregnancy was statistically related to birth weight of the child which is given in table 3. Risk of low birth weight was 1.36 times higher amongst post term pregnancy as compared to full term.

## DISCUSSION

In the current study, prevalence of Low Birth Weight was found to be 17%, which is almost similar to that reported for worldwide by UNICEF (15%) in 2019 & that reported by NFHS-5 (18%) nationally. Low birth

weight was more common in women with extreme age which is less than 20 years or 41-45 years of age. Also, low birth weight was more common in illiterate participants, labourer by occupation and also to those who belonged to Class IV as per modified Prasad classification. In present study, this finding can be attributed to the fact that all of the women in present study were from rural areas.

This study demonstrated how certain socioeconomic factors have a negative impact on new born weight. The reason for this impact may be that the mothers in rural area did not get enough rest throughout pregnancy and worked continuously.

Low birth weight was more common among participants with characteristics like height <140 cm and weight <50kg. Weight gain <6 kg during pregnancy was associated with low birth weight. This could be as a result of anthropometric measurements, which are either directly or indirectly determined by nutritional status which has been found in other studies<sup>14,15</sup>. The growth and development of the foetus inside the uterus might be hampered by maternal under nutrition. Also, low birth weight was on higher side amongst female who had tobacco addiction before and/or during the pregnancy. Grand Multi Gravida ( $\geq 4$ ) was also associated with low birth weight in current study.

Statistical association was obtained between outcome of pregnancy and birth weight of the child. Low birth weight was present in all preterm deliveries. In present study preterm birth and low birth weight was observed which is similar to the results of the studies done at Tanzania<sup>16</sup> & India<sup>17</sup>.

In a study conducted at Nepal<sup>14</sup> found maternal height <146 cm, maternal weight  $\leq 50$  kg, primiparity, multi-parity, Iron and folic acid consumption for  $\leq 60$  days, were the significant risk factors associated with Low birth weight which is similar to present study. In a similar study done in Gambia,<sup>18</sup> rate of LBW & Preterm birth was found as 10.5% & 10.9% respectively, while in present study LBW was on higher side i.e., 17% while Preterm birth was slightly lower at 9.3%. In a study conducted at Guwahati,<sup>19</sup> reported that low birth weight was related to maternal factors like age & weight which is similar to the current study.

## CONCLUSION

The prevalence of LBW was found to be 17%. Variables like early age (<20 years) at marriage, illiteracy, low Socio-Economic Class and use of tobacco were found to be significantly affecting the birth weight and associated with low birth weight.

## RECOMMENDATION

Similar studies can be conducted on larger scale and risk factors identified can be added to the existing

list of "high risk pregnancy" and "risk factors for low birth weight".

## LIMITATIONS

In present study, duration of the study was long, recall bias may occur amongst participants and birth weight was taken as mentioned in Mamta card.

## REFERENCES

1. KotabalR,HebbaliLP,RatnagarR. Study the factor associated with Low birth weight among newborns delivered in tertiary-care hospital, Shimoga, Karnataka. *International Journal of Medical Science and Public Health* 2015;4(9):1287-19
2. Villar J, BelizánJ. The relative contribution of prematurity and fetal growth retardation to low birth weight in developing and developed societies. *Am J Obstet Gynecol.* 1982;143(7):793-8.
3. WHO. Regional consultation towards the development of a strategy for optimizing fetal growth and development. Cairo, Egypt:World Health Organization. 2005.
4. WHO. Nutrition Landscape Information System (NLIS) [Internet]. 2022 [cited 2022 May 15]. Available from: <https://www.who.int/data/nutrition/nlis/info/low-birth-weight>
5. United Nations Children's Fund and WHO (2004) Low birth weight country, regional and global estimates, New York [http://www.unicef.org/publications/index\\_24840.html](http://www.unicef.org/publications/index_24840.html)
6. Gebremedhin M, Ambaw F, Admassu E, Berhane H (2014) Maternal associated factors of low birth weight: a hospital based cross-sectional mixed study in Tigray, Northern Ethiopia. *BMC Pregnancy Childbirth* 15:222. <https://doi.org/10.1186/s12884-015-0658-1>
7. Feresu SA, Harlow SD, Woelk GB (2015) Risk factors for low birth weight in Zimbabwean women: a secondary data analysis. *PLoS One* 10(6):e0129705. <https://doi.org/10.1371/journal.pone.0129705>
8. Demelash H, Motbainor A, Nigatu D, Gashaw K, Melese A (2015) Risk factors for low birth weight in Bale zone hospitals, South-East Ethiopia: a case-control study. *BMC Pregnancy Childbirth* 15:264. <https://doi.org/10.1186/s12884-015-0677-y>
9. Sachin SM, Girish M, Rajesh D, Surekha Y, Madhav KT, Kiran P (2012) Maternal risk factors associated with term low birth weight neonates: a matched-pair case control study. *Indian Pediatr* 49:25-28
10. Dasgupta A, Basu R (2011) Determinants of low birth weight in a block of Hooghly, West Bengal: a multivariate analysis. *Int J Biol Med Res* 2(4):838-842
11. Siza JE (2008) Risk factors associated with low birth weight of neonates among pregnant women attending a referral hospital in Northern Tanzania. *Tanzan J Health Res* 10(1):5-8
12. WHO, UNICEF (2004) Low birth weight, country, regional and global estimates. WHO, Dept. of Reproductive Health Research, ISBN: 92-806-3832-7, New York, 1-32.
13. United Nations Children's Fund and World Health Organization. Low Birthweight: Country, regional and global estimates. Unicef. 2004. 1-31 p.
14. Yadav, D. K., Shukla, G. S., Gupta, N., Shrestha, N., Singh, A., & Kaphle, H. P. (2020). Maternal and Obstetric Factors Associated with Low Birth Weight. *Journal of Nepal Health Research Council*, 17(4), 443-450. <https://doi.org/10.33314/jnhrc.v17i4.2263>
15. Demelash H, Motbainor A, Nigatu D, Gashaw K, Melese A. Risk factors for low birth weight in Bale zone hospitals, South-East

- Ethiopia: a case-control study. *BMC Pregnancy Childbirth*. 2015 Oct 13;15:264
16. Rugaimukam JJ, Mahande MJ, MsuyaSE, Philemon RN (2017) Risk Factors for Preterm Birth among Women Who Delivered Preterm Babies at Bugando Medical Centre, Tanzania. *SOJ GynecolObstetWomens Health* 3(2):1-7. DOI: <http://dx.doi.org/10.15226/2381-2915/3/2/00124>
  17. Mallick A. Prevalence of low birth weight in India and its determinants: Insights from the National Family Health Survey (NFHS), 2015-2016. *Anthropol Anz*. 2021 Jan 11. doi: 10.1127/anthranz/2021/1317. Epub ahead of print. PMID: 33432318.
  18. Jammeh, A, Sundby, J. and Vangen, S. (2011) Maternal and obstetric risk factors for low birth weight and preterm birth in rural Gambia: a hospital-based study of 1579 deliveries. *Open Journal of Obstetrics and Gynecology*, 1, 94-103. doi: 10.4236/ojog.2011.13017
  19. Deka, A., Saharia, N. and Bihani, A., 2022. A Study On Maternal Factors Associated With Low Birth Weight Newborns. *New Indian Journal of Paediatrics*, [online] 7(2), pp.82-88. Available at: <<https://nijp.org/wp-content/uploads/2018/09/v7n2-p082-088.pdf>> [Accessed 22 June 2022].