



STUDY ON PREVALENCE AND SOCIODEMOGRAPHIC DETERMINANTS OF LOW BIRTH WEIGHT : A CROSS-SECTIONAL STUDY

Dr Preeti Arora*

Demonstrator, Department of Community Medicine, Kalpana Chawla Govt. Medical College, Karnal, Haryana, India*Corresponding Author

Dr Naresh R Makwana

Professor, Department of Community Medicine, Shri MP Shah Medical College , Jamnagar ,Gujarat , India

ABSTRACT

Background : Low birth weight (LBW) (<2500 g), is the strongest determinant of infant morbidity and mortality. The birth weight of an infant is the single most important determinant of chances of survival, healthy growth and development. **Objective :** The aim of this study was to find the prevalence of low birth weight and its association with socio-demographic factors like age education and socio-economic status. **Method :** The present study design was a community based cross-sectional study. It was conducted in an urban area of Jamnagar, Gujarat from Jan 2016 to Dec 2016. The study population consisted of newborn babies (< 28 days) in urban areas of the study district. Sample size 400 was calculated by taking 50% as the minimum prevalence of low birth weight with 10% permissible error. **Result :** The prevalence rate of low birth weight in our study was 19.8 %. The socio-demographic risk factor for low birth weight of newborns in our study were Maternal age (p = 0.0011). Maternal education (p= 0.000) and occupation (p= 0.000) of mothers were found to be significantly associated with low birth weight of newborn. To conclude the present study, magnitude of the problem of lbws (19.8%) in the study area was high. **Conclusion :** The present study revealed that maternal age, education, socioeconomic status and occupation were significantly associated with the birth weight of a newborn.

KEYWORDS : Low birth weight, Prevalence, Socio-demographic factors.

Introduction

The birth weight of an infant is the single most important determinant of chances of survival, healthy growth and development¹. The birth weight of an infant, simple as it is to measure, is highly significant in two important aspects. In the first place, it is strongly conditioned by the socio-demographic factors and nutritional status of the mother. In the second place, it is one of the most important determinant of the chances of the newborn to survive and to experience healthy growth and development.^{2,3} The low birth weight is an index of our status of public health in general and of maternal health and nutrition in particular.⁴

Low birth weight is defined by WHO as a birth weight less than 2500 g (5.5 pounds). This is based on epidemiological observations that infants weighing less than 2,500 g are approximately 20 times more likely to die than heavier babies.⁵

India, one of the countries with the highest incidence of low birth weight, adds nearly 7.5 million such babies annually.⁷ India alone accounts for 40 percent of low-birth-weight babies in the overall developing world and more than half of those born in Asia.⁶ About 18.6 per cent of babies born in India are low birth weight as compared to 4 percent in some developed countries.⁸ In Gujarat, out of the total weighed births, prevalence of low birth weight is 17 %.⁹ In Gujarat prevalence of low birth weight is high, but not much data are available pertaining to prevalence of low birth weight especially in the study district of Gujarat.

Social determinants of health such as income, education, housing, addiction, and living place (urban/rural) have an important role in LBW. While LBW associated factors are well studied in developed countries, there is not enough evidence in developing countries¹⁰

With this background, this study was conducted to study the prevalence of low birth weight and its associated socio-demographic factors in a district of state Gujarat, India.

Materials and Methods:

The present study design was a community based cross-sectional study. It was conducted in an urban area of Jamnagar, Gujarat from Jan 2016 to Dec 2016.

Study population: The study population consisted of newborn babies (< 28 days) in urban areas of the study district born during the study period and information is sought from their respective mothers. All the new born babies less than 28 days were included in the study till the desired sample size was achieved. All newborn babies more than 28 days and those mothers who were not willing to participate in the study were excluded.

Sample size: Previous literature pertaining to low birth weight for study area was not available. So, by assuming 50% as prevalence of low birth weight, 95% confidence interval and 5% level of significance, the sample size was calculated by the Cochran's formula i.e. $4pq/L^2$; where p = prevalence in consideration, q = 1 - p, L = relative error taken into consideration i.e. 10% of p. By applying the above formula, the sample size came out to be 384, which was rounded off to 400 study subjects.

Sampling technique: There were 19 wards in the study district, out of which 4 were selected randomly for the purpose of study. From each of the selected wards, 100 study subjects were selected consecutively till the desired sample was achieved.

Data collection: The study subjects were interviewed through house to house visit. Record of all antenatal mothers was obtained from the nearest anganwadi centre and were tracked for their delivery. Also, all mothers having newborns below 28 days of age were initially contacted. The study subjects were informed about the purpose of study and their privacy and confidentiality was ensured. Data were collected with the help of an oral questionnaire by in person interview with the mother after obtaining an informed consent. Birth weight of an infant less than 2500 g (up to and including 2499 g), irrespective of gestation, was considered as low birth weight. The socio-demographic variables studied were address, religion, mother's age in years, mother's education, with occupation and per capita income of the family.

Data analysis: Collected data were compiled in Microsoft Excel sheet and analyzed using SPSS for Windows, subscription version. Results were expressed as mean (\pm S.D.), percentages and chi square test was applied to find association between the variables. The p-value less than 0.05 was taken as statistically significant with a confidence level of 95%.

Results

A total of 400 study subjects were recruited for the purpose of the study. The prevalence rate of low birth weight in the present study was 19.8 %. The mean birth weight of newborns was 2.86 kg with a range of 1.1 Kg to 4.4 Kg. On further analysis, it was noted that 2.3% of newborns had birth weight between 1 to 1.49 kg, i.e (Very low birth weight) , 17.5% had weight between 1.5 to 2.49 kg (low birth weight) .80.2% babies had normal weight at birth. (figure 1).

In the present study, out of 400 mothers, Majority 342(85.5%) were between the age group 21 to 30 years of age followed by 7.5% in the <20 years age and 7.0% from >30years age . Majority 358 (89.5%) were Hindu and 10.5% were Muslim. Majority 327(81.75%) have

studied upto higher secondary level . 9.5% of the mothers were illiterate. Majority of the mothers 366 (91.5%) are Housewives, followed by 26 (6.5%) doing Job. Only 1% is involved in agriculture and labour. 4(1%) were involved in other occupations like tailoring etc. As regards to socioeconomic class 23(5.8 %) belonged to class I ,39(9.8%) belonged to class II, 151 (37.8%) to class III, 166 (41.5%) to class IV and 21(5.1%) belonged to class V.

Table 2 shows association between socio-demographic variables of mother and birth weight of newborn. The percentage of low birth weight babies was 46.4% in the >30 years age group, followed by 20% in < 20 years age group. The percentage of LBW in the age group 21-30 years is 17.5%. This difference in the distribution was statistically significant, (p=0.0011)

The percentage of low birth weight babies was almost same in women belonging to Hindu (19.6%) and Muslim (21.4%) religion. There was no statistically significant difference in the percentage of low birth weight babies among different religions (p = 0.773).

The present study revealed that among 35 women who studied upto graduate/postgraduate level, 18 (61.5%) had given birth to low birth weight babies. 28.9% of illiterate women had low birth weight babies. Percentage of LBW for women studied upto higher secondary was 15.3%.

Thus, there is statistically significance difference in the percentage of low birth weight babies of literates and illiterates (p = 0.000) Out of 2 women who were doing labour work , both had low birth weight babies. In other working group, Out of 26 women doing job,14 (53.8%) had low birth weight babies. Among 366 housewives ,63(17.2%) had low birth weight babies. The occupation of the women was associated with the low birth weight (p = 0.000).

In our study, the percentage of low birth weight babies was 52.2% in upper class, followed by 33.3 % in lower class. The percentage of LBW in lower middle and upper middle is 21.1% and 15.4%. The least percentage of low birth weight was noted in middle class. This difference in the distribution was statistically significant, (p=0.000)

Figure 1

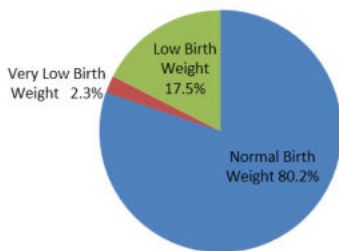


Table 1: Distribution of the study subjects according to their socio-demographic characteristics of the mother.

CHARACTERISTICS OF MOTHER	FREQUENCY N=400	PERCENT
Age (in years)		
< =20	30	7.5
21 – 30	342	85.5
>30	28	7.0
Religion		
Hindu	358	89.5
Muslim	42	10.5
Literacy Status		
Illiterate	38	9.5
Till Higher secondary	327	81.75
Graduate /Postgraduate	35	8.75
Mother's occupation		
House wife	366	91.5
Agriculture	2	0.5
Labour	2	0.5
Job	26	6.5
Others	4	1.0

Socio-economic Status		
Upper class (I)	23	5.8
Upper middle Class(II)	39	9.8
Middle Class(III)	151	37.8
Lower Middle Class(IV)	166	41.5
Lower Class(V)	21	5.1

Table 2: Association between socio-demographic variables of mother and birth weight of newborn (n=400)

CHARACTERISTIC OF MOTHER	LOW BIRTH WEIGHT	NORMAL BIRTH WEIGHT	CHI SQUARE	P VALUE
Age (in years)				
< =20	6(20%)	24(80%)	13.625	0.0011
21 – 30	60(17.5)	282(82.5)		
>30	13(46.4%)	15(53.6%)		
Religion				
Hindu	70(19.6)	288(80.4)	0.083	0.773
Muslim	9(21.4)	33(78.6)		
Mothers Literacy Status				
Illiterate	11(28.9)	27(71.1)	28.292	0.0000
Till Higher secondary	50(15.3)	277(84.7)		
Graduate /Postgraduate	18(51.4)	17(48.6)		
Mother's occupation				
House wife	63(17.2)	303(82.8)	30.160	0.000
Agriculture	0(0)	2((100)		
Labour	2(100)	0(0)		
Job	14(53.8)	12(46.2)		
Others	0(0)	4(100)		
Socio-economic Status				
Upper class (I)	12(52.2)	11(47.8)	23.250	0.000
Upper middle Class(II)	6(15.4)	33(84.6)		
Middle Class(III)	19(12.6)	132(87.4)		
Lower Middle Class(IV)	35(21.1)	131(78.9)		
Lower Class(V)	7(33.3)	14(66.7)		

Discussion

The prevalence rate of low birth weight in our study was 79 (19.8%). The mean birth of newborns was 2.86 kg. Majority of the studies done in rural areas of India had the same magnitude of the problem of LBWs^{11,17,12,18&19} ,But, one study done in Ballabgarh had the prevalence rate of LBW as low as 8.8% and another study conducted in West Bengal as high as 31.3%^{15&20} On further analysis it was noted that 2.3% of newborns had birth weight between 1 to 1.49 kg, i.e (Very low birth weight) , 17.5% had weight between 1.5 to 2.49 kg (low birth weight) . 80.2% babies had normal weight at birth. The community based study undertaken in West Bengal, revealed that 3.3% of newborns had birth weight < 1.8 kg, 2.7% between 1.8 to 2 kg, 25.3% between 2.1 to 2.49 kg, 48.0% between 2.5 to 2.9 kg and 20.7% of newborns had birth weight ≥ 3 kg¹⁵. In a hospital based study conducted in Pune, it was noted that 0.7% of newborns had birth weight < 2 kg, 19.9% between 2 to 2.49 kg, 44.2% between 2.5 to 2.9 kg and 35.2% of newborns had birth weight ≥ 3 kg²¹.

The mean age of the study subjects was 25.57 years, the findings were similar to other studies^{12,13&14}. Our study revealed that the prevalence of teenage pregnancy was 7.5% . This was much less when compared with other studies conducted in West Bengal and Government Maternity Hospital, Tirupati where it was 11.62%¹⁵ and 10.20%¹⁶ respectively. Many researchers demonstrated that increasing maternal age is an independent risk factor of Low Birth Weight. The Women age < 20 (teenagers) years were seen to have High risk of Low Birth Weight. The results coincidence with the finding of Gagan Agarwal et al²² the prevalence of LBW among mother's aged < 18 years 42.86% and those >35 years 33.33%. The results are supported by similar study Samiran Bisai et al the rate of LBW decreased with the increasing age

of mother's after 18 years. The young Mother's (age < 19 years) delivered a higher rate of LBW baby than those mother's aged 19 year onwards.²³

Maternal age at delivery <18 and >35 years old was associated with increased risk of LBW. A large number of epidemiological studies have shown that LBW occurs in young and old mothers. There are social disadvantages such as low socioeconomic status, low education, poor nutrition, and low body mass index responsible for these results in younger mothers; however, in the older mothers, biological factors such as chromosomal anomalies, preeclampsia, and diabetes are responsible for this issue^[24,25,26,27]

The proportion of births to women ≥ 35 years of age was 8.4% in 1990 and 12.6% in 1996, a 51.2% increase. Among these women, LBW delivery increased 11%, and preterm delivery increased 14%. Delayed childbearing accounted for 78% of the change in LBW rate in the population and 36% of the change in preterm delivery rate in the population. Provincial multiple birth rates increased by 15% for twins and 14% for triplets. Delayed childbearing accounted for 15% of the twin increase and 69% of the triplet increase.²⁸

In our study there was no statistically significant difference in the percentage of low birth weight babies among different religions ($p = 0.773$). This study shows insignificant association between birth weight and religion which was suggested by Yada et al.²⁹

A study in Kolkata³¹ showed Proportion of low birth weight babies were less for Hindu mothers (24.5%) compared to mothers belonged to Muslim (54.6%) and other religion (46.6%) and this was also statistically significant, which might be due to some cultural factors. It was in contrast to the findings shown by Mavalankar DV et al in Ahmedabad, India where they found Muslim women were at much lower risk of lbw babies than Hindu mothers.³⁰

In our study there is statistically significance difference in the percentage of low birth weight babies of literates and illiterates ($p = 0.000$). In a study done by Dr Nirmalya Manna et al Maximum proportion of low birth weight babies were found among illiterate mothers(41.3%) followed by mothers with primary education (28.1%). As the education of the mother increased, the prevalence of low birth weight also significantly ($p=0.001$) decreased³¹

The occupation of the women was associated with the low birth weight ($p=0.000$).

Many researchers reported that occupation is one of the major factors of Low Birth Weight. Bener A et al³² found that Risk factors considered was mother's occupation. Labourer and coolie workers occupation are more risk factors of Low Birth Weight compared with Govt and private services.

In this study there is significant association of low socioeconomic status and LBW babies. ($p=0.000$). The finding of significant association of low socioeconomic status and LBW babies shown by this study is consistent with previous studies^{11,27,33,34,35}. Low socioeconomic status and low educational status leads to low health consciousness, lower nutritional status and low antenatal attendance, leading to the increased risk of LBW babies.³⁶

Conclusion

To conclude the present study, magnitude of the problem of low birth weight (19.8%) in the study area was high. The present study revealed that maternal age, education, socioeconomic status and occupation were the risk factors significantly associated with the birth weight of a newborn. The problem of LBW is multidimensional, and hence, we need an integrated approach incorporating medical, social, economical and educational measures to address this issue.

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Ethical clearance - Ethical clearance taken from Institutional Ethical Committee.

REFERENCES:

1. Park K. Park's Textbook of Preventive and Social medicine, 24th edition, 570.
2. Nagargoje M M, Chaudhary S S, Deshmukh J S, Gupta S C, Mishra S K. A case control study for risk factors of low birth weight in Nagpur city of Maharashtra. IJCH, 2011;22(1). <https://www.iapsmupuk.org/journal/index.php/IJCH/article/view/175>.

3. Shakya K, Shrestha N, Bhatt Mr, Hepworth S, Onta S. Accuracy of low birth weight as perceived by mothers and factors influencing it: A facility based study in Nepal. International Journal Of Medical Research & Health Sciences, 2015;4(2):274-280.
4. Dandekar RH, Shafee M, Sinha SP. Prevalence and risk factors affecting low birth weight in a district hospital at Perambalur, Tamil Nadu. Global Journal Of Medicine and Public Health. 2014; 3(2):1-5.
5. Kramer MS. Determinants of low birth weight: Methodological assessment and meta-analysis. Bulletin of the World Health Organization, 1987;65(5): 663-737.
6. UNICEF Data : Monitoring the situation of children and women, Jan 2016. Update. Available from: <https://data.unicef.org/topic/nutrition/low-birthweight>.
7. Ramachandran N. Birth weight birth right. Available from: <http://www.livemint.com/Opinion/lznnDseEccQyqJ7oMLxt4L/Birthweight-birthright.html>.
8. Public health foundation of India. India health report : Nutrition 2015. http://www.transformnutrition.org/wp-content/uploads/sites/3/2015/12/INDIA-HEALTH-REPORT-NUTRITION_2015_for-Web.pdf
9. Chellan R, Paul L, Kulkarni PM. Incidence of low-birth-weight in India, regional variations and socio-economic disparities. Journal of Health & Development, 2007;3(1):147-162.
10. Momeni M, Danaei M, Kermani AJN, Bakhshandeh ME, Forooodnia S, Mahmoodabadi Z, et al Prevalence and risk factors of low birth weight in the Southeast of Iran. International Journal of Preventive Medicine. 2017;8(12):112-6
11. International Institute of Population Sciences. National Family Health Survey, India 2005-06 (NFHS-3, 2007) pp:225.
12. Rao T, Aggarwal AK, Kumar R. Dietary Intake in Third Trimester of Pregnancy and Prevalence of LBW: A Community-based Study in a Rural Area of Haryana. Indian Journal of Community Medicine 2007; 32 (4):272 – 276
13. Khatib N, Zahiruddin QS, Gaidhane AM, Waghmare L, Srivatsava T, Goyal RC et.al. Predictors for Antenatal Services and Pregnancy Outcome in a Rural Area: A Prospective Study in Wardha District, India. 2009; 63 (10): 436 – 444
14. Kumar A, Chaudhary K, Prasad S. Maternal Indicators and Obstetric Outcome in the North Indian Population: A Hospital-based Study. 2010; 56 (3): 192-5.
15. Biswas R, Dasgupta A, Sinha RN, Chaudhuri RN. An epidemiological study of low birth weight newborns in the District of Puruliya. Indian J Public Health. 2008 Apr-Jun;52(2):65-71.
16. Nagaraj K. Determinants of Low Birth Weight A case-control Study in Tirupati, India. The Indian Practitioner 2003; 56(4): 226 – 230.
17. Sachar RK, Kaur N, Soni RK, Dhot R, Singh H. Energy Consumption during Pregnancy & its relationship to Birth Weight – A Population based Study from Rural Punjab. Indian Journal of Community Medicine 2000; 25(4): 166 – 169.
18. Radhakrishnan T, Thankappan KR, Vasani RS, Sarma PS. Socioeconomic and Demographic Factors Associated with Birth Weight: A Community Based Study in Kerala. Indian Pediatrics. 2000; 37: 872 – 876.
19. Negi KS, Kandpal SD, Kukreti M. Epidemiological Factors Affecting Low Birth Weight. JK Science 2006; 8 (1): 31 – 34
20. Kapoor SK, Kumar G, Pandav CS, Anand K. Incidence of Low Birth Weight in Rural Ballabgarh, Haryana. Indian Pediatrics 2001; 38: 271 – 275.
21. Ghate MM, Pratinidhi AB, Gupte AM. Effects of Maternal Nutritional Status on Birth Weight of the Baby. J. Of Obst. & Gyn. Of India 2001; 51(1): 38 – 41.
22. Agarwal G, Ahmad S, Goel K, Kumar V, Goel P, Gardang M, Punj A. Maternal Risk Factors Associated with Low Birth Weight Neonates in a Tertiary Care Hospital, Northern India. 2012; 2(9):doi:10.4172/2161-0711.1000177
23. Bisai S. Maternal Height as an independent risk factor for neonatal size among adolescent bengalees in Kolkata, India. Ethiop J Health Sci. 2010;20(3):153-8.
24. Valero De Bernabé J, Soriano T, Albaladejo R, Juaranz M, Calle ME, MartinezD, et al. Risk factors for low birth weight: A review. Eur J Obstet Gynecol Reprod Biol. 2004;116(1):3-15.
25. Momeni M, Esfandyarpour R, Danaei M. The neglected socio-behavioural risk factors of low birth weight. Soc Determ Health, 2016;1:97-103.
26. Badalyan V. Case control study aimed at revealing risk factors of low birthweight in Yerevan city. College of Health Sciences, American University of Armenia; 2014. <https://pdfs.semanticscholar.org/6b5c/ee202ec8a447b94e5c3cd5e1eaf8151dfe0.pdf>.
27. Viengskhonne L, Yoshida Y, Sakamoto J. Factors affecting low birth weight at four central hospitals in Vientiane, Lao PDR. Nagoya J Med Sci 2010; 72(1-2):51-8.
28. Suzanne C. Tough, Christine Newburn-Cook, David W. Johnston, Lawrence W. Svenson, Sarah Rose, JaquesBelik. Delayed Childbearing And Its Impact On Population Rate Changes In Lower Birth Weight, Multiple Birth, And Preterm Delivery. Pediatrics:2002;109(3): 399-403.
29. Yadav DK, Chaudhary U, Shrestha N. Risk factors associated with low birth weight. Journal of Nepal Health Research Council. 2011;9(19):159-164.
30. Mavalankar DV, Trivedi CC, Gray RH. Maternal Weight, Height And Risk of poor pregnancy outcome in Ahmedabad, India. indian paediatrics. 1994;31:1206-12.
31. Manna N, Sarkar J, Baur B, Basu G, Bandyopadhyay L. Socio-Biological Determinants of Low Birth Weight: A Community based study from rural field practice area of Medical College, Kolkata, West Bengal (India). IOSR Journal of Dental and Medical Sciences 2013;4(4):33-9.
32. Bener A, Salameh KM, Yonsafzai MT, Saleh NM. Pattern of maternal complications and low birth weight: Associated risk factors among highly endogamous women. ISRN ObstetGynecol; 2012; doi:10.5402/2012/540495
33. Jafari F, Eftekhari H, Pourreza A, Mousavi J. Socioeconomic and medical determinants of low birth weight in Iran: 20 years after establishment of a primary healthcare network. Public Health. 2010; 124(3):153-8.
34. Sharma MK, Kumar D, Huria A, Gupta P. Maternal risk factors of low birth weight in Chandigarh India. Internet J Health. 2009; 9. Available from http://www.ispub.com/journal/the_internet_journal_of_health/volume_9_number_1_12/article/maternal-risk-factors-of-low-birthweight-in-chandigarh-india.html. Accessed 10 December, 2018.
35. Mumbare SS, Maingdarkar G, Darade R, Yenge S, Tolani MK, Patole K. Maternal risk factors associated with term low birth weight neonates: A matched-pair case control study. Indian Pediatrics. 2012;49(1):25-8.
36. Mann LI, Tejani NA, Weiss RR. Antenatal diagnosis and management of small for gestational age fetus. Am J Obstet Gynecol. 1974;120(7):995-1004.