International Journal of Health Sciences and Research
Vol.12; Issue: 9; September 2022
Website: www.ijhsr.org
Review Article *ISSN: 2249-9571*

Consequences of Low Birth Weight among Tribal Populations in India: A Review Analysis

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DOI: https://doi.org/10.52403/ijhsr.20220914

ABSTRACT

Background: Low Birth Weight (LBW) is considered an inescapable health hazard directly related to public health. It has already been well established by various scientific houses that less than 2.5 kg weight at the time of birth of a newborn is considered LBW. This research paper makes an attempt to depict the prevalence of LBW among tribal infants from all over India, based on published research articles.
Methods: While searching for LBW-related articles by keywords, the researcher benefited from various well-known scientific websites like ResearchGate, Academia.edu, Science direct, PubMed/Medline, WHO (World Health Organization) database, and Google scholar. From 2000 to 2022 years published articles are involved in the present review analysis. Use descriptive statistics to understand the magnitude of the summarized data by using the Past Software 4.03 version.
Results: A total of 17 articles were selected for the review analysis along with an investigation of 28746 infants, the prevalence of LBW in tribal infants of India was achieved at 39.89 % based on the study. The highest prevalence of LBW was in infants in Maharashtra at 87.50 % (95 % CI: 74.754 to 95.272), also the lowest LBW prevalence was found in children in Assam at 16.70 % (95 % CI: 16.100 to 16.820).
Conclusion: LBW prevalence is quite high among tribal infants in India, health policymakers need to work on the intervention of anemia, along with the nutritional status of mothers and children to decrease the prevalence rate of low birth weight.

Keywords: *Birth Weight, Infant, Low Birth Weight (LBW), Preterm birth, Socio-Economic condition, Tribes.*

INTRODUCTION

Low birth weight is one of the imperative unavoidable burning issues associated with public health [3]. Newborns with a birth weight of less than 2500 gm are said to be LBW infants on the basis of the reference scale of the World Health Organization (WHO) [1]. Worldwide more than 22 million newborns are born with LBW per year [3]. The enormity of LBW also differs from one country to another. All-inclusive one of every seven infants is born with LBW [26]. Developing countries account for an inconsistent burden of LBW due to mothers with poor socioeconomic conditions and low-level education presenting a good vulnerability to having LBW infants. The enormity of LBW in developing nations (16.5%) is inclined to be two times that of developed countries (7.0%) [4,27]. An approximate 6% of newborns are born LBW in the Pacific and East Asia, up to 28% in South Asia, also 13% in Sub-Saharan Africa [28]. Up to half of all LBW children are born in south Asia [29]. Moreover, another concern is that the LBW rates are increasing in certain developing countries, for instance, Oman,

where the rate of LBW went from 4% in 1980 to 8.1% in 2000 [30]. The high-income-based areas also report a lower prevalence rate of LBW, including 6.9% in the UK [31]. The occurrence of low birth weight among neonates in India differs between 25-30 %, study reported it may be caused by a variety of poor financial conditions, and biological, social, behavioral, along with environmental factors [5, 32]. In research conducted by ICMR, wherein the decisive factor for LBW was taken to be < 2000 gm, also the study was reported to be 5.5 % [33]. Additionally, another study reveals that in India, around 30-35% of infants are LBW, conversely, more than half of these newborns are considered full-term babies [34]. In general, India alone accounts for around 40% of LBW infants in the developing nations, also more than half of infants with LBW are born in Asia [35]. The causes of LBW are multifaceted and several, also it mostly depends on intricate interactions of various factors like socio-demographic, genetic, employment, reproductive, economic, cultural, different regional factors, political, and immediate physical environmental conditions of the women during pregnancy. The etiology of LBW is majorly associated with psychological [41, 42, 43], maternal [36, 37, 38, 39, 40], and socioeconomic factors.

On the basis of the 2011 census, in India, the tribal population was 8.6%. Out of the total tribal population, around 40.6% of tribal communities were from below the poverty line, side by side it also reveals that LBW children are also found to be high among tribal communities along with tribal-dominated areas in India [6].

In this context, this present review study intended to enquire about the LBW status among the tribal people in India and the purpose of this review study is to abridge the evidence of LBW among tribal communities.

MATERIALS & METHODS

In this study, we selected the published articles for review from an electronic database search of Academia.edu, ResearchGate, PubMed/Medline, Science direct, WHO database, Google scholar, and government reports. We also retrieved different articles using headings and keywords from 2000 to 2022 years, including low birth weight, pregnancy, neonatal, antenatal, infant mortality, and tribe. We did not try to locate the unpublished articles in our study and cross-check the reference to articles. This systematic review followed the parameter of (WHO) regarding LWB, which means weighing less than 2.5 kg or 2000gm out of the total of live births during the same time period. Our search identified a total of 500 records, but we excluded 269 screened titles, duplication, along with an abstract of 209 publications. Another 5 reviews were also expelled after more assessment of the whole texts of the articles. Finally, 17 articles fulfilled our inclusion criteria and were also included in the descriptive analysis of this systematic review study.

Statistical Analysis: The probability plot, Histogram analysis, and Rader cart diagram analysis were performed for showing general distributional features of data set variables by using Past software 4.03 version.

RESULT

The research was conducted in India and a total of 17 articles fulfilled the criteria, as well as included in the study. Two case-control studies were mainly included in this review study, in which women who delivered a newborn with LBW were compared with those women who delivered newborns with non-low birth weight. The selected sample size for this present study ranged from 37 to 14640 infants. The research by Chande was unique in that it was conducted only in a tribal area of Maharashtra [7]. Finally, Desai and colleagues [8] studied a large population of

Gujarat and worked on tribal pregnant women.

The wide range of prevalence rates of low birth weight (16.70% -87.00%) documented in the studies selected for review may also reflect the basic difference in different geographical locations and as well highlight the reasons for low birth weight in tribal or rural locations in India [7,9]. Four studies also reported very low birth weight (VLBW) [7, 8, 9, 10] while none of the studies reported extremely low birth weight (ELBW).

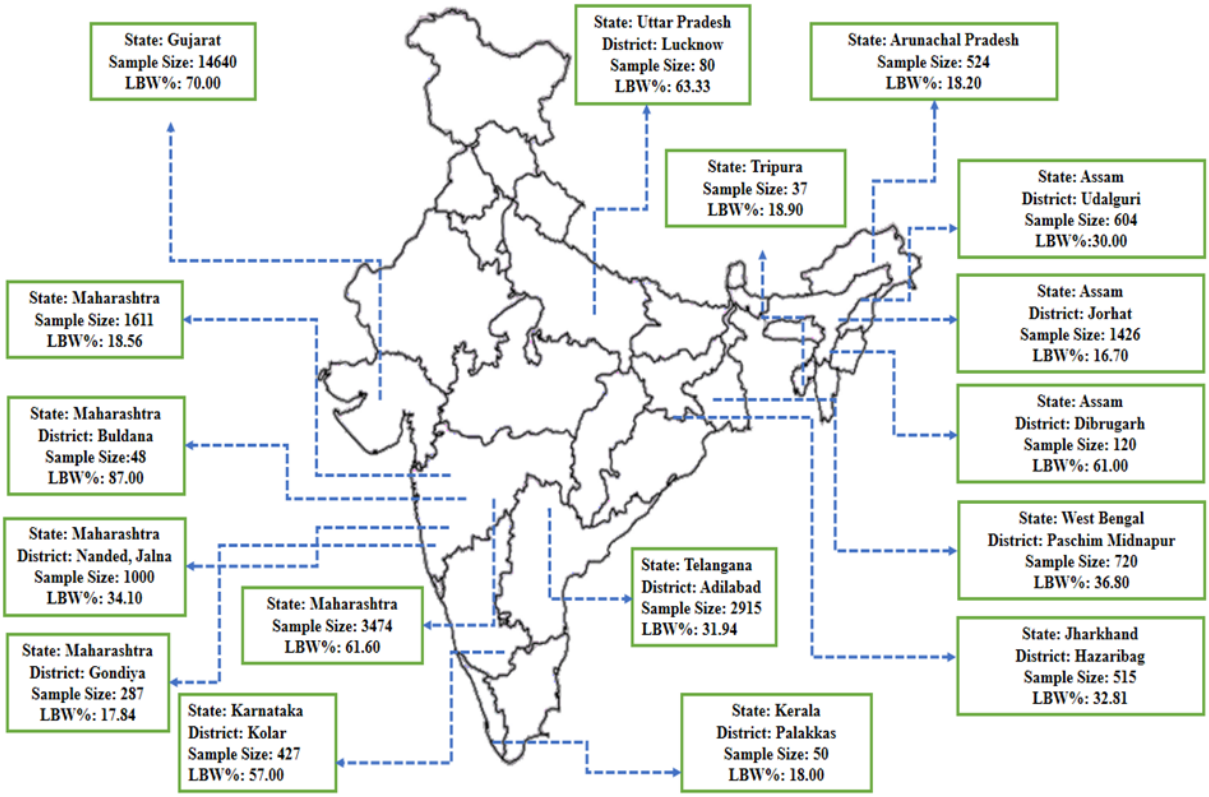

Figure 1: Distribution of states of the reviewed study with a prevalence of LBW

The most common cause of LBW is fetal growth restriction and premature birth which constitutes before 37 weeks of pregnancy [44]. The highest frequency of LBW was found in tribal children in Budala, Maharashtra at 87.00 % in 2015, as well as the lowest LBW prevalence was also found in infants in Jorhat, Assam at 16.70 % in 2020. (Figure 1) is the pictorial presentation of the state-wise prevalence of LBW data among the tribal populations along with the study area and the states.

The description of the outcome of LBW is also considered a standard measurement of morbidity rate, also accepted as a birth weight of less than 2.5 kg. The reasons for LBW may possibly stem from poor intrauterine growth or pre-maturity, poor parental nutrition, chronic disease, gestational diabetes, pregnancy-induced preeclampsia, or high blood pressure. Four studies reported on LBW in Maharashtra, which are consistently 87.50 %, 17.84 %, 34.10 %, and 18.56, as well as those studies also revealed that early pregnancy; consequent birth, poor health care during pregnancy, low maternal education, inadequate consumption of Folic acid & Iron, premature birth, and anemia are responsible for LBW [7, 25, 23, 24].

The total number of selected sample sizes included in the review study was 28746 infants, in general, the prevalence rate of LBW in tribal children of India based on the systematic analysis has been achieved at 39.89 %.

Table 1. The total prevalence rate of LBW in tribal newborns based on Confidence interval analysis

Study	Sample size	LBW (%)	95% CI
Chande, 2016	48	87	74.754 to 95.272
Pal et al, 2016	720	36.8	33.274 to 40.446
Mundlod and Thakkarwad, 2016	2915	31.94	12.196 to 14.704
Gogoi and Ahmed, 2007	120	61	51.504 to 69.614
Das and Das, 2015	604	30	26.336 to 33.795
Desai et al, 2017	14640	70	69.312 to 71.070
Sarkar and Saikia, 2000	524	18.2	13.806 to 23.258
Suryanarayana et al.,2018	427	57	15.290 to24.810
Narwade and More, 2018	1611	18.56	16.749 to 20.610
Thakre et al, 2018	287	17.84	13.527 to 22.693
Sharma et al, 2014	80	63.33	56.106 to 77.554
Bhattacharjya et al, 2015	305	23.9	17.962 to 35.155
Narwade and More, 2018	1000	34.1	35.668 to 41.798
Murshid and Krishnaprabha, 2018	50	18	8.576 to 31.437
Kumari et al.,2019	515	31.81	21.437 to 36.382
Khound and Sharma.,2020	1426	16.7	16.100 to 16.820
Chhabra and Rathod, 2021	3474	61.6	14.800 to 26.280

The research findings are summarized in Table 1 and provide the difference in CI of the selected studies. In a study that just provided the LBW percentage of Infants [5], the records were extrapolated using the totals in each exposure group. A study established a considerable association between Maternal Hemoglobin and LBW Status, as well as significantly associated with LBW and Body Mass Index (BMI) status of the mothers [11]. Another study revealed that in Arunachal Pradesh that LBW frequency among Tangsa Tribe was significantly higher than in other groups. This present research also found that the frequency of LBW among tribal infants in rural areas is quite high, ranging between 16.70 % - 87.00% (95% CI: 28.55 - 51.29 %). Suryanarayana and colleagues found no positive significant correlation between Hb levels of pregnant women and birth weight (P=0.406, r 0.041) [22]. One study mentioned that the LBW prevalence rate was significantly higher among pregnant women who delivered their babies vaginally (32%, P=0.001), and it was more among in the case of multipara (26.2%) [13].

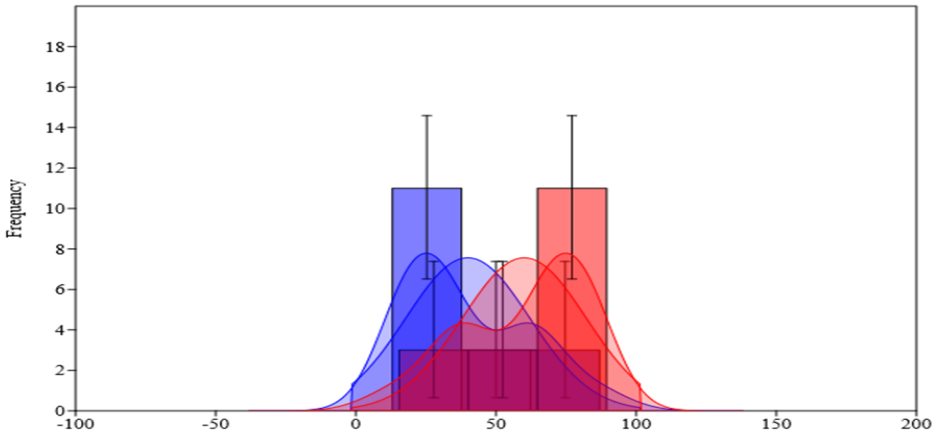

Figure 2: Frequency distribution of LBW in the selected studies

The histogram above shows a frequency distribution for LBW and Non-Low Birth Weight (NLBW). Three bars cover all the LBW and NLBW data categorically, the height indicates the number of data sets frequency in each range and these three peaks for each variable contributed to the overall statistics. We can see that the largest

frequency of responses was the bin started from 13-37.667, frequency of the data set is 11(CI: 6.515-14.584), bin started 37.667-62.333, for 3(CI: 0.645-7.383), and bin started 62.333-87 with frequency 3(CI: 0.645-7.383) for LBW. On the other hand, the bin started from 13-37.667, the frequency of the data set is 3 (CI: 0.645-7.383), the bin started 37.667-62.333, for 3(CI: 0.645-7.383), and the bin started 62.333-87 with frequency 11(CI: 6.515-14.584) for NLBW. The analysis can conclude that the majority of LBW% falls between 13 and 37.667 (Figure 2).

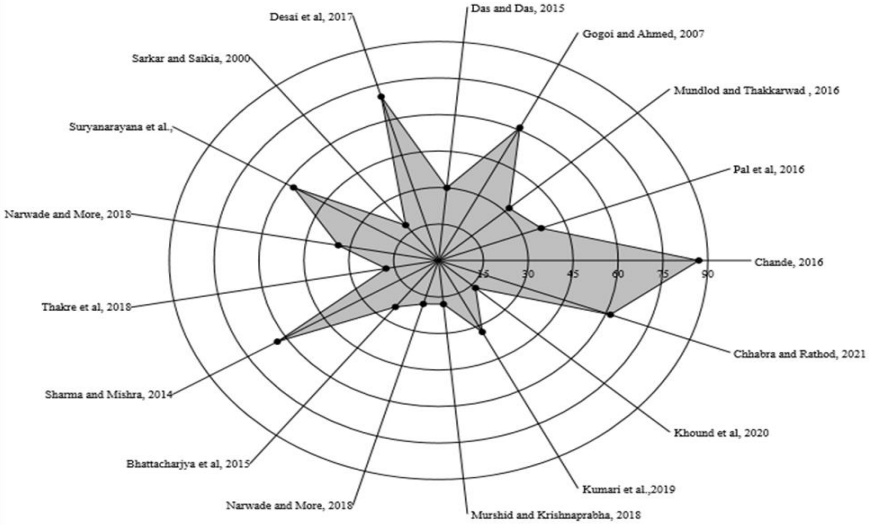

Figure 3: Rader Chart on the LBW prevalence rate in infants

A total of 17 published articles constituting the sum total of the sample (infants) 28746 were collected from various sources. These radar plots constitute 17 studies having different quantitative scales for LBW frequency data. This plot demonstrates visually to understand the actual value (strength and weaknesses) of the variables in several data sets. Here each radii represents one study circle. The data length of radii is proportional to the magnitude of the variable present on the radii (Figure 3).

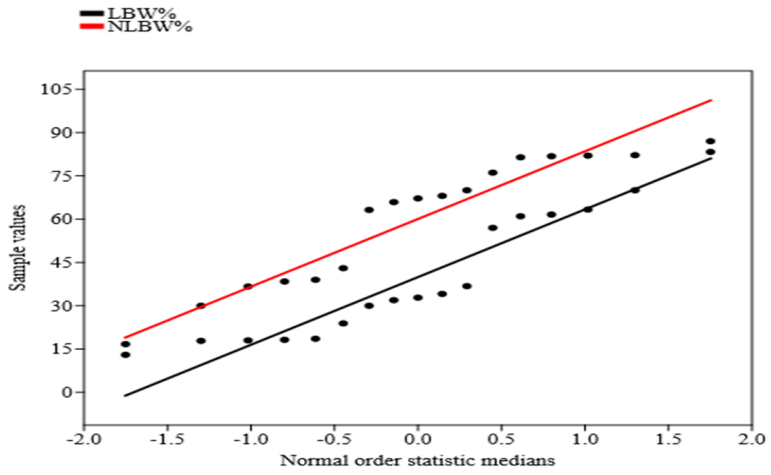

Figure 4: The correlation analysis of LBW and NLBW in tribal infants based on a probability plot

Visually, the probability plot for both LBW and NLBW reveals a quite linear pattern. This is demonstrated by the correlation coefficient of 0.943, fit to the probability plot. Data with long tails associated with the normal distribution and the non-linearity of the normal probability plot can also be brought to light in two different ways. First, the middle portion of the data also shows an 'S' pattern, and this is frequent for both long and short tails. In this exacting case, the S pattern in the middle is quite observable. Second, the few initial and the few terminal points also show a well-marked disparity from the reference integral line; this is mainly visible for the first few data-based points.

In this case, we can quite reasonably conclude that probability plots, also point out the long-tailed associated distributions (Figure 4).

DISCUSSION

The goal of the World Health Organization (WHO), is to reach a 30% decline in low-birth-weight babies by the year 2025 [1]. Side by side based on the outcomes from this present review study, an investigation of 28746 infants, an overall prevalence rate of LBW in India, according to the present analysis, was also achieved at 39.89 %. WHO as well reported the occurrence of LBW in East Asian nations at 10%, in Southern Asia at 33 %, furthermore in developing countries at 18 %, in developed nations, and worldwide at 6 % along with 17 % respectively [14]. The studies highlighted that the majority of LBW newborns are associated with intrauterine growth retardation, which can be due to low status of BMI along with Anemia [8,10,11,17], moreover, other studies also revealed that poor antenatal check-ups, nutritional status, HDsP, premature rupture of membrane, hypertension of mother during pregnancy, prematurity, and underweight during gestational age of mother, along with underweight before pregnancy, and maternal age can also contribute to the delivery of LBW infants [8,9,10,13,15,16,17].

We analyzed different studies in this review and tribal or rural locations demonstrate a higher prevalence rate of LBW so the frequency of LBW was 39.89 % in rural areas of India, while 36.8% in poor areas in Bangladesh, and also 20.9% in rural locations of most Asian nations [14]. Dou to the comparatively high LBW incidence in India, it is important to enhance maternal health care attempts through improved treatment process after and before the delivery, provide suitable nutrition during and after pregnancy to the women, increase the prevention rate of iron deficiency anemia, reduce the rate of early marriage, provide proper education to women, organize developing care programs in rural areas for mothers during pregnancy, enhance the awareness to prevent teenage pregnancy, accurately implementing the pregnancy care, and increased responsibility on a recommendation to health care centers for mothers to decrease the prevalence of LBW in infants, promoting along with equipping the good quality of health care center in India, the primary basis for treatment and hospitalization of LBW newborns would be properly provided.

Limitation of the Study

The present review study has some limitations which need to be declared. This study is based on limited databases, only collecting the data from English language publications, and also might have missed some applicable articles related to LBW. Moreover, the lack of full-text access to the published articles, along with the low eminence of some related articles.

CONCLUSION

In conclusion, we concluded that our results support the findings that LBW among tribal infants is still painstaking as a health issue in India. The study revealed a high prevalence of LBW (39.89%) in children in India; therefore, Health policymakers need to make effective health care policies to provide satisfactory treatments, with

periodical care for infants and pregnant women. The finding of this systematic review also reflects that intervention of anemia and nutrition may decrease the high prevalence of LBW in India. Additionally, accurate antenatal care with good maternal nutritional status, adequate perinatal clinical services, satisfactory maternal care, social support for the mother, and accurately treating pregnancy-related conditions including high blood pressure in pregnant women, pre-eclampsia, and gestational diabetes is crucial for preventing LBW.

As relevant instructions for future research, that analysis should be used to clearly find outs the long-term effects of LBW, the effects of LBW on development, the association between anemia and the status of nutrition of the mothers during pregnancy, along with other outcomes including the effects of extremely low birth weight infants on community and families, prevention of premature birth, and the main cause of LBW in developed nations.

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

REFERENCES

1. WHO.int. 2022. *Global nutrition targets 2025: low birth weight policy brief*. Available at: https://www.who.int/publications/i/item/WHO-NMH-NHD-14.5, Accessed 6 June 2022].
2. Raman TR, Devgan A, Sood SL, Gupta A, Ravichander B. Low birth weight babies: incidence and risk factors. *Med J Armed Forces India* 2017; 54(3):191-95.
3. da Silva Lopes K, Ota E, Shakya P, Dagvadorj A, Balogun OO, Peña-Rosas JP, et al. Effects of nutrition interventions during pregnancy on low birth weight: an overview of systematic reviews. *BMJ Glob Health* 2017; *2*(3):000389.
4. Silvestrin S, da Silva, CH, Hirakata VN, Goldani AA, Silveira PP, Goldani MZ. Maternal education level and low birth weight: a meta-analysis. *J Pediatr* 2013; 89(4):339-45.
5. Murphy CC, Schei B, Myhr TL, du Mont J. Abuse: a risk factor for low birth weight? A systematic review and meta-analysis. *CMAJ* 2001; 164(11):1567-72.
6. Kumari N, Algur K, Chokhandre PK, Salve PS. Low birth weight among tribal in India: Evidence from National Family Health Survey-4. *Clin Epidemiol Glob Health* 2021; 9:360-66.
7. Chande S. Birth weight of tribal infants born to adolescent mothers. *International Journal of Home Science*, 2016; 2(1):318-21.
8. Desai G, Anand A, Shah P, Shah S, Dave K, Bhatt H, Desai S, Modi D. Sickle cell disease and pregnancy outcomes: A study of the community-based hospital in a tribal block of Gujarat, India. *J Health Popul Nutr* 2017; 36(1):1-7.
9. Khound M, Sharma SJ. Risk Factors for Low Birth Weight Babies in Healthy Literate Mothers Belonging To Middle Socio Economic Status: A Hospital Based Observational Study. *IOSR J Pharm* 2020; 10(11):12-19.
10. Chhabra S, Rathod V. Community Based Study of Preterm Births, Small for Gestation and Low Birth Weight Babies in Rural Tribal Women with Extreme Poverty. *J Pediatr Neonatal Biol* 2021; 6:16-23.
11. Sharma M, Mishra S. Effects of maternal health and nutrition on birth weight of infant. *International Journal of Science and Research* 2014; 3(6):855-58.
12. Sarkar NC, Saikia AC. Birth weight at Changlang, Arunachal Pradesh. *Indian Journal of Pediatrics* 2000; 67(6):419-21.
13. Bhattacharjya H, Das S, Ghosh D. Proportion of low birth weight and related factors in a tertiary care institute of Tripura. *International Journal of Medicine and Public Health* 2015; 5(1):10-13.
14. Sabbaghchi M, Jalali R, Mohammadi M. A Systematic Review and Meta-analysis on the Prevalence of Low Birth Weight Infants in Iran. *Journal of Pregnancy* 2020; 2020:e3686471.
15. Gogoi G, Ahmed FU. Effect of maternal nutritional status on the birth weight among women of tea tribe in Dibrugarh district. *Indian J Community Med* 2007; 32(2):120-22.
16. Murshid V, Krishnaprabha V. Nutritional Status and Birth Outcome of Mudukas

Tribal Pregnant Women in Attapady Block, Kerela. . *International Journal of Science and Research* 2018; 7(5): 1257-59.
17. Kumari S, Garg N, Kumar A, Guru PKI, Ansari S, Anwar S, et al. Maternal and severe anaemia in delivering women is associated with risk of preterm and low birth weight: A cross sectional study from Jharkhand, India. *One Health* 2019; 8: 100098.
18. Pal DK, Mondal T, Ghosh R. A Study on the Factors Associated with Low Birth Weight of Tribal Women in a Rural Area of West Bengal. *IOSR J Dental MediSci* 2016; 15(2):78-79.
19. Mundlod S, Thakkarwad S. Prevalence of Low Birth Weight & Associated Maternal Risk Factors in Tribal Medical College (RIMS) Adilabad (TS). *Medical Science* 2016; 6(10):195-96.
20. Das NK, Das R. A study on cause of death among the tribal children of Udalguri district, Assam. *Int J Med Sci Public Health* 2015; 4(8):1060-65.
21. Suryanarayana R, Chandrappa M, Santhura AN, Prathima S, Sheela SR. Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. *J Family Med Prim Care* 2017; 6(4):739-43.
22. Narwade RG, More UB. Comparative study of birth weight in newborns in tribal and non-tribal area in Maharastrahwada region of Maharashtra, India. *Indian Journal of Obstetrics and Gynecology Research* 2018; 5(4):496-99.
23. Narwade, R.G. and More, U.B., 2018. The effects of maternal age and parity on birth weight in a tribal community of Kinwat, Nanded, Maharashtra, India. *Int J Reprod Contracept Obstet Gynecol* 2018; 7(11):4451-54.
24. Thakre SB, Thakre SS, Kaware AC, Adikane H. Predictors of low-birth-weight babies born in tribal tertiary health care setting: a cross sectional study. Int J Community Med Public Health 2018; 5(7):3049-55.
25. Kayode GA, Amoakoh-Coleman M, Agyepong IA, Ansah E, Grobbee DE, Klipstein-Grobusch K. Contextual risk factors for low birth weight: a multilevel analysis. *PLoS One* 2014; 9(10):e109333.
26. Feresu SA, Harlow SD, Woelk GB. Risk factors for low birth weight in Zimbabwean women: a secondary data analysis. *PLoS One* 2015; 10(6):e0129705.
27. Who.int. 2022. *Global nutrition targets 2025: low birth weight policy brief*. Available at: <https://www.who.int/publications/i/item/WHO-NMH-NHD-14.5> [Accessed 30 June 2022].
28. Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: When? Where? Why? *Lancet* 2005; 365(9462):891-900.
29. Islam MM. Increasing incidence of infants with low birth weight in Oman. *Sultan Qaboos Univ Med J*. 2015; 15(2):e177-e83.
30. Johnson CD, Jones S, Paranjothy S. Reducing low birth weight: prioritizing action to address modifiable risk factors. *J Public Health (Oxf)* 2017; 39(1):122-31.
31. Mehrban S. *Disorders of weight and gestation*. *Care of the newborn.* 6th ed. New Delhi: Sagar publications;1991, p.219
32. Raman TR, Devgan A, Sood SL, Gupta A, Ravichander B. Low birth weight babies: incidence and risk factors. *Med J Armed Forces India* 1998; *54*(3):.191-195.
33. Dalal A, Chauhan S, Bala DV. Epidemiological determinants of low birth weight in Ahmedabad city: a facility-based case-control study. *Int J Med Sci Public Health* 2014; 3:430–32.
34. Reddy RS, Sarma YV. Comparative study of socio-economic status of mothers who delivered term low birth weight babies with mothers who delivered normal birth weight babies in a tertiary care rural hospital. *Arch Iran Med* 2015; 2(5):129–34.
35. 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; 15:264.
36. Hossain N, Khan N, Khan NH. Obstetric causes of stillbirth at low socioeconomic settings. *J Pak Med Assoc* 2009; 59(11):744–47
37. Sachin SM, Girish M, Rajesh D, Surekha Y, Madhav KT, Kiran P. Maternal risk factors associated with term low birth weight neonates: a matched-pair case control study. *Indian Pediatr* 2012; 49:25–28
38. Dasgupta A, Basu R. Determinants of low birth weight in a block of Hooghly, West Bengal: a multivariate analysis. *Int J Biol Med Res* 2011; 2(4):838–42

39. Golestan M, Akhavan Karbasi S, Fallah R. Prevalence and risk factors for low birth weight in Yazd, Iran. *Singapore Med J* 2011; 52(10):730–33
40. Agarwal G, Ahmad S, Goel K, Kumar V, Goel P, Garg M, et al. Maternal risk factors associated with low-birth-weight neonates in a tertiary care hospital, Northern India. *J Community Med Health Educ* 2012; 2:177.
41. Siza JE. Risk factors associated with low birth weight of neonates among pregnant women attending a referral hospital in Northern Tanzania. *Tanzan J Health Res* 2008; 10(1):5
42. Meshram II, Rao KM, Reddy CG, Sharad KS, Sreerama KK, Hari KR. Prevalence of under nutrition and its predictors among under 5-year children in Surat region, Gujarat, India. *J Clin Nutr Diet* 2016; *2*(1): 1-12.
43. Shah PS, Zao J, Al-Wassia H, Shah V, Knowledge Synthesis Group on Determinants of Preterm/LBW Births. Pregnancy and neonatal outcomes of aboriginal women: a systematic review and meta-analysis. *Womens Health Issues* 2011; 21(1):28-39.

How to cite this article: Subhashree Das, Sahid Afrid Mollick, Supriya Ray et.al. Consequences of low birth weight among tribal populations in India: a review analysis. *Int J Health Sci Res.* 2022; 12(9):108-116. DOI: *https://doi.org/10.52403/ijhsr.20220914*

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