

Original Research Article

Trends analysis of birth weight of newborn babies born to mothers of different ethnicities of Tripura: a facility-based observational study

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ABSTRACT

Background: There is little known about the ethnic disparity, which is one of the social determinants of low birth weight in India. This issue was not extensively studied, especially in North-east India. The study aimed to analyse the birth weight trends of newborn babies born to different ethnicities in Tripura.

Methods: A cross-sectional study was conducted in the West Tripura District of Tripura, capturing birth records from 2017 to 2022 among mothers who went through institutional normal vaginal delivery. A 1520 delivery case record form was used to record all birth events, and they were analysed using both descriptive and inferential statistics. Ethical approval was taken from the Institutional Ethics Committee, AGMC, Tripura.

Results: In total, 1520 delivery cases were recorded as normal vaginal delivery. The mean birth weight (kilogram) of newborn babies among Tribal mothers is 3.14 ± 0.46 kgs, Bengali communities' mothers is 2.83 ± 0.38 kgs, and Tea tribe mothers is 2.76 ± 0.42 kgs. The difference in the mean birth weight of newborns among different ethnicities is found to be statistically significant (p -value 0.008). There was a declining trend in the year 2020-2021 (post-COVID era). The low-birth-weight rate was higher among the tea tribe and the Bengali communities than among Tribal babies (p -value 0.000).

Conclusions: The low birth weight was comparatively lower among the tribal community than the tea tribe and the Bengali community. The study suggested taking specific interventions against low birth weight, targeting the marginalized population.

Keywords: Birth weight, Mother's ethnicity, Newborn

INTRODUCTION

Research on the social determinants of health often considers birth outcomes as a marker of health status, as birth outcomes are shaped by a complex web of maternal risk factors, which include health-seeking behaviour, exposure to chronic and acute stress, access to economic and social resources, and medical care. One of the most widely studied birth outcomes is birth weight.¹ The maternal reproductive and behavioural factors like maternal race/ethnicity, age and education, parity, plurality, inadequate prenatal care, marital status, previous preterm birth, smoking, and pre-pregnancy body mass

index have a direct bearing on the weight of the child.²⁻⁵ Birth weight is a good reflector of the status of maternal health. It is also true that birth weight is the single most important factor that affects neonatal mortality and morbidity, infant and childhood morbidity. Low birth weight i.e. weight below 2500 gm, may indicate that the baby did not remain in the uterus long enough or it did not develop well enough. Neonates with a weight less than the 10th percentile or more than 2 SD below the mean for the gestation age are classified as small for gestational age. This group of neonates with poor intra-uterine growth remains a cause of concern in developing countries, including India. The incidence of low birth weight (LBW)

in India varies between 25-30% and of which 60-65% are because to intra-uterine growth retardation (IUGR).⁶ Some of the adverse factors responsible are maternal malnutrition, anaemia, inadequate prenatal care, drug abuse, birth order, maternal medical problems, e.g., pregnancy-induced hypertension, diabetes mellitus, cardiac diseases, and chronic infections.⁷

Tripura has a rich cultural heritage of 19 tribes in addition to Bengali, Manipuri, Muslim, Nepali, etc. Moreover, many tea tribe community people are also migrating and residing in Tripura, especially from northern India, like Munda, Bhumij, Shaontals, Odiya, and they belong to Other Backward Classes (OBC). Many studies have shown that social determinants like a mother's literacy, socioeconomic condition, parity, age, residence, and community are strongly correlated with poor birth outcomes, including birth weight. Tripura has 15-20% of low birth weight.⁸ Many studies in developed countries have determined the racial/ethnic disparities in birth outcomes. But in India, data are scarce regarding the relationship between the birth weight of newborn babies born to different ethnic groups of mothers. Thus, this study aimed to assess the birth weight of newborns among different ethnic mothers in Tripura.

METHODS

After obtaining ethical approval, a cross-sectional study was conducted where retrospective data of newborn babies' weight were captured from the community health centres of the West District of Tripura from June to November 2023. The West District was randomly selected out of 8 (eight) districts of Tripura. The district comprises 3 (three) Sub-Divisions i.e., Sadar, Mohanpur and Jirania. Sadar Sub-Division is mostly an urban Sub-Division. Mohanpur and Jirania Sub-Divisions are inhabited by

diverse communities, and each Sub-Division has 1 (one) Community Health Centre catering to a diverse population. Ethnicity was defined as the fact or state of belonging to a social group that has a common national or cultural tradition. It means the identification of a group based on a perceived cultural distinctiveness that makes the group into a "people." In Tripura, ethnic groups are Tripuri (a total of 19 tribes in it), Bengali, Manipuri, Nepali, etc. The tea garden worker community was labelled as the Tea tribe ethnic group. The records of newborn babies of the last 5 (five) years from 2017 to 2022 having born by normal vaginal delivery with complete information of respective mothers and newborn outcome, were included (census sampling). Incomplete information on ethnicity, birth weight, twin deliveries, still stillbirths were excluded from the study. These data were collected from the Hospital Birth/Labour Registers using a pre-designed form for data extraction. The necessary permission was obtained from the Medical Officer in charge of the respective health facility to access the records. Data entry and analysis were done using SPSS version 21.0. Demographic and obstetric characteristics of the mothers were expressed in frequency, percentage, mean, and standard deviation. The association between Ethnicity and Birth weight differences was tested for statistical significance using the chi-square test and Student's t-test. A probability value less than 0.05 was considered statistically significant.

RESULTS

A total of 1520 normal vaginal deliveries recorded from the study sites were included. During the year 2017, 340 births were recorded, 280 during 2018, 312 during 2019, 253 during 2020, and 189 during post post-COVID-19 pandemic era, i.e., during 2021 and 167 during 2022.

Table 1: Sociodemographic profile of different ethnic mothers (n=1520).

Socio-demographic profile	Different Ethnicity			P value
	Tripuri N (%)	Bengali N (%)	Tea Tribe N (%)	
Age in years (Mean±SD)	23±4	24±4	22±3	0.298
Teenage pregnancy (%)	23.5	18.4	31.0	0.001
Religion				
Hinduism	577 (74.4)	446 (99.2)	282 (96.0)	0.000*
Christianity	198 (25.5)	2 (0.4)	0 (0.0)	
Others	1 (0.1)	2 (0.4)	12 (4.0)	
Education				
Can't able read and write	25 (19.4)	23 (17.8)	81 (62.8)	0.000
Upto primary	89 (23.7)	137 (36.2)	151 (40.2)	
Upto higher secondary	635 (65.0)	280 (28.6)	61 (6.2)	
Graduate & above	25 (69.4)	10 (27.8)	1 (2.8)	
Gravida				
Primigravida	421 (57.1)	166 (22.5)	150 (20.4)	0.000
Multigravida	355 (45.4)	284 (36.2)	144 (18.4)	
Period of gestation in weeks (median)	40	38	38	-

*Fisher's exact test applied

As per the objective of the study, an ethnic wise comparison of sociodemographic and pregnancy profiles was shown in Table 1. The mean age of the participants was 23 ± 4 years, 24 ± 5 years, and 21 ± 3 years among the Tripuri, Bengali, and Tea tribe communities, respectively. Teenage pregnancy was higher among the tea tribe population (31.0%) followed by the Tripuri people (23.5%) and the Bengali ethnic (18.4%), and it is found to be statistically significant (p value 0.001) (Table 1). The majority of the participants follow Hinduism (Tripuri 74.4%, Bengali community 99% and Tea tribe 96%). The participants who are illiterate and educated upto primary level are from the tea tribe group (62.8% and 40.2% respectively). Most of the Tripuri and Bengali community people are educated upto secondary level schooling (81.8% and 62.2% respectively). Among those who are graduate and above, the majority are from the Tripuri ethnic women (69.4%) and only 1 woman was found to be a graduate among the tea tribe group. There is a significant difference in education status among the participants (p-value 0.000). The median gestation period in weeks by ethnicity of the participants (Tripuri 40 weeks, Bengali – 38 weeks, and tea tribe 38 weeks) (Table 1). The birth weight trends for those who were born from the year 2017 to 2022 show consistent findings. There was a consistent finding of birth weight up to 2020 (mean birth weight 3.02 kgs) but a decline of birth weight of the new babies was observed from 2020 to 2021 (mean birth weight 2.7 kgs) i.e, during post COVID-19 era. This may be due to an interruption in the maternal health services. However, the mean birth weight trend regains in the year 2022 (mean birth weight 2.9 kgs) irrespective of ethnicity or community (Figure 1).

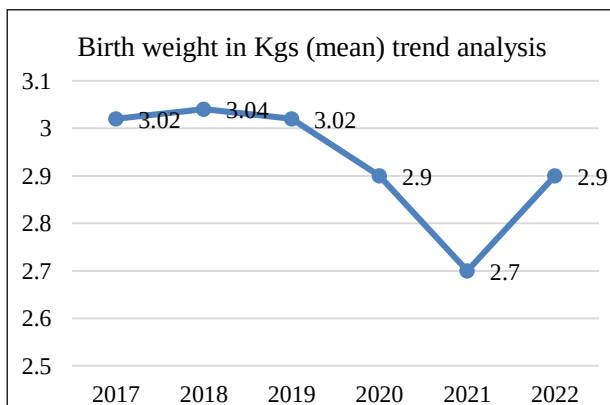


Figure 1: Trend analysis of birth weight from 2017 to 2022 (n=1520).

There was a significant difference in the birth weight of the babies born to different ethnicities from 2017 to 2022 (p-value 0.000). Though there was normal birth weight observed between the different ethnic groups, Tripuri women show a higher mean birth weight (3.14 ± 0.46) compared to Bengali (2.83 ± 0.38) and tea tribe (2.76 ± 0.42) mothers (Table 2).

Table 2: Ethnic wise mean birth weight comparison of the newborn babies born during 2017-2022 (N=1520).

Ethnicity of the mother	Number	Birth weight (mean $\pm$ SD)	95% CI	P value
Tripuri	776	3.14 $\pm$ 0.46	3.11-3.18	0.000
Bengali	450	2.83 $\pm$ 0.38	2.79-2.87	
Tea Tribe	294	2.76 $\pm$ 0.42	2.71-2.80	

CI= Confidence interval

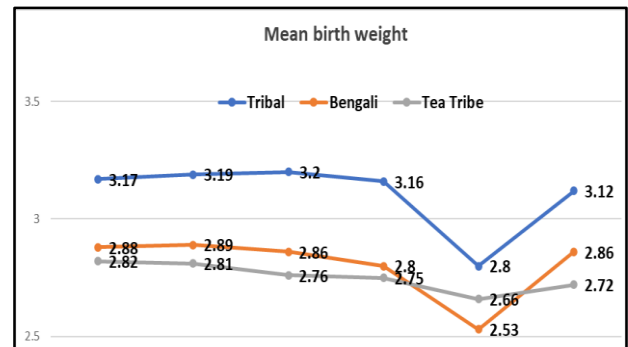


Figure 2: Year-wise trends of birth weight of newborn babies born to different ethnic mothers (n=1520).

Figure 2 depicts ethnic wise trends of birth weight of newborn babies born to different ethnic mother where birth weight trends of the Tripuri tribe show better than those of the Tea tribe and the Bengali communities.

The present study also demonstrated that low birth weight was slightly higher in Bengali communities (37.7%) than babies born to tea tribe mothers (36.3%); however, there was significant difference with Tripuri ethnic group as the proportion of low birth weight among them was only 26% with a p value of 0.000 (Table 3).

Table 3: Association between ethnicity of the mother and low birth weight (LBW) (n=1520).

Birth weight category (Kgs)	Different ethnicity			P value
	Tripuri N (%)	Bengali N (%)	Tea Tribe N (%)	
Normal weight	738 (53.7)	395 (28.8)	241 (17.5)	0.000
Low birth weight (LBW)	38 (26.0)	55 (37.7)	53 (36.3)	

DISCUSSION

In India, many studies and surveys were conducted and reported the disparities of birth weight outcomes to different populations and settings or even region-wise.^{7,9,10,12,13} The present study focusses on determining the birth weight in between the major community or ethnic group residing in Tripura over the period specially among the Tripura Tribal ethnic group, Bengali community and

tea tribe group (people basically migrated-in from different part on India like Assam, Odisha, Bihar, Uttar Pradesh, West Bengal for income generation by working in different tea garden of Tripura). In recent days, many authors have critically analysed the NFHS-4 (2015-16) and NFHS-5(2019-20), on the birth weight trends of Indian Children in different ways, like locality (urban and rural), caste or category-wise (General, SC, ST, OBC).⁹⁻¹²

The present study studied the trends of birth weight in tribal, Bengali, and tea tribe babies born to those ethnic mothers from 2017 to 2022. The study findings showed normal birth weight trends across the ethnic groups. This finding is incorporated with both NFHS-4 and NFHS-5, where Indian children's average birth weight is normal range and only 15-22% show low birth weight (LBW).^{9,11,12}

The COVID-19 pandemic had a significant impact on education, health, income loss, and increased unemployment levels, micronutrient and maternal malnutrition.¹³ The present study also observed that there was a decline in mean birth weight during the post-COVID-19 pandemic period i.e, after 2022, where birth weight trends were much lower than other observed years. The trend of mean birth weight was significantly higher in tribal babies born to their mothers than in Bengali and tea tribe ethnic mothers' babies. Though much previous literature has shown contradictory findings in this regard, where the tribal babies' birth weight comparatively lower range.^{11,12,14} The present study showed that low birth weight (LBW) was slightly higher in Bengali communities (37.7%) than babies born to tea tribe mothers (36.3%); however, there was significant difference with Tripuri Tribal group as proportion of low birth weight (LBW) among them was only 26% (p value 0.000). Narwade RG et al¹⁵ also demonstrated the contradictory findings where they show the mean birth weight among the tribal neonates (2.74 kg) was significantly lower (p-value=0.001) than among non-tribal neonates (2.88 kg). Also, the proportion of low-birth-weight neonates was significantly higher among the tribal population. The backward communities, such as tea garden workers, were burdened with a higher low birth weight, as the present study shows, with 36.3% who belong to Odisha, Bihar, Uttar Pradesh, and West Bengal. This burden is also in line with a spatial analysis done by Banerjee A in 2020.¹⁶ Majhi et al found that LBW baby birth rate in tribal communities.¹⁷ However, Deepa et al showed that the mean birth weight of babies from tea tribe communities was significantly lower (2.34±0.61 kg) than that of other communities (2.7±0.46 kg), with a p-value of 0.0007.¹⁸ This finding is similar to the results of the present study. The NFHS-4 and NFHS-5 reports were highly focused on many social determinants, such as social class, income, religion, caste, education, parity, age, but were less focused on the variable of ethnicity specifically.^{11,12} The present study addresses this issue, especially the three major ethnic groups residing in Tripura.

The strength of the study was the huge sample size and inclusion of the community health centre area and different ethnic groups. However, sub-ethnic groups were not differentiated and analysed in the present study.

CONCLUSION

Overall, the present study concluded that there are significant birth weight differences between Tripuri, Bengali, and tea tribe mothers, where the Tripuri ethnic babies' birth weight is better than another ethnic groups. The study findings recommend further in-depth study for these mixed findings, targeting a specific population group. The health policy should focus specific vulnerable population to combat one of the social determinants, i.e, ethnicity of poor birth outcome, to fulfil the SDG-2030 target.

Recommendations

Doppler parameters and clubbed it with all adverse outcomes including perinatal deaths and nursery admissions. Martinez et al studied small-for-gestational-age group and concluded that middle cerebral artery vasodilation was associated with the highest risk of caesarean delivery (p<0.001) and caesarean delivery for nonreassuring fetal status (p<0.001) and also increased risk of neonatal acidosis (odds ratio, 9.0).

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