Systematic Review

Trends in prevalence of low-birth-weight babies in India

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ABSTRACT

Low birth weight (LBW) affects newborns' survival and is a global concern especially for developing countries. It is the most common health indicator for assessing neonates' health conditions. The present study was conducted to determine the prevalence of LBW in India in background of global perspective. A systemic review of the literatures was done, available in the principle medical databases including PubMed (including Medline), Google scholar, Web of science and Scopus from 2000 to 2021. A total of 65 articles were identified in the described database. Altogether 24 articles met the inclusion criteria and were eligible for data analysis. According to the all four national family health survey (NFHS) a decreasing trend is observed in the prevalence of LBW. The prevalence of LBW in India is 16.4 % in NFHS-4, 20.9% in NHFS-3, 22.9% in NHFS-2 and 25.2% in NHFS-4 respectively. A number of socio-demographic and maternal factors are responsible for LBW babies in India. LBW babies are global public health concern. Special emphasis should be given to the underlying factors responsible for LBW babies in India.

Keywords: LBW, Prevalence, India, NFHS

INTRODUCTION

Birth weight can be defined as the first weight of the newborn obtained after birth. LBW is one when the birth weight is below 2500 gm regardless of gestational age and is usually applied to live births only.[1] It is one of the important determinants of infant morbidity and mortality as well as the risk of developmental disabilities and illnesses in future.[2] According to WHO, about 25 million LBW babies are born each year, nearly 95% of them in developing countries.[3] Global prevalence of LBW is estimated to be 14.6% with prevalence varying across regions from 7.2% in developed regions to 17.3% in Asia and within region from 5.6% in central Asia to 27.2% in Southern Asia.[4] Regarding its consequence, about 2.5 million and 23,091 newborns die every year due to LBW across the world.[5] It also exhibits a remarkable burden on the social and economic sectors as well as healthcare system.[6] LBW shares significant portion of global neonatal mortality which is approximately 60-80% of total child mortality.[4] Particulars obtained from birth weight is of great value, as it is an indirect indicator of maternal nutrition and auguring indicator of potential neonatal death and malnutrition if the child survives.[7] LBW is a multifactorial phenomenon. Both maternal and fetal factors are found significantly to be associated with the LBW.[8] Maternal factors influencing LBW include extremes of maternal age (younger than 16 years of age or older than 40 years), multiple pregnancy, obstetric complications), infections (e.g., malaria) chronic maternal conditions (e.g., hypertensive disorders of pregnancy), and nutritional status.[9] The world health assembly (WHA) endorsed a comprehensive implementation plan on maternal, infant and young child nutrition in 2012, which specified six global nutrition targets, including a 30% reduction in the number of LBW live births in between 2012 and 2025.[10] LBW is thus a key indicator of progress towards the achievement of the global nutrition targets and monitoring LBW trends is an essential component of the global nutrition monitoring

framework approved by member states at the WHA in May, 2015.[11] These targets are repeated in the sustainable development goals (SDGs). Over the past few decades, globally, there has been a considerable depletion in child mortality; however, significant challenges remain.[12,13] LBW is now a global concern because it is one of the major causes of under-5 child mortality.

METHODS

Search strategy

The literature available in the principle medical databases including PubMed [including Medline], Google scholar, web of science and Scopus were searched and tag in accordance with each database in the titles, keywords and abstracts of articles. LBW in India and its synonyms ("Premature births", "preterm birth", "preterm births") were searched as keywords for retrieving articles published in English 2000 to 2021 (Table 1).

Table 1: Strategy used for search in the databases.

S. no.	Search terms
1	#Low birth weight
2	#Premature, birth, premature births, preterm birth, births, preterm, preterm births
3	Combination #1 and #2: Low birth weight or low-birth-weight infant or low birth weight infant or LBW infant
4	#India or Asia or world
5	#Combination #3 and #4: Low birth weight or low-birth-weight infant or low birth weight infant or LBW infant and India or Asia or world
6	#Combination #5 and 2000:2021

Inclusion and exclusion criteria

Review articles, national survey, scientific reports, observational and cohort studies on the prevalence of LBW were included. Therefore, case studies, abstracts, posters and letters to editor, repeated articles, and case-control and intervention studies were excluded. The studies with different definition or definitions for LBW which does not support WHO criteria, unrelated studies, and studies conducted on specific groups such as mothers with chronic diseases, working mothers, specific age groups were excluded. After selection of the studies based on the above-mentioned criteria, related articles were appraised by a checklist consisting of questions regarding title, year and place of studies, sampling method, sample size, design, and prevalence of LBW.

Selection of studies

First, the inclusion and exclusion criteria for this review were defined. In the second steps one of the researchers performed of the search process, the titles and abstracts of articles were reviewed and irrelevant ones were excluded.

In the third step, for choosing the most relevant articles, we selected those, for those full-texts were available. Only articles in English were considered.

Risk for assessment bias

Three independent investigators performed the analysis process described above. In case of any disagreement, the investigators held discussions to reach consensus.

Data extraction

Three independent investigators selected relevant articles and extracted data regarding the study design, research zone, time of research, sample size and participants (according to inclusion and exclusion criteria). The heterogeneity of the articles was assessed and disagreements were solved by discussion. The search process resulted in retrieving 65 articles. After removing unrelated and duplicate articles, 44 articles were selected. The inclusion and exclusion criteria led to the deletion of 40 articles. Lastly, 24 articles were included for the data analysis.

RESULTS

The South Asia region has the highest prevalence of LBW in the world. Worldwide 15% babies are born with LBW where more than half them from Asia (Figure 3). In fact, South Asia continues to carry the greatest share and nearly half of all LBW newborns in the world. Global target to reach a reduction in LBW of 10.5 % by 2025 which was 15% in 2012 and 14.6% in 2015 we need 2.74% annual average rate of reduction in LBW instead of a reduction rate of 1.00%.[14] It is a matter of hope that over the past two decades the South Asia region had an incredible achievement in child survival because of the success in preventing and treating the childhood illness and child deaths are now almost condensed in neonatal period.[15]

Coupled with the global target the government of India and the stakeholders monitor the progress through various flagship programs like the NFHS. To date India conducted four NFHS and the phase-1 fifth NFHS-5 has just released. Data from the NFHS of 2005-2006 (NFHS-3) and 2015-2016 (NFHS-4) included 11 300 children from NFHS-3 and 99 894 from NFHS-4 data; all these children was the last full-term singleton live-births, born within the last 3 years prior to the survey. In India, the prevalence of LBW has significantly declined from 20.4% (95%CI 19.4-21.4) to 16.4% (95% CI 16.1-16.8) in the last decade.[16] The propensity of prevalence of LBW babies in India as per the four NFHS from 1992 to 2015 is depicted in (Figure 2). Though the fall in prevalence is sluggish over a decade but it may be admired as a decreasing trend, despite the magnitude of maternal and child health programs implemented during the same period.[17] According to NFHS-5 phase 1 report infant and child mortality rates across most Indian states

have declined. Sikkim, Jammu and Kashmir, Goa and Assam were the best performers as they witnessed a steep reduction in neonatal mortality rate (NMR), infant mortality rate (IMR) and under-five mortality rate (U5MR). Tripura, Andaman and Nicobar Island, Meghalaya and Manipur recorded a spike in all three categories of child mortality. Bihar registered the highest prevalence of NMR (34), IMR (47), and U5MR (56) across 22 surveyed states and Union territories while Kerala reported the lowest death rates. The child mortality rate of Maharashtra remained unchanged in the last five years.[18]
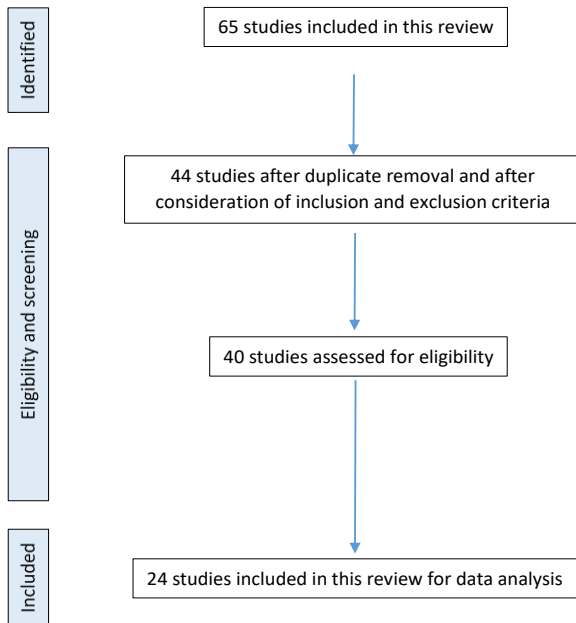

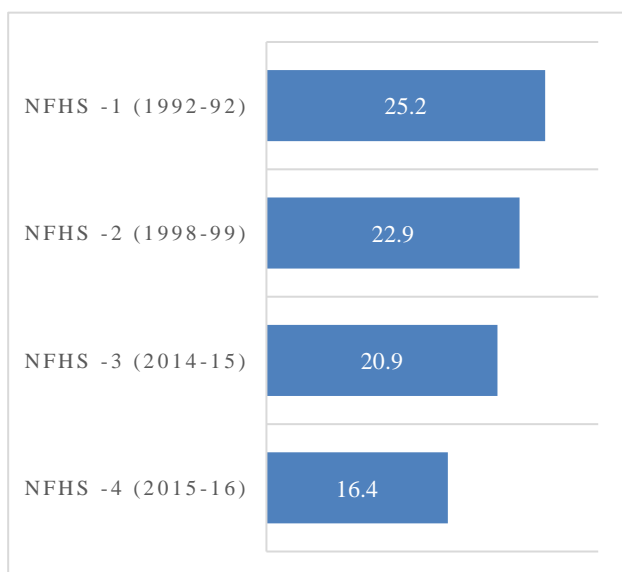**Figure 1: Flow diagram for systemic review of this article.**

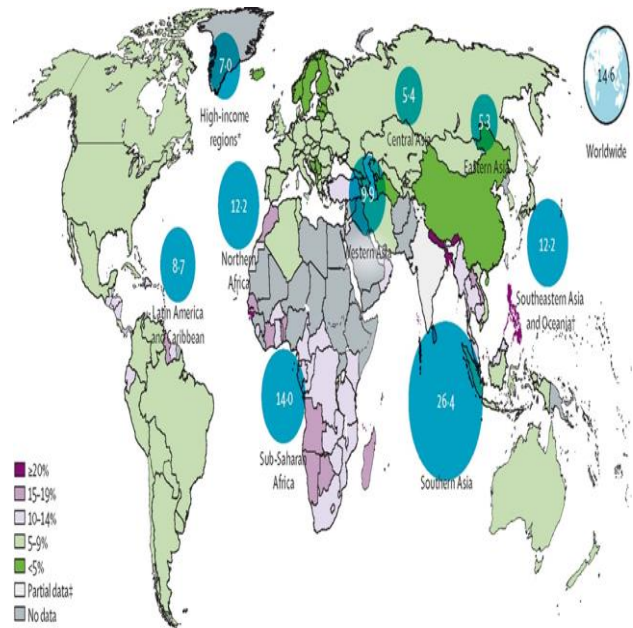**Figure 2: Trends in prevalence of low birth weight in India.**

Figure 3: LBW prevalence, by country and United Nations region.

In a cross-sectional study done by Pal et al was carried out during September 2016 to June 2018, in different districts of West Bengal state revealed that 21.49% infants were born LBW. The risk of LBW was higher among women those age <20 years. The odd of LBW was higher among women who never followed ANC visit and who did not consume iron folic acid tablet and additional diet during pregnancy. More LBWs were seen among women who were from low socioeconomic family, rural residence, and illiterate.[19] In another study done by kumara et al. using data from NHFS-4 during the period of 2015 and 2016 in 35,029 tribal children from 20 selected states where tribal population is dominant. These include; Madhya Pradesh, Maharashtra, Orissa, Gujrat, Rajsthan, Jharkhand, Chhattisgarh, Andhra Pradesh, West Bengal, and Karnataka with a higher number of Scheduled Tribes. 232 districts have proportionately higher LBW than the national average (18.2%). Aged mother at birth, more ANC visits and a high wealth index are associated with low incidence of LBW of a newborn.[20] Prevalence of LBW was 44.6 % in a hospital-based cross-sectional study in Sevagram during the period of 2007.[21] A retrospective observational study done taking into account a total of 1216 newborns over the period of 24 months revealed a percentage of LBW of about 27.55%. The occurrence of LBW was significantly higher in babies of anemic mothers, young mothers and those with <3 ANC check-up.[22]

DISCUSSION

The LBW is, infant, a major problem in developing countries. Asian countries, for example, account for highest prevalence of the total LBW followed by Africa and Latin America Among. Asian countries, South Asia has the highest incidence (27%) of LBW (Figure 3). It's

the high time to think LBW as a public health problem. An infant with a birth weight less than 2500 gm, is considered as an important determinant of a new-born's survival, physical growth, physical and psychological development.[23-25] When the picture is compared with the developed countries, developing countries are mainly sharing the major burden of having LBW infants.[26,27] In this context, developing countries are focusing and taking initiatives to improve the intrauterine growth of the foetus by supplying nutritious food and medical services to pregnant mother which significantly dictate the weight at birth of the newborn.[28]

This difference in the prevalence of LBW could be explained by variations in the study set up and socioeconomic and demographic differences. It is quite evident that as the age of mothers increased, the likelihood of LBW decreased subsequently. The older mother is less likely to have babies with LBW, because older mothers are less likely to deliver LBW children may be due to the maturity of the reproductive organs.

It is also evident from this review that, to reduce the prevalence of LBW in India female education and antenatal care are vital determinants, that should be addressed as an earliest possible time. Uninterrupted execution of multifaceted health promotion programs is needed to overcome these problems effectively in states and districts of India. To monitor the pregnant mother ANC should be prioritizing more. An emphasis should be given to the regular monthly weighting and growth monitoring of children in LBW prone districts or states, as the effective public health strategy to reduce LBW.

It was observed that the socioeconomic condition influences LBW. LBW babies are more prevalent in mothers belongs to low socioeconomic conditions. Similarly, Yadav et al found that the proportion of LBW babies decreased with increase in the per capita income of the family.[29] This review also focused the light on a picture that iron and folic acid consumption during pregnancy reduces the prevalence of LBW. Indeed, Khan et al, Roudbari et al, and Rizvi et al found that mothers not using supplements such as multivitamins, iron, folic acid or calcium during pregnancy delivered LBW babies which is significantly higher which is almost similar to present study.[30-32] According to (UNICEF and WHO, 2019) LBW shares higher proportion of global neonatal mortality which is estimated to be around 60-80%. The highlights in phase-1 NHFS-5 the IMR and NMR has declined in India, which may torch the light of decreasing trends in LBW in India.

Though it may be admired as a decreasing trend, the reduction in prevalence of LBW is sluggish over time despite the enormity of maternal and child health programs implemented during the same period. A number of factors related to the mother or fetus or both may contribute to LBW. A decreasing trend in the incidence of LBW and increasing mean birth weight are now

contemplate gravely in the national action plans. Evidence based Actions if taken appropriately, can save millions of newborns including LBW babies in the next few years. Conversion of knowledge into action is the key for meeting this challenge and realizing the goal.

CONCLUSION

South Asia has become the red zone for the largest proportion and number of LBW children in the world for decades. Among the countries in the South Asia India has focused on this problem to achieve global targets to which its governments have committed to. This study highlights over the span of years there is continuous decline in the prevalence of LBW in India. The underlying determinants of LBW is to be noted. Policymakers should widen their perspectives on nutrition interference to ensure that investments aimed at addressing LBW are tailored in ways that will also contribute to tackling the problem.

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