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RESEARCH ARTICLE

A CRITICAL ANALYSIS OF CHILDHOOD MORBIDITY AND MORTALITY PATTERN IN INDIA: TRENDS AND DISPARITIES

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ABSTRACT

India has one of the highest rates of infant mortality and morbidity around the world. If the current situation prevails then as a country we would be raising a generation which is debilitated and unable to contribute effectively to the productivity of the country Even though over the last decade there has been some reduction in the under five mortality rates yet, many children continue to die before reaching the age of five years. Sharp geographical differences in nature and extent of the childhood morbidity and mortality exist which highlights the need for area specific strategies and intervention. The burden of morbidities appears particularly high among rural and indigenous tribal populations. Given the vast and diverse geographic purview of our country, interstate differences in the morbidity and mortality pattern are also visible. Assam, Madhya Pradesh, Odisha, Uttar Pradesh, Rajasthan, Bihar and Chhattisgarh are states having U5MR higher than the national average. Among the scheduled tribes of India, mortality, morbidity and malnutrition rates remain particularly high when compared to the population at large. Most tribal children tend to show equivalent patterns of development at birth followed by significant disparities in the first few years itself. Under nutrition, lack of medical facilities, disadvantaged environmental factors such as poor sanitation, overcrowded housing, poverty coupled with socio cultural factors such as early motherhood, anemia among adolescent girls, are the major contributing factors for high incidence of morbidity and mortality among the Indian children. There is an urgent need to reduce the sickness load of our children. Strategies for morbidity and mortality reduction should be based on understanding the unique dynamics under which these exist, and should address the issue of disparity.

INTRODUCTION

About half of the all under- five deaths occur in only 5 countries- India, Nigeria, Pakistan, Democratic Republic of Congo and China. India (21%) and Nigeria (13%) together, account for more than a third of all under five deaths in the world (Bangidiwala *et al.,* 2006). India's child mortality rate has dropped by more than half since 1990, but it still recorded the world's highest number of deaths among children below age five in 2013 (UN Report). The report, 'Levels and trends in Child Mortality 2014', found that India registered 1.34 million under 5 deaths in 2013, the highest in the world (Bhan, 2013). The number of under-five deaths in India declined from 3.33 million in 1990 to 1.34 million in 2013. India's infant mortality rate fell from 88 death/1000 live births in 1990 to 41 in 2013. Neonatal mortality rate fell from 51 deaths/1000 live births to 29 last year (Bhang *et al.,* 2005). The under-five mortality is the probability (expressed as a rate per 1000 live births) that a child born in a specific year or time period will die before reaching the age of five, subject to current age specific mortality rates. Since 1990, a rapid decline was seen in the U5MR and from an estimated level of 125 in 1990, fell to a level of 49 in 2013. Given to reduce under-five mortality rate to 42 per thousand live births by 2015, as per the historical trend, India may be missing the target. However, considering the continuance of the sharper annual rate of decline witnessed in the recent years, India is likely to reach near the target. Under-five mortality has declined because of reductions in the neonatal, post neonatal and child mortality rates. Proportionately, child mortality rates has declined more than infant mortality and similarly post neonatal mortality has declined more than neonatal mortality, increasing the relative importance of peri-natal and neonatal mortality (NIPCCD, 2014). The under-five mortality rate as per SRS was estimated 49 at national level in 2013 and there were considerable inter-state variations. Among the bigger States, highest U5MR was in Assam (73) and lowest in Kerala (12). Assam (73), Madhya Pradesh (69), Odisha (66), Uttar Pradesh (64), Rajasthan (57), Bihar (54) and Chhattisgarh (53) have U5MR higher than the national average (49). The States of Kerala (12), Tamil Nadu (23), Maharashtra and Delhi (26), Punjab (31), Karnataka and

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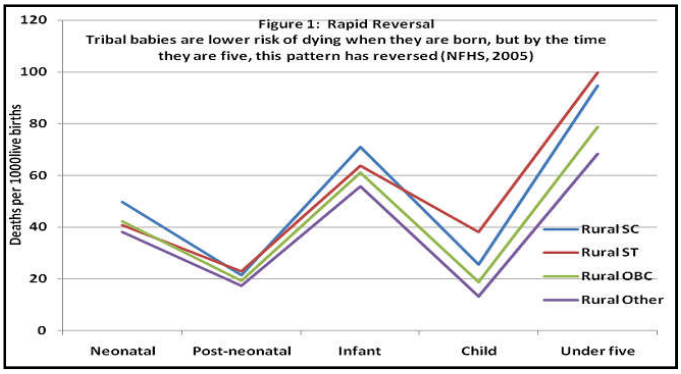
West Bengal (35), Jammu and Kashmir (40), Andhra Pradesh and Himachal Pradesh (41) have already achieved the given national level MDG target to reduce U5MR to 42 per thousand live births by the year 2015. Gujarat and Haryana (45) are likely to achieve the national target by 2015 (NIPCCD, 2014). Globally, there is variation in mortality pattern among under-five children in different countries. In India, the National Family Health Survey-3 (2005-06) showed huge variation in childhood morbidity profile among different states and among various social groups. It can be easily predicted that if this situation prevails; India would be raising a generation which is debilitated and unable to contribute effectively to the productivity of the country (Ministry of Health and family Welfare, National Family and Health Survey, 2005-06).

Indigenous populations are routinely marginalized and deprived of their access to fundamental resources. Inferior health outcomes among indigenous communities can in part be attributed to inadequate access to health care facilities and medical services (Mohankumar, 2009). Among the scheduled tribes of India, mortality, morbidity and malnutrition rates remain particularly high when compared to the Indian population at large (Office of the Registrar General and Census Commissioner of India, 2004; IIPS, 2000) These communities, officially recognized under the fifth schedule of the Indian constitution, comprise a significant portion of the Indian population. Dispensation of health care services to this population, however, by the government and private sector alike, is disproportionately lacking (Ministry of Health and Family Welfare, 2002). Scheduled Tribes make up 8 to 9 percent of the population, but account for about 14 percent of all under-five deaths, and 23 percent of deaths in the 1-4 age group in rural areas. Since the majority of deaths among tribal children are concentrated in the 1-4 age group, in this age group, tribal deaths account for almost - a quarter of all deaths. For all other social groups, the representation of deaths is proportionate to the representation of that group in the population. It may be observed that, the estimated IMR for Scheduled Tribes was 88 per 1000 live births against all-India estimate of about 68 (including Scheduled Tribes) as per the Census of India, 2001. It means that compared to total population, the IMR for Scheduled Tribes population was around 30 percent higher. Further, U5MR was 129 for Scheduled Tribes against all-India estimates of around 96 (higher by almost 35 percent). There is huge variation across states as lowest U5MR is around 55 (many states around 60), whereas highest is more than 100 for several states. The infant and child mortality rates (most likely to be underestimates) in the Scheduled Tribes have shown improvement but slower than in the total population, with NFHS1 (1992-93) and NFHS2 (1998-99). Results reveal that these rates in Scheduled Tribes are higher by about one third than in the other population (Narkhede *et al.,* 2012; Srivastava *et al.,* 2012; Melania and Alberto, 2003)

Tribal children start on par with others but fall well behind by the time they are five. Studies in other parts of the world also disaggregate mortality outcomes by race or ethnicity. Heaton and Amoateng (2007) for instance document child mortality/survival rates for different ethnic groups in South Africa and found white children to have clearly the highest rates of survival. Gaps in mortality between black and white South African children tend to start from early ages and widen as the children grow older. The pattern of the mortality gap between Scheduled Tribes and non-Scheduled Tribes in India is curiously different, in that the former start on par with their non-tribal counterparts, but rapidly are disadvantaged by the time they are five years old. This divergence is all the more striking when compared with Scheduled Caste children who also face disadvantages. From the neonatal to the infant period, ST children in rural areas have lower chance of dying than SC children. But between the ages of 1-4, they start to lag behind registering much higher child mortality than SC children (see Figure 1).



A recent study was carried by Sahu *et al.,* 2014 on the level of infant and child mortality showed that it was high among Scheduled Tribes particularly those living in rural areas. This study examines data from the three rounds of the National Family Health Survey (NFHS) of India from 1992 to 2006 which were analysed to assess the levels and trends of infant and child mortality. Univariate and multivariate Cox proportional hazard model were used to understand the socio-economic and demographic factors associated with mortality during 1992–2006. The results revealed significant change in infant and child mortality over the time period from 1992-2006 among Scheduled Tribes in rural areas. After controlling for other factors, birth interval, household wealth, and region were found to be significantly associated with infant and child mortality. Hazard of infant mortality was highest among births to mothers aged 30 year or more (HR=1.3, 95% CI=1.1-1.7) as compared with births to the mother's aged 20-29 years. Hazard of under-five mortality was 42 per cent (95% CI=1.3-1.6) higher among four or more birth order compared with the first birth order. The risk of infant dying was higher among male children (HR = 1.2, 95% CI=1.1-1.4) than among female children while male children were at 30 per cent (HR=0.7, 95% CI=0.6-0.7) less hazard of child mortality than female children. Literate women were at 40 per cent (HR=0.6, 95% CI=0.50-0.76) less hazard of child death than illiterate women. Findings concluded that, Mortality differentials by socio-demographic and economic factors were observed over the time period (1992-2006) among Scheduled Tribes (STs) in rural India. Findings support the need to focus on age at first birth and spacing between two births. The U5MR is better recorded/reported. It represents the magnitude more accurately. The 1-4 year mortality is 33.6 in Scheduled Tribes and 10.3 in the non-Scheduled Tribes. There is a scope for corrective action like immunization, management of acute respiratory infections, Diarrhea and Malnutrition. A very high IMR and U5MR in seven states namely Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh, Gujarat, Rajasthan and Andhra Pradesh need urgent attention.

Many studies had been undertaken in various parts of the country to reveal the magnitude and native morbidity profile among under-five children (Ukey and Chitre, 2012; Dongre, *et al.,* 2010; Singh, *et al.,* 2013; Srivastava *et al.,* 2012; Lakshmi, 2005). However, findings of the studies indicate geographical differences in nature and extent of the problem highlighting the need for area specific strategies and intervention. The burden of morbidities appears particularly high among rural and indigenous tribal populations who constitute about 8.2 % (84.3 million) of total population in India, (GOI, 2012). Socio-economic, maternal health and environmental disparities have been associated with the morbidity variations across various States and social groups in India. (NSSO, 1998; Stroobant and Gourbin, 1995; Biswas *et al.,* 2003). The demographic study of the determinants of infant and child mortality and morbidity concentrates on the (cultural, environmental, social and behavioural) factors, which may influence the likelihood of ill health, disease and death in early infancy. Several factors are known to be responsible for causing higher rates of morbidity in children (Giri *et al.,* 2008). While many of the factors are related to health care services and their uptake by the population, several other factors are entwined in the sociocultural fabric of the society. While nutritional status is known to be an important variable in the causation of morbidity in children, the data on the nutritional status of under-five children from tribal communities is lacking. However, from the available literature it was found that tribal children have higher rates of morbidity and female children are known to receive less than desired nutritional intake (Shahnawaz and Singh, 2014). Under nutrition is still high among the tribal children as compared to their rural counterparts (NNMB, 2000). India is the only country in South and South-East Asia with a higher prevalence of under nutrition in rural areas (underweight 43%, stunting 48% and wasting 20%). Neighbouring countries such as Nepal (underweight 39%, stunting 49% and wasting 13%) and Bangladesh (underweight 41%, stunting 43% and wasting 17%) had lower prevalence of under nutrition in rural areas (Pasricha and Biggs, 2010; Meshram *et al.,* 2010). A study carried out by NIN (first repeat survey), during 1998-99 reported that the prevalence of under-weight, stunting and wasting was 57%, 58% and 23%, respectively (WHO standard). In the present study, the prevalence of under-weight, stunting and wasting was 49%, 51% and 22%, respectively (NNMB, 2000). Rao *et al*. (2006) reported higher prevalence of underweight (72%) and stunting (67.8%), while the prevalence of wasting (13.4%) was lower among pre-school children of the Saharia tribe of Rajasthan. Another study reported higher prevalence of underweight (61.6%) and wasting (32.9%), while the prevalence of stunting was similar (51.6%) among preschool tribal children in Madhya Pradesh (Rao *et al.,* 2005).

Higher prevalence of under nutrition among 1-3 year old children might be due to faulty feeding practices such as untimely initiation of complementary feeding, non-exclusively breast feeding up to first six months and high prevalence of infections such as diarrhoea, ARI in this age group. The prevalence of under nutrition was higher among boys than girls, which is similar with other studies (Mittal *et al.,* 2007, Felice, 1999). Under nutrition has chronically remained a major public health problem among tribal children population in India (Govani *et al* 2015; Joshi, 1996; Akin, 1991). Under nutrition predisposes the child to infection and complements its effect in contributing to child mortality (UNICEF, 2013; Ramachandran and Gopalan, 2009). Disadvantaged environmental factors such as poor sanitation, overcrowded housing, poverty, etc play an important role for the infants especially on their mortality and morbidity**.** Historical studies on infant mortality brought about the quite general observation that a good deal of its decline could be achieved before efficient preventive and curative medication (vaccination against measles, whooping cough, tetanus and antibiotics) was made available by simply creating safe and healthier living environments. The association between environmental deprivation and poor survival in infancy has already been documented (NSSO, 1998; Gumber and Berma, 1997; Shariff 1995; Kannan *et al.,* 1991) in many studies. The association between socio-economic factors and infant mortality was further reinforced when improvements in overall infant mortality levels over time ran parallel with general social and economic development in most industrialised countries during the twentieth century (Muhe *et al.,* 1995). Furthermore, since the Second World War, corroboration of the strong inverse relationship between socio-economic development and mortality rates has been found repeatedly among countries and areas within countries. Links between individual- level social inequalities and regional (aggregate-level) differences are partly explained by relatively high spatial concentration of the deprived and of populations of lower social class (Abhulimhen *et al.,* 2012; Awasthi and Aggarwal, 2003; Stroobant and Gorbin, 1995).

Almost half of 20-24 year old women in India (44.5%) are married before age 18, and 22% of all 20-24 year old women have given birth by age 18 years (IIPS, 2007). Such early motherhood, in India and elsewhere, is associated with increased likelihood of neonatal death and stillbirth, low birthweight infants, and child and infant morbidity and mortality (ICRW, 2007; UNICEF, 2001; UNICEF, 2007; UNFPA, 2005; Adhikari, 2003; Mehra and Agarwal, 2004; Abdullah *et al.,* 2007; Ibrahim *et al.,* 1994; Markovitz, 2005; Phipps *et al.,* 2002; Olausson at al, 1999; Awasthi and Agarwal, 2003; Taffa, 2003; Santhya and Jejeebhoy, 2007; Reynolds at al 2000). These disproportionate risks seem to be related to social and health related vulnerabilities among adolescents, including increased rates of poverty, maternal depression, and malnutrition. Lack of education and inadequate access to health care (because of impeded mobility as well as residence in rural areas with no local providers) may also account for adolescents' lower use of antenatal care, skilled delivery care, and complete infant vaccination schedules (ICRW, 2007; UNICEF, 2001; UNICEF, 2007; UNFPA, 2005; Adhikari, 2003; Mehra and Agarwal, 2004; Abdullah *et al.,* 2007; Ibrahim *et al.,* 1994; and Jejeebhoy, 2007; Reynolds at al 2000; Lenders *et al* 2000). Biological vulnerability for adverse outcomes among younger mothers may also persist through physical immaturity (Ibrahim *et al.,* 1994; Markovitz, 2005) and exacerbation of the effect of chronic malnutrition by competition for scarce nutrients between the mother and fetus (Stewart *et al.,* 2007; Mayor, 2004). Correlating with these findings, early motherhood is also linked with poor maternal health outcomes, including pregnancy complications and maternal mortality (ICRW, 2007; UNICEF, 2001; UNICEF, 2007; UNFPA, 2005; Adhikari, 2003; Mehra and Agarwal, 2004; Mayor, 2004;

Smith and Pell, 2001; WHO, 1999), which in turn increase the likelihood of poor infant and child health outcomes. Furthermore, women who get married and begin childbearing at a younger age are also more likely to have a greater number of children (Raj *et al.,* 2009; ICRW, 2007; UNICEF, 2001; UNICEF, 2007; UNFPA, 2005), which is also linked to increased likelihood of poor maternal, infant, and child health outcomes (Hellerstedt, 1995; Liang and Zeger, 1986). Such findings show the need for analysis of the relative contribution of child marriage to poor infant and child health beyond that accounted for demographic vulnerabilities of the mother (Boorooah, 2004; Messer, 1997; Mishra and Retherford, 2005).

Gulati (2003) reported that respiratory and diarrhoeal diseases together account for two third of total morbidity in children under the age of five years. Similar findings were reported by Datta *et al* (1967) who reported that respiratory and diarrhoeal diseases together account for 73.9% of total episodes of diseases with respiratory diseases contributing 39.7% and diarrhoeal diseases 33.9% of total episodes of diseases. Bansal (1986) also reported that respiratory illnesses and diarrhea accounted for 64.9 % of all morbidity. Recent data from studies by Narkhede *et al* (2012), Srivastava *et al* (2012) and Abhulimhen *et al* (2012) also report that malnutrition, respiratory infection and diarrhoeal diseases are still major problem among under five children. Acute respiratory infection (ARI) is one of the leading causes of childhood morbidity and mortality (Giri *et al.,* 2008; Deb, 1998; Kaushik *et al.,* 1995; Bansal, 1992). Early diagnosis and treatment with antibiotics can prevent a large proportion of deaths caused by ARI. Among the states percentage of children with ARI symptoms varies from 1 percent in Himachal Pradesh to 13 percent in West Bengal and 14 percent in Tripura. More than 80 percent of children with ARI symptoms were taken to a health facility or provider in Delhi, Kerala, Haryana, Punjab, Goa and Tripura. The percentage of children with ARI symptoms who received antibiotics was highest in Mizoram (52 %), followed by Uttarakhand (46 %) and lowest in Chhattisgarh (1 %). Diarrhoea is another single most common causes of death among children under age five following acute respiratory infection. Deaths from acute diarrhea are most often caused by dehydration due to loss of water and electrolytes. Dehydration related deaths can be prevented by prompt administration of rehydration solutions. Government of India has launched the Oral Rehydration Therapy Programme as one of its priority activities for child survival. One major goal of this programme is to increase awareness among mothers and communities about the causes and treatment of diarrhea (NIPPCD, 2014). Other common conditions from which the children suffer in tribal setting include skin disorders and dental disorders, nutritional deficiencies, intestinal disorders, ophthalmic disorders and ENT disorders (Divakar *et al.,* 2015). Past researches on the morbidity pattern of children indicted that most children tend to have 4-5 episodes of illness on an annual basis. Venkatesh (2000) reported (4.85 episodes per child per year); Muhe *et al* (1995) recorded 3.34 episodes per year and Malhotra and Prasad (1986) (4.1 episodes per child per year). However, in other studies the observed frequency of illness was as high as 10 episodes. Melania (2003) reported noting 10.8 episodes per child per year. The episodes of acute respiratory infections were observed more during winter months and diarrhoeal episodes were more during summer months in present study. Niyogi *et al* (1999) and Kumar (2004) also reported the peak incidence of ARI in winter and diarrhea in summer. The possible reasons for varying number of episodes in different studies could be differing geographic and climatic conditions apart from inherent differences in the study design and methodology.

Overall, analysis of the relevant literature available reveals that high incidence of childhood morbidity and mortality in India. Rural and Tribal populations are especially vulnerable to high level of disease load, especially due to lesser accessibility to health care services and due to poor environmental conditions. Under nutrition is also a cause of concern for children under five years of age. Acute respiratory disorders, diarrhoea and Pneumonia are fairly common among children. Timely interventions if provided can improve life expectancy of many under-five children.

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