

Maternal Mortality in India: An Overview of Social Causes

Kavita Singh*, Seema Puri*, Geeta Chopra**

*Department of Food and Nutrition, Institute of Home Economics, University of Delhi

**Department of Human Development, Institute of Home Economics, University of Delhi

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Abstract- Reducing maternal mortality has been a constant struggle globally. Although developed regions have shown a steep decline in maternal deaths, developing world continues to contribute inordinately to the total maternal deaths. The Millennium Development Goal (MDG) ‘five’ focused on reducing maternal mortality and achieving universal access to reproductive health care. In lieu of that, India has made extensive efforts to achieve the same, which are visible through the sharp increase in the rate of institutional births (NFHS 4), but the concurrent high incidences of maternal mortality present a contradictory picture of the nation’s progress in improving maternal health. Despite of the boom in the medical and health sector that India has witnessed in the past decades, progress in reducing maternal mortality at the national level is disappointing. With new Sustainable Development Goal (SDG) to reduce maternal mortality ratio to 70 per 100,000 live births by the year 2030, India needs to move beyond the hospital-based approach in addressing the reproductive health issues. The determinants of maternal mortality need to be studied through the lens of social phenomenon to understand its multidimensional nature. The present review, thus, briefly explores the available evidences to determine the causes of maternal mortality operating from proximate to distant level.

Index Terms- Maternal Mortality, Causes, Maternal and Reproductive Health, Social Determinants of Health, India

I. INTRODUCTION

Maternal mortality refers to the “death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the site and duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not by accidental or incidental cause” (WHO 1994). It is used as a proxy indicator to assess the country’s maternal and reproductive health status. Maternal mortality can have a serious health effects and psychological costs for the family members especially children. Recent studies have shown significant decline in the incidences of maternal deaths in the developed world, but the estimates from the developing countries are still highly disappointing. According to the WHO, UNICEF, UNFPA and the World Bank, of the total estimated maternal deaths that occurred globally, developing countries accounted for 99% of them (WHO, 2016). In the past decade, India has been able to reduce maternal mortality from 206 to 181 maternal deaths per

100000 live births, but with 17 % (50000 maternal deaths) of all maternal deaths occurring in India, it still is the highest contributor of maternal deaths in the world followed by Nigeria (14%, 40000). In fact, India and Nigeria together account for two third of the global maternal deaths (WHO, 2014). Despite of witnessing an excellent economic growth and a boom in the health sector, India couldn’t percolate down this progress to the reproductive health indicators. Post-partum haemorrhage, hypertensive disorders and sepsis are the most common causes of maternal deaths in India followed by complications of delivery and obstructed labour (Say, 2014; Montgomery, 2014), and it is being emphasised that 80 % of these deaths can be prevented or avoided through institutional deliveries or by providing quality health care to the women (CRR, 2008; WHO, 2010; Hogan, 2010). However, the current high rates of institutional deliveries (table 1) with concurrent high maternal mortality rates in the country indicate that the maternal mortality cannot be addressed only through hospital-based approach and there is an urgent need to look beyond it. In this review, maternal health situation and maternal mortality issue has been looked as a social phenomenon.

II. FINDINGS

1.0 Socio-Economic disparity: The disparity in maternal mortality within a country is visible, but what is even more remarkable is the spread of it among different socio-economic groups (Barros, 2012). Maternal deaths continue to be concentrated among poor women (WHO, 2012). A case control study from rural Rajasthan for instance, shows a 5 times higher risk of maternal mortality among women belonging to the poor household as compared to the women of non-poor households (Gupta, 2010; Jain, 2016). The national health portal also classified the socio-economic conditions of the family as one of the primary reasons for high maternal mortality rate in the country (Jayabalan, 2015). Poverty, along with the rise in cost of health care leads to high out of –pocket expenditure on maternal health services. Although, National Rural Health Mission render most of these services available for free of cost to the marginalized population; transportation and incidental costs associated with hospital delivery prevents many women from accessing these services (Esscher, 2014; Jain, 2016). This phenomenon could be explained by looking at the access to maternal health care services in the country. National level data shows that although the uptake of antenatal care (ANC) and

skilled attendance at birth has increased across the country, the progress has been slow among women belonging to economically disadvantaged segments (Pathak, 2010; RSOC, 2014). A substantial amount of studies in India shows that health seeking behaviour is associated with the household economic status irrespective of the geographic location of the household. A study by Hazarika, 2011, shows wealth as one of the strongest

predictor of using skilled birth attendance. Postnatal care within 48 hours of delivery is almost half in the lowest quintile as compared to highest (23.0 and 48.8 respectively) (RSOC, 2014). Overall, studies have shown that economically weaker stratum of the population in India is disadvantaged in terms of affordability and accessibility of the maternal health services.

Table 1. Trends in Essential Maternal Health Indicators

| S.No | Indicators | NFHS 3 (2005-2006) | | | NFHS 4 (2015-2016) | | |
|------|---|--------------------|-------|-------|--------------------|-------|-------|
| | | Urban | Rural | Total | Urban | Rural | Total |
| 1 | Antenatal care coverage ^{1, 2} | 73.8 | 42.8 | 50.7 | 66.4 | 44.8 | 51.2 |
| 2 | Antenatal care coverage (FULL) ³ | NA | NA | NA | 31.1 | 16.7 | 21.0 |
| 3 | Births attended by skilled health personnel | 75.3 | 39.9 | 48.8 | 90.0 | 78.0 | 81.4 |
| 4 | Perinatal mortality rate | 36.3 | 52.6 | 48.5 | | | |
| 5 | Prevalence of low birth weight | 19.3 | 23.3 | 21.5 | | | |
| 6 | Prevalence of anemia in women | 51.5 | 58.2 | 56.2 | | | |
| 7 | Mothers who consumed IFA for 90 days or more when they were pregnant with Their last child (%) ⁴ | 34.5 | 18.1 | 22.3 | 40.8 | 25.9 | 30.3 |
| 8 | Institutional births | 69.4 | 31.1 | 40.8 | 88.7 | 75.1 | 78.9 |
| 9 | Received PNC within 48 hours of discharge/delivery | 60.8 | 28.5 | 36.8 | 71.7 | 58.5 | 62.4 |
| 10 | Currently married women who usually participate in household decisions (%) | 45.0 | 33.0 | 36.7 | 85.8 | 83.0 | 84.0 |

Grey area – numbers for the indicators are not available

1. NFHS 3- Mothers who had at least 3 antenatal care visits for their last birth (%)
2. NFHS 4- Mothers who had at least 4 antenatal care visits (%)
3. Full antenatal care is at least four antenatal visits, at least one tetanus toxoid (TT) injection and iron folic acid tablets or syrup taken for 100 or more days
4. NFHS 4 - Mothers who consumed IFA for 90 days or more when they were pregnant with their last child (%)

1.1 Antenatal and postnatal care: Antenatal care has been termed as one of the “four pillars” of safe motherhood by the WHO (WHO, 1994; Bergsjø, 2001). High-quality antenatal, intra-natal and postnatal care and emergency obstetric care are the most important ways to reduce the maternal morbidity and mortality (AHS, 2011; Mumbare, 2012; Travasso, 2015). One of the strategies that has been adopted by the Indian government to combat high rates of maternal mortality is to ensure universal access to Antenatal Care (ANC), Emergency Obstetric Care (EmOC) and Skilled Birth Attendance (SBA) (Paxton, 2005; WHO, 2015; Himanshu & Källestål, 2017). An analysis of WHO data of 188 developed and developing countries revealed that maternal mortality is related to the obstetrical care received by the women (McClure, 2007). In India, although the institutional deliveries or birth by skilled attendants has increased many folds as per the NFHS 4, the coverage of full ANC and its components is still very low. ANC full coverage which includes receipt of 3+ ANC, at least one dose of Tetnus Toxoid (TT) and consumption of 100 Iron Folic Acid (IFA) tablets/syrup is only 21 % (Victora et al. 2012; Kumar et al. 2013; NFHS 4). When looked separately, IFA supplements for 90 days, an important intervention for reducing and preventing anemia among pregnant women is as low as 30 % (table 1). Clearly, the utilization of

health services is mainly limited to the hospital-based deliveries. This indicates that majority of pregnant women in the country are still not even getting the basic recommended ANC services (Sinha, 2014).

1.2 Education: The direct link between education and maternal mortality is not well established, however, there is enough research done on the correlation between the two, indicating female literacy to be one of the significant determinants of maternal mortality (Bhalotra, 2013; AHS, 2014). Globally, a WHO survey on maternal and perinatal health in 24 countries showed that women with no education and those between one to six years of education are twice at risk of maternal mortality as compared to women with higher education and the findings were obtained after adjusting for marital status, maternal age and parity (McAlister, 2006; Karlesen et al, 2011). In India, state level analysis of mother’s education level and maternal mortality ratios shows an inverse association (AHS, 2014). This could be attributed to the improved health related practices among women with high literacy levels compared to women with low or no education. For instance, maternal education level and utilization of health services are positively associated irrespective of the socio-economic status of the family (Grown, 2005; Kesterton AJ, 2010; Pillai, 2013; AHS, 2014).

Educated mothers are more likely to seek antenatal care, post-natal care and skilled birth attendants during pregnancy, which reduces the risk of maternal mortality significantly (NFHS 3, 2008; Sanneving, 2013; AHS, 2014). At the state level, four states including Uttar Pradesh, Madhya Pradesh, Bihar and Rajasthan, with significantly low female literacy rates (61%, 59.4%, 49.6% and 56.5 % respectively), together contributes a total of 67 % of MMR in the country as compared to states with high female literacy like Kerala (97.9%), Tamil Nadu (79.4%) (SRS, 2011; NFHS 4, 2016).

1.3 Urban- Rural differences: According to the census 2011, approximately 69 % of the population lives in rural area (RGI, 2011) thus, making India primarily a rural population. The people residing in the rural segments have poor availability, accessibility, affordability of health services when compared to their urban counterpart mainly because of complex socio-economic and cultural structure in the rural area, which challenges the uptake of subsidized services of the government by the vulnerable groups (Kumar, 2013; Montgomery, 2014; Gupta, 2016). The disparity is even more evident among maternal health services. Analysis of three rounds of NFHS survey reveal that rural areas have higher economic inequality in utilization of skilled birth attendance when compared with their urban counter parts (table 1) (Chauhan, 2015). District level analysis of the Annual Health Survey (2010-2013) shows a significant disparity in the usage of maternal and child healthcare services at the districts level in India. Urban residents are way ahead of the marginalized people, concentrated mainly in the rural areas, in the usage of healthcare services (Awasthi, 2016). RSOC (2013-2014) data also shows the continued difference in the uptake of maternal health services among rural and urban parts of the country.

1.4 Nutrition factors and inequity: India scored a 28.5 in the global hunger index, designating the malnutrition problem in the country as serious. According to this, 15.1% of the Indian population is undernourished i.e. calorie deficient (Von, 2016). Among these, the most affected are the vulnerable group of women and children. Stunting among women (height <145cm), resulting from chronic under-nutrition, increases the need for assisted delivery by 60 % compared to women with normal height and it has been linked with obstructed and/or prolonged labour which in turn significantly increases the risk for maternal deaths (Rush, 2000; Black, 2008; UNICEF, 2015).

Micronutrients deficiencies, especially iron deficiency anemia, accounts for 40 per cent of the maternal deaths in India, directly or indirectly (NIPCCD, 2015). Pregnancy increases the risk of maternal anemia (specifically iron deficiency anemia) as there is an increase in maternal iron requirements to support both maternal and fetal needs (Steer, 2000). Severe anemia can lead to heart failure and death from shock (Ronsmans, 2008). It has been estimated that haemoglobin levels of <5 g/dl leads to 8-10 folds increase in maternal mortality. Haemorrhage, one of leading cause of maternal mortality in the developing world, is the consequence of severe anemia among pregnant women. Evidences show that anemia is linked to increased blood loss during delivery and puts women at greater risk of postpartum haemorrhage (Kavle, 2008). 25 % of maternal deaths have been attributed to the postpartum haemorrhage globally, making it as

one of the leading cause of maternal mortality (Say, 2014; MCHIP, 2015).

Gestational hypertension has been found to be prevalent among women with low calcium intake, leads to pre-eclampsia, which is referred as the second leading cause of maternal deaths (19% of total deaths) (Hofmeyr, 2007; Black, 2013). Several other complications during pregnancy have been associated with calcium deficiency leading to maternal as well as fetal adverse outcomes. Many studies have been done so far to ascertain the association of serum calcium level with pre-eclampsia during pregnancy, for instance a study conducted in Bangalore, India, found a significant reduction in the serum calcium level among pre-eclamping pregnant women as compared to normal pregnant women (Ramachandra, 2016), however, the evidences are equivocal (Trumbo, 2007; Gupta, 2016).

Zinc Deficiency, wide spread in the developing country has been associated with long labour, increases the risk for maternal deaths (King, 2000; Jou, 2010). Several studies across the world have shown that zinc supplementation helps in reducing the complications during pregnancy (Chaffee, 2012; UNICEF, 2014). It is estimated that over 80% of pregnant women worldwide have inadequate zinc intake (Hill, 2013).

Vitamin A deficiency has been recognized not only to harm the eyes but to increase maternal mortality. About 800 000 deaths in children and women of reproductive age are attributable to vitamin A deficiency (Ezzati, 2002). Evidence from south Asian countries shows that vitamin A supplementation can lower the risk of maternal mortality by reducing the severity of sepsis. An adequate intake of beta-carotene (vitamin A precursor) may also reduce some maternal health risks related to oxidative stress. These claims are however later challenged in another replication study in Bangladesh, Indonesia and Ghana and in the meta-analysis study where Vitamin A supplementation had no effect on pregnancy related mortality (Black, 2008; Kirkwood, 2010; West, 2011; Lyman, 2012).

Discrimination in the allocation of food at the household level also determines the individual level intake of nutrients by the mother. The intra-household food allocation is determined by social, cultural and environmental factors, especially in the south Asian country like India (Gittelsohn, 2003; Harris-Fry, 2017). Women are often considered of low social status in comparison to men and therefore, they are usually allocated less food and/or less preferred foods (Harris-Fry, 2017). A study conducted in Bangladesh found that 90 % of the women ate last in the household and received the smallest share (Shannon, 2008).

1.5 Maternal age: Early marriage and child bearing are still quite prevalent in India, especially in rural areas; 18% and 47% are married before 15 years and 18 years, respectively (SOWC, 2014). With pregnancy and childbirth complications being the second most prevalent cause of deaths among 15-19 years old globally; it is estimated that 70,000 female teenagers die each year because they are pregnant before they are physically mature enough for successful motherhood (Mayor, 2004, WHO, 2014). In India, with 26.8 % of women marrying before the age of 18 years, teenage pregnancy imposes a huge barrier in reducing the incidences of maternal deaths (NFHS 4). A hospital-based study conducted to evaluate the maternal and foetal outcomes of

teenage pregnancy in Bhopal, India, found that 53.12 % of teenage pregnancies were associated with complications such as abortions, hypertension, and premature rupture of membranes and anemia which increases the risk for maternal deaths (Yasmin, 2014). Physical immaturity and chronic malnutrition and scarce nutrition from mother to foetus increase the biological vulnerability for adverse outcomes among younger mothers (Raj et.al, 2010). Advanced age pregnancy, on the other hand, exposes women to higher risk of pregnancy induced hypertension while age related morbidities may also complicate the pregnancy (Bateman B, 2010; RCOG, 2011; Nair M, 2014).

1.6 Sanitation and hygiene: Poor sanitation and hygiene practices during pregnancy or delivery may lead to adverse pregnancy outcomes. Anemia, one of the leading causes of poor pregnancy outcomes, can be a result of hookworm infection due to poor sanitation practices during pregnancy (Brooker et al, 2008; Cheng JJ, 2012). Sepsis, which accounts for around 11 % of all maternal deaths at the global level and 10-15 % of maternal deaths in developing countries, is the result of poor hand hygiene and contaminated surfaces during delivery (Seale A, 2009; Gravett CA et al. 2012; WHO, UNICEF, 2012; Say, 2014). Waterborne infections during pregnancy have been associated with considerable risk of maternal deaths (Emerson & Purcell, 2004). Unhygienic storage of water has been identified as the major cause of malaria infection due to breeding of mosquitos, which in turn poses elevated risk to pregnant women (Heyman, 2008; Mota et al, 2012). The other mechanism through which inappropriate hygiene practices may lead to adverse pregnancy outcomes, is the life-course effect of repeated childhood infections resulting in childhood stunting, short stature in adulthood and eventually a cephalopelvic disproportion in pregnancy, thus, increasing the risk of obstetric labour (Konje & Ladipo, 2000; Neilson et al. 2003; Toh-Adam et al. 2012). A systematic review on association between poor sanitation and maternal mortality found that women of households with poor sanitation have 3.14 times higher odds of dying than women with better sanitation conditions. Further, women with poor water supply had 1.75 times odds of maternal mortality as compared to those with adequate water supply (Benova, 2014).

1.7 Women empowerment and equity: Low status of women in the family and society has been linked with maternal survival (Jamison, 2006). Studies have shown that care seeking behaviour of women and their social status, economic condition, educational attainments and decision-making powers are linked together (Ahmed, 2010) and that maternal mortality is a sensitive indicator of inequality and social development (WHO, 2016). The key factor to reduce maternal mortality is not just the availability of a well-functioning health care system but also its access to the most vulnerable section of women in the society. Several studies have shown the negative effects of gender inequalities on women's reproductive health practices and outcomes by limiting their access to health services and information and increasing their vulnerability to gender-based violence (Blanc, 2001; Doodoo & Frost, 2008; Stephenson, 2012). At the household levels, gender inequality affects the family size, contraceptive use, age at marriage (Woldemicael 2009; Desai and Andrist, 2010). A study conducted in Varanasi, India, on the dimensions of women autonomy, finds that women with greater freedom of movements have high coverage of ANC services and

are more likely to use safe delivery care (Bloom, 2001). Analysis of the data from the national level surveys also indicates a direct link between women's autonomy and use of prenatal, delivery and postnatal care in the rural India (Mistry, 2009). It is therefore not surprising that the countries sharing the major proportion of maternal mortality at the global level are also the ones with high gender inequality. India ranked at 125 among 155 countries on the gender inequality index, a rank lower than its neighbouring countries (UNDP, 2016). While good governance ensures the availability of these services, women empowerment and gender equality ensures the access to the available services (Dalal, 2012; Hagman, 2013). Gender inequality have far more grave long term effects than just access to the health services as explained by Osmani and Sen in their work on intergenerational consequences of gender inequality. It says that gender inequality in pregnancy leads to fetal deprivation which in turn leads to child under-nutrition among the less affluent population but at the same time, among the affluent, Barker's hypothesis comes into the play thus leading to the double jeopardy (Osmani & Sen, 2003)

1.8 Caste inequality: Caste based inequality has also emerged as an important determinant of availability as well as accessibility of the health services at the community level and plays a key role in maternal health outcomes (Shah, 2006). India, in the realm of its complex social structure, subjects its women to inequality in terms of religion and castes, rendering the outreach of the available health services to certain sections of the society (Shah, 2006). NFHS 3 findings suggest that the coverage of antenatal care was less in Scheduled Castes (SC) (74%) and Scheduled Tribes (ST) (70.6%) compared to other population groups (84.8%). Skilled Birth attendants at birth is also much less in ST (25%) and SC (40.6%) population compared to others (57.8%). The percentage of institutional deliveries was much less in ST (17.7%) and SC (32.9%) compared to other population groups (51%) (Kumar, 2010; NFHS 3). The inequality deepens in the villages and other remote areas of the country. For instance, a cross-sectional study conducted in rural Kerala showed that women from lower castes (SC/ST/Other Backward Class(OBC) have poor health status as compared to the women from upper castes (Mohindra, 2006). Untouchability, a still existent issue in many rural and remote parts of the country, leads to major discrimination in the rendering of health services to the women belonging to the lower castes. An upper caste front line health worker would not provide her services to Dalit (lower caste) women. A report on prevalence of untouchability in India showed that Dalit villages reported denial of visits by health workers (30-40%), entry into private health clinics (20-25%) and in cases of entry, they reported discriminatory treatment in the health centers (10-15%) (Shah, 2006). A caste and gender-based oppression have a cumulative effect on women's health seeking behaviour.

III. CONCLUSION

Despite of all the economic growth in the past decades in India, the maternal mortality rates are still unacceptably high (SRS, 2013; WHO, 2015). National, state and district level surveys of the country presents a grim picture of maternal health status highlighting the underachievement of the government

initiatives taken so far to curb the mortality rates in the country (Vora, 2009). Although, haemorrhage, hypertension and anemia, have been reported to be the primary causes of maternal deaths across the country, other underlying causes like socio-economic disparity, rural-urban differences, education level of women, caste and gender-based inequity etc. are a real hurdle to any attempt made to reduce maternal deaths in the country. Further, there is marked difference in the maternal mortality rates at the state levels, with some states heading towards achieving the set targets while some are still struggling at the initial stage. It is therefore the time to look at the maternal and reproductive health not just as a medical event but rather a social phenomenon, where contextual factors play an equally important role. There is a need to adapt the strategies and policies for maternal mortality reduction specific to the state while simultaneously taking lessons from the well performing states.

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AUTHORS

First Author- Kavita Singh, Senior Research Fellow, Department of Food & Nutrition, Institute of Home Economics, University of Delhi, F-4, Hauz Khas, New Delhi- 110016, India. Email: singhkavita486@gmail.com

Second Author- Dr. Seema Puri, Associate Professor, Department of Food & Nutrition, Institute of Home Economics, University of Delhi, F-4, Hauz Khas, New Delhi- 110016, India. Email: dr.seemapuri@gmail.com

Third Author – Dr. Geeta Chopra, Associate Professor, Department of Human Development, Institute of Home Economics, University of Delhi, F-4, Hauz Khas, New Delhi- 110016, India. Email: drgeeta_chopra@yahoo.com

Corresponding Author – Dr. Seema Puri, singhkavita486@gmail.com, +91 9999813486