## **Perspective Article**

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# Maternal mortality: scenario, causes and prevention of the tragedy in Indian context with special consideration to Assam, India

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#### **ABSTRACT**

Though child birth gives joy to mother and family, yet this joy may transform to tragedy in the event of maternal death. Maternal mortality has been identified as a priority on health policy and research agendas for developing countries. MMR has been decreased from 398/100,000 live births in 1997 to 178 in 2013 India and 347 in 2011 to 301 in 2013 in Assam, India. Maternal death may occur during antenatal, intranatal or postnatal period thus necessitating services during these periods. For pregnant women during antenatal, intranatal or postpartum period ante natal care services, institutional delivery, access to basic emergency obstetric care (BEmOC) comprehensive emergency obstetric care ( CEmOC), post natal care, referral services should be provided. In the event of injection oxytocin not being available due to constraints of optimal storage conditions or other logistical barriers, misoprostol is recommended to be given for prevention of PPH. Government of India policies and strategies (NPP/RCH II) have focused on enhancing-access and availability of comprehensive abortion care services in both the public and private sector. Maternal death review should be done in case of any maternal death to find out the associated factors. "Maternal near miss" surveillance is an effective tool for improving safe motherhood programs. Government of Assam has kept goal 2 under Assam bikas yojna: reduction in maternal mortality ratio to 210 per 100000 live births. Some planned strategy taken for achieving this goal. But for success in reducing maternal death the community will need to be involved not only through educating them about the signs and symptoms of emergency but also to develop appropriate mechanisms for ensuring that women in distress get the quality care.

Keywords: Maternal mortality, Emergency obstetric care, Comprehensive emergency obstetric care, Distress

#### INTRODUCTION

"Women are not dying because of a disease we cannot treat. They are dying because societies have yet to make the decision that their lives are worth saving"

Mamoud Fathalla, President (FIGO), World Congress, Copenhagen 1997

"Who are behind the numbers? What were the facts? Whose faces were seen in the throes of agony, distress,

and despair? What were their dreams??How the child will be brought up without mother? What clues they have left for improvement? Why their lives ended before the child started life"

Though child birth gives joy to mother and family, yet this joy may transform to tragedy in the event of maternal death. Maternal mortality has been identified as a priority on health policy and research agendas for developing countries. It has gained increased recognition over the past two decades, due to its inclusion as a key

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target indicator in a number of international conferences, such as the 1990 World summit for children, the 1994 international conference on population and development and the 1995 World conference for women.<sup>3</sup> However, the inclusion of improved maternal health as the fifth United Nations(UN) millennium development goal (MDG) in 2000, and specifying a reduction of three quarters in the maternal mortality ratio between 1990 and 2015 as the primary target of MDG has given thrust on governments to have proper systems to measure maternal mortality.<sup>4,5</sup> India has high commitment to millennium development goal as it was signed by then Prime Minister of India at millennium summit in 2000. The government of India has launched the national rural health mission in 2005 with the aim of decreasing MMR, IMR and TFR.<sup>6</sup> To understand the reasons, we need to briefly review two major aspects of Maternal Mortality in India. The first relates to the States where India has very high maternal mortality rates. The second is what are the major causes of maternal mortality in the country. MMR has not been estimated at state level in most of the studies.<sup>7</sup> Decentralized district-based health planning is essential in India because of the large inter-district variations. In the absence of vital data at the district level, the state level estimates are being used for formulating district level plans as well as setting the milestones thereof. In the process, the hotspots (districts requiring special attention) very often get masked by the state average.

#### Indicators of maternal and pregnancy-related mortality<sup>8</sup>

The international classification of diseases (ICD), revision 10, provides three different definitions related to maternal mortality.

#### Maternal death

A maternal death is the death of a woman while pregnant or within 42 days of the termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental causes.

#### Pregnancy-related death

A pregnancy-related death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of cause.

#### Late pregnancy-related death

A late pregnancy-related death is the death of a woman while pregnant or within 12 months of termination of pregnancy, irrespective of cause.

#### Maternal mortality indicators<sup>5</sup>

The four indicators developed for measurement of maternal mortality are defined below.

The most commonly used indicator is the maternal mortality ratio (MM Ratio), which refers to the number of maternal deaths per live birth, multiplied by a conventional factor of 100 000.

$$\textit{MM Ratio} = \frac{\textit{Number of maternal deaths}}{\textit{Number of live births}} \times 100000$$

The MM Ratio was designed to express obstetric risk.

The MM Rate is an indicator of the risk of maternal death among women of reproductive age. The MM Rate is usually multiplied by a factor of 1000:

MM Rate = (Number of maternal deaths /Number of women aged 15-49 years) x 1000.

A third indicator that expresses the salience of maternal deaths relative to other causes of death among women of reproductive age, is the proportion of maternal deaths among all deaths of females of reproductive age (PMDF):

*PMDF* = Total maternal death/ Number of death among women 15-45years.

A fourth indicator of maternal mortality is the lifetime risk of maternal death (LTR). The LTR reflects the chances of a woman dying from maternal causes over the course of her 35-year reproductive lifespan. Two common ways of calculating an approximation of the LTR are:

 $LTR = 35 \times MM Rate$ 

Or LTR= 1-(1-MMR/100000) TFR

#### Problem Statement

#### Global scenario

MMR declined from 400 maternal deaths per 1,00,000 live births in 1990 to 210 in 2010. The latter represents an average annual decline of 3.1%. All MDG regions experienced a decline in MMR between 1990 and 2010, with the highest reduction in the 20-year period in Eastern Asia (69%) followed by Northern Africa (66%), Southern Asia (64%), Sub-Saharan Africa (41%), Latin America and the Caribbean (41%), Oceania (38%) and finally Caucasus and Central Asia (35%). Although the latter region experienced the lowest decline, its already low MMR of 71 maternal deaths per 100000 live births in 1990 made it more challenging to achieve the same decline as another region with a higher 1990 MMR value. When interpreting change in MMR, one should take into consideration that it is easier to reduce MMR when levels are high than when they are low.8

#### Indian scenario

According to SRS 2010-12, MMR of India 178, 257 in EAG and Assam Subtotal, 105 in South Subtotal and 127 in other subtotal. Maternal mortality ratio in India has shown an appreciable decline from 398/100,000 live births in the year 1997-98 to 301/100,000 live births in the year 2001-03 to 254/100,000 live births in the year 2004-06 and 178 as per SRS 2013 data (Figure 1). 10,11

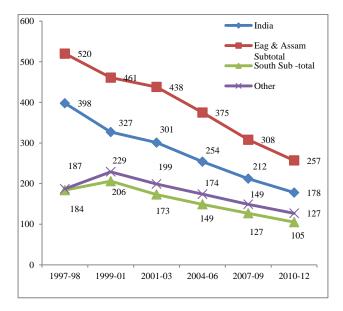


Figure 1: Trend of maternal mortality in India from 1990-2012. 9-11

Scenario in Assam

MMR has been decreased from 347 to 301 in Assam, 436 to 404 in Upper Assam, 288 to 281 in Hills and Barak Valley,325 to 254 in Lower Assam and 314 to 251 in North Assam from 2011 to 2013(Figure 2). 12,13

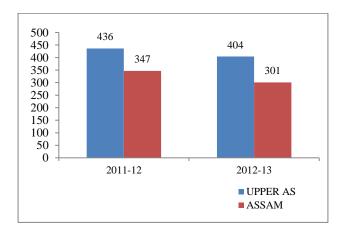


Figure 2: Trend of MMR in Assam and upper Assam. 12,13

The National health policy (1982) aimed at reducing the maternal mortality in India from the over 400 per 100,000 live births to less than 200 per 100,000 live births by the

end of year 2000 and national health policy 2002 aimed reduction of MMR to 100/Lakh. <sup>14,15</sup> We, even in 2015, are far from this target in many states of India including Assam. In India, hemorrhage (25.6 percent) ranks first as the cause of maternal death, followed by sepsis (13percent), toxemia of pregnancy (11.9 percent), abortions (8 percent) and obstructed labor (6.2 percent) while other causes together total 35.3 percent. <sup>16</sup>

#### Where are we wrong

We have many policies, program and schemes for the pregnant women to motivate them for institutional delivery and better antenatal check-up. Still we could not achieve millennium development goal. Maintaining health care standard at the grass root level for people of the rural areas, river rine areas or tea garden of Assam, India requires interdisciplinary collaboration among doctors, midwives, auxiliary nurses, other paramedical staff and the community leaders. The provision of health care at the terminal end of our health provisioning system in this these areas urgently requires a willful political drive to improve the present scenario. The high MMR is due to large number of deliveries conducted at home by untrained persons. In addition, lack of adequate referral facilities to provide emergency obstetric care for complicated cases also contributes to high maternal mortality rate. The age at marriage and child bearing, child spacing, family size and fertility patterns, literacy, socio-economic status and traditional way of maintaining customs and beliefs also have a big contribution. 13

One of the biggest challenges facing Assam in the area of children and women development is high maternal mortality. Although we have achieved the maximum decline of 19 percent in maternal mortality ratio between 2005-06 and 2007-09, Assam, continues to remain in the Country having the highest maternal mortality ratio (MMR) of 328 per 100,000 live births in the country (all India average: 178, with Kerala having the lowest MMR at 81). Safe deliveries, too, remain a challenge; as per the DLHS-3 data, 39.9% of deliveries are attended by trained attendants; the all India average is 52.7%. As for institutional births, Assam is at 64.4% (CES, 2009) which is lower than the national average of 72.9%.

# Multiple approaches to measuring maternal mortality exist and are in practice around the World. 10

Example of this approaches for measuring maternal mortality

- Civil registration system.
- Sample registration system
- · Household survey.
- Annual health survey.
- Reproductive –age mortality studies (RAMOS).
- Verbal autopsy.
- National population census.

- Retrospective household surveys (sibling-based and sisterhood surveys, reproductive-aged mortality studies and verbal autopsies focusing on maternal death).
- Prospective surveillance of deaths of reproductiveaged women using community-based informants.

Causes: Direct causes are those resulting from obstetric complications of the pregnant state (i.e. pregnancy, delivery and postpartum), interventions, omissions, incorrect treatment or a chain of events resulting from any of the above. Indirect causes are those resulting from previously existing diseases or from diseases that developed during pregnancy and that were not due to direct obstetric causes but aggravated by physiological effects of pregnancy.<sup>17</sup>

Determinants of maternal mortality<sup>18</sup>

#### Obstetric causes

- Toxemias of pregnancy
- Haemorrhage
- Infection
- Obstructed labour
- Unsafe abortion

#### Non-obstetric causes

- Anaemia
- Cardiac, renal, hepatic or metabolic diseases
- Malignancy
- Accidents

#### Social factors

- Age at birth
- Parity
- · Birth interval
- Malnutrition
- Poverty
- Illiteracy
- Ignorance and prejudices
- Lack of maternity services
- Poor environmental sanitation
- Poor communication and transport facilities
- Social customs

The estimated average interval from onset to death for major obstetric complications is very short. It is 2 hours for post-partum hemorrhage, 12 hours for ante-partum hemorrhage, 1 day for ruptured uterus, 2 day for eclampsia. But at the community level, no perception that any of these complications are serious and can result in death if not attended within the time indicated. Next, even where efforts are made to seek medical attention, the community lacks either the means or the knowledge on where to go for such emergencies. Not all health centers or hospitals are equipped to tackle emergencies in obstetrics.<sup>7</sup>

While there are many factors that can cause delay in getting treatment, they can be grouped using a Simple model called the 3 delays. <sup>19</sup>

- Delay in deciding to seek care;
- Delay in reaching a treatment facility; and
- Delay in receiving adequate treatment at the facility.

#### Prevention of maternal mortality

For all women aged 15 to 49 years, Non-maternal services like nutrition, micronutrients, female education, empowerment, prevention and treatment of prevalent diseases e.g. HIV, CVD, increased physical accessibility to health facilities are to be encouraged. <sup>20</sup> Maternal death may occur during antenatal, intranatal or postnatal period thus necessitating services during these period. For Pregnant women during antenatal, intranatal or postpartum period, ante natal care services, institutional delivery, access to basic emergency obstetric care (BEmOC) and comprehensive emergency obstetric care (CEmOC), post natal care, referral services should be provided. Incentive to be provided to skilled Birth Attendant, Trained Traditional Birth Attendant for conducting unavoidable home delivery. 21 The Ministry of Health and Family Welfare, Government of India (MoHFW, GoI) is committed to provide free of cost quality institutional care to mothers and their newborns during and just after childbirth under the janani suraksha yojana and the janani shishu suraksha karyakram. However, there remain a number of pockets in the country where the coverage of institutional deliveries is still sub-optimal due to a variety of reasons like remoteness and inaccessibility or lack of understanding. In these circumstances, where some of the women are not able to access institutional care and deliver at home, the ANMs are expected to provide quality intra- and immediate postpartum care to women and their newborns. It is a well-known fact that hemorrhage is the largest contributor to maternal mortality in India and is responsible for almost 40% of the maternal deaths in the country, the major part of these deaths being due to postpartum hemorrhage (PPH). Various high-impact medical interventions effectively prevent postpartum hemorrhage. Active management of the third stage of labor, using Injection oxytocin as the uterotonic of choice, is being used at health facilities for prevention of PPH. In the event of Injection oxytocin not being available due to constraints of optimal storage conditions or other logistical barriers, Misoprostol is recommended PPH.<sup>22</sup> Medical to be given for prevention of interventions occur in clinical settings and can include primary (supplements during pregnancy), secondary (early detection and treatment of risk) or tertiary prevention (treating obstetrical emergencies complications). Medical interventions have a wide reach in high-income countries where nearly all infants are delivered in hospitals with trained medical providers. The Lancet maternal survival steering group published a series of five articles about maternal survival in 2006. Their key messages included the importance of focusing on maternal death rather than morbidity as an outcome where the mortality burden is high. A clear message from this series of articles is that focus on the intra-partum period is essential to end the epidemic of maternal deaths. Interventions such as prenatal care, postpartum care, family planning and safe abortion are justified after near birth interventions are already in place. They also assert that the single interventions with strong evidence are only effective at reducing MMR in populations if they are part of component packages that are distributed widely.<sup>23</sup>

Safe abortion services may be provided for those pregnant women who do not want child. Government of India policies and strategies (NPP/RCH II) have focused on enhancing-access and availability of comprehensive abortion care services in both the public and private sector. Strategies planned under NPP 2000 to expand the availability of safe abortion care. Community-level education about the availability of safe abortion services and dangers of unsafe abortion may be encouraged. Make safe and legal abortion more attractive by:

- Increasing geographic spread
- Enhancing affordability
- · Ensuring confidentiality
- Providing compassionate abortion care (including post-abortion counseling).<sup>24</sup>

Moreover family planning methods should be made accessible with a cafeteria approach for woman not wanting child. If unwanted pregnancies are prevented, data suggest that between 25% to 40% of maternal deaths could be eliminated.<sup>25</sup>

There are two dimensions to healthcare

Stages of the life cycle and places where the care is provided. These together constitute the 'continuum of care.' This continuum of care approach of defining and implementing evidence-based packages of services for different stages of the lifecycle, at various levels in the health system, has been adopted under the national program reproductive, maternal, newborn, child plus adolescent health (RMNCH+A). Priority interventions are given under RMNCH+A.<sup>26</sup>

- Adolescent nutrition; iron and folic acid supplementation.
- Facility-based adolescent reproductive and sexual health services (Adolescent health clinics).
- Information and counselling on adolescent sexual reproductive health and other health issues.
- Menstrual hygiene.
- Preventive health checkups.

Maternal death review should be done in case of any maternal death to find out the associated factors. Two types of maternal deaths audit are done - the institutionbased maternal death audit and the verbal autopsy. In the former only maternal deaths occurring in the institution are reviewed to find out the causes of death and related factors. The latter covers all deaths - institutional and domiciliary.<sup>27</sup> The protocols for operationalizing the verbal autopsy also include "district maternal deaths verbal autopsy" meetings convened by the district collectors every month in their districts to review maternal deaths.

"Maternal near miss" surveillance is an effective tool for improving safe motherhood programs. <sup>28</sup>

Pal A et al mentioned that EmOC facilities should be well distributed to serve 500,000 people and there should be one comprehensive and four basic EmOC facilities which can reduce MMR in an area. EmOC key functions are: antibiotics (injectable), oxytocic drugs, anticonvulsants, manual removal of placenta, removal of retained products, assisted vaginal deliveries, surgery (cesarean section), and blood transfusion facilities. The first six services are basic and all eight services are comprehensive.<sup>29</sup>

### Tamilnadu experience<sup>30</sup>

It is very encouraging that a few states in India have shown remarkable progress in reducing maternal mortality by introducing innovative changes within the framework of existing organizational set-up, resources, and constraints. Tamil Nadu has recorded impressive achievements in reducing MMR from132 in 2001-2003 to 111 in 2004-2006. As per NFHS-3, overall indicators of MCH care are also very encouraging like high contraceptive prevalence (61.6%), high antenatal care coverage (3 antenatal visits - 96.5%), and institutional deliveries (96%). The key strategy to reduce MMR is focused at ensuring 100% institutional delivery and quality emergency obstetric services (both basic and comprehensive) at PHCs, FRUs, and district hospitals. The state government follows a threefold path to success: Prevention and termination of unwanted pregnancies, promoting institutional deliveries and quality emergency obstetric care, interventions to shorten the three delays.

Government of Assam has kept goal 2 under Assam bikas yojna

Reduction in maternal mortality ratio to 210 per 1000000live births by 2016.<sup>31</sup> Strategy taken for achieving this goal-

- Tracking of pregnant women with anemia and PIH during pregnancy at village and sub centre level for early referral and management.
- Ensuring quality ANC through ASHA Incentive @ Rs. 100/- per PW (4 ANCs including registration + consumption of 100 IFA tablets + TT2/booster).
- Introduction of iron sucrose injection for moderate to severe anemic pregnant and postpartum women

- Strengthening quality ANC and thereby identifying high risk pregnancy and complication during pregnancy and referral.
- Successful implementation of mamoni under Assam bikash yojana for nutritional support to pregnant women during antenatal period.
- ANC tracking through MCTS (mother child tracking system).
- Conduct of regular maternal death audit (MDA) and taking corrective action.
- Strengthening of health facilities, in terms of functional FRU, 24X7 PHC and sub centre delivery points have been taken up for improved institutional delivery and case management.
- Implementation of janani sishu suruksha karyakram (JSSK) to improve the acceptance of health care by pregnant women.
- Special emphasis to be given to night ceasarian sections depending on adequate number of specialists.<sup>31</sup>
- Launched 'mamata' scheme, by insisting on a postdelivery hospital stay of 48 hours of the mother and the newborn. Any complication that may arise during this period is addressed by skilled doctors available at Government health institutions. During discharge from hospital, the mother receives a gift hamper called the 'mamata' kit. <sup>32</sup>
- The majani schemes is a social assistance to all girl children born in the family up to second order is given a fixed deposit of Rs. 5,000/- for 18 years.<sup>32</sup>

#### **CONCLUSION**

Though central and state government schemes have encouraged people for institutional delivery yet 64.4% institutional delivery is observed in Assam, India.<sup>13</sup> Infrastructure and bed capacity of the tertiary care level hospital should be increased for better accommodation of pregnant women. Free and uninterrupted flow of fund and monitoring of proper utilization of schemes will improve more in the maternal health scenario. To accelerate the pace of decline of MMR in order to achieve the NRHM and MDG Goal, there is a need to give momentum to implement technical strategies and interventions for maternal health. In areas with difficult topography and terrain and marginalized population promoting institutional delivery alone as a strategy may not yield the desired results. Promotion of other strategies along with skilled delivery is a more appropriate alternative. The community will need to be involved not only through educating them about the signs and symptoms of emergency but also to develop appropriate mechanisms for ensuring that women in distress get the quality care. In addition, analysis of inequities in maternal health care need to be undertaken at the state and district level in terms of health infrastructural, skilled and trained manpower shortcomings and governance challenges. It is our responsibility to make sure that maternal and new-born survival and health figure prominently in the sustainable development agenda,

considering the critical role of women and the babies they bear in the development of future generations and communities. In 2030, let's be able to stand and say that ending preventable maternal mortality occurred on our watch and as a result of our collective commitment and actions.

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