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AN EXPLORATION OF MATERNAL MORTALITY IN INDIA AND ASSAM

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Abstract:
The New Sustainable Development Goals (SDGs) agenda (2015) priorities reduction of Maternal Mortality to below 70 per 100,000 live births through 2030. Over the years, Assam continues to experience highest MMR in India. Compared to India which experiences 122 MMR in 2015-17 (SRS), MMR in Assam (229) is more than doubled whereas as compared to the developed state Kerala (42), it is more than five times. **Objectives:** This study explores the trend of maternal mortality rate in India and Assam from different sources. It also explores the district level maternal mortality ratio in Assam .**Methodology:** Data are collected from different sources like Sample Registration System, Annual Health Survey Report, MMR and IMR Survey Report, Assam 2009; websites of Govt. of India data, website of WHO, Ph. D. thesis and articles published in different journals. The study is analytical. Analysis is done by finding out percentage change and using table, graphs and diagrams. **Results:** In India, the EAG states experience two third of the maternal deaths of the country. Considering the present MMR, where India needs a reduction of MMR by about 42.63% over the coming period of 13 to 14 years, Assam requires about 69.43% reduction of MMR to achieve the sustainable development goal. In Assam, districts Cachar (516.63) Dibrugarh (413.31), Kamrup (R) (357.39), N.C. Hills (335.57) Golaghat (325.31) and Jorhat (309.93) are more vulnerable districts of MMR. **Conclusion:** There is urgent need of context specific approaches to achieve targeted reduction of MMR to achieve sustainable development goal.

Keyword: MMR, SDGs, India, Assam, District

Introduction

Reduction of **Maternal Mortality Ratio [1] (MMR)** is one of the objectives of Sustainable Development Goals. According to the WHO, ***maternal death is the death of woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes*.** As per the UNICEF[2], MMR is the key indicator for efforts to improve the health and safety of mothers during and after childbirth. According to UN inter agency estimates, from 2000 to 2017, the global maternal mortality ratio declined from 342 deaths to 211 deaths per 1,00,000 live birth i.e. reduction of average annual rate of 2.9%. But this reduction is less than half the 6.4 percent annual rate needed to achieve the sustainable development goals of 70 maternal deaths per 1,00,000 live births by 2030. The two regions, sub-Saharan Africa and South Asia, account for 86 percent of maternal deaths worldwide. Sub-Saharan Africans suffer from the highest maternal mortality ratio i.e., 533 maternal deaths per 1 lakh live births a year which is over two thirds (68%) of all maternal deaths per year worldwide. South Asia experiences maternal death ratio of 163 accounting for 19% of global total. In India, as per estimate of WHO more than 25% of the total maternal deaths of the globe occur and this is the highest burden for any single country in the world (MMR and IMR Survey Report Assam, 2009)

As per World Health Organisation estimates (2019), every day in 2017, approximately 810 women died from preventable causes related to pregnancy and childbirth. As most of the causes of maternal deaths are preventive such severe bleeding (mostly bleeding after childbirth), infections (usually after childbirth), high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications

[1] Number of maternal deaths per 1,00,000 live births
[2] United Nations Children Fund

from delivery and unsafe abortions UNICEF concerted actions to increase quality maternal health access services. As per UNICEF

"*All women need access to antenatal care in pregnancy, skilled care during childbirth, and care and support in the weeks after childbirth. All births should be assisted by skilled health professionals, as timely management and treatment can make the difference between life and death for both the mother and the baby".*

The ICPD[3] (1994) conference held at Cairo recognised complications related to pregnancies and childbirth as leading causes of mortality for women of reproductive age in many parts of the developing world and aimed to promote women's health, nutritional status and safe motherhood. The goal set in the conference was to reduce maternal mortality by the year 2015: a reduction in maternal mortality by one half of the 1990 levels by the year 2000 and a further one half by 2015. However, no country in the world has yet met the goals set in the conference and the problems identified continue to remain more acute in the developing countries (Radkar and Parasuraman, 2007). Women in less developed countries face crucial trade-off when they attempt to fulfil their biological, social, physiological and other needs. The danger of childbearing can be reduced only if women are healthy and well nourished before they become pregnant. However, utilization of health services is a complex behavioural phenomenon. Empirical studies of preventive and curative services have often found that the use of health services is related to the availability, quality and cost of services as well as social structure, health belief and personal characteristic of the users. (Beeker et.al. 1993.) Looking at a risk, it is necessary to understand the factors responsible for maternal mortality so as to plan efficient interventions that would help reducing mortality.

Maternal mortality ratio has been recently used as an illustration of disparity between developed and developing countries. At the global level, it has been estimated that about half a million women die each year of pregnancy-related causes, 99 per cent of them in developing countries. The gap in maternal mortality between developed and developing regions is wide: in 1988, it ranged from more than 700 per 100,000 live births in the least developed countries to about 26 per 100,000 live births in the developed regions (ICPD, 1994). According to the World Health Organization, the lifetime risk of dying from pregnancy or childbirth-related causes is 1 in 20 in some developing countries, compared to 1 in 10,000 in some developed countries. Similar result is found by Radkar and Parasuraman (2007) in their study. They found that about 1 in 48 women in developing countries die from pregnancy-related causes compared to only about 1 in 1,800, for developed countries. As per the UNICEF's report ***Asia-Pacific's Children 2008*** covering 37 countries the gap between rich and poor is rising within sub-region of Asia and the Pacific. As per this report one in every three women is underweight. The report emphasised the need for addressing discrimination against women and girls as part of overall strategies to improve child and maternal health. In Bangladesh, the maternal mortality ratio is 570 per 100,000 live births, compared to India and Pakistan with 450 and 320 respectively. The three countries, India, Pakistan and Bangladesh account for 28 per cent of the world's births and 46 per cent of its maternal deaths [Motashaw 1997]. As per the report of the United Nations Maternal Mortality Estimation Inter-Agency Group (UN MMEIG), Nigeria and India had the highest estimated numbers of maternal deaths, accounting for approximately one third (35%) of estimated global maternal deaths in 2017, with approximately 67 000 and 35 000 maternal deaths (23% and 12% of global maternal deaths), respectively.

The United Nations universal declaration of human right 1948 in article 25 stressed that "motherhood and childhood are entitled to special care assistance". In India, a large portion of women die needlessly each year from causes related to pregnancy, childbirth and abortion. India's maternal mortality rate which was 600 in 1990 reduced to 480 in 1995, and then to 390 in 2000, 280 in 2005 and 200 in 2010. This shows a 66% decline in Maternal Mortality Ratio (MMR) within the

[3] International Conference on Population and Development

period 1990 to 2010. During this period, although India has witnessed success in terms of reducing maternal mortality, the level still remain very high as compared to that of any developed nation. India's MMR (200 per 100,000 live births) is fifty times higher than that of some developed countries and approximately six times higher than that of neighbouring countries Sri Lanka (35) and China (37) (UNFPA 2012). Again as per Sample Registration System, Maternal Mortality Ratio of India has declined from 130 in 2014-2016 to 122 in 2015-17. The decline has been most significant in EAG States & Assam from 188 to 175. Among the Southern States, the decline has been from 77 to 72 and in the Other States from 93 to 90. Though, ***maternal mortality in Assam has declined but still Assam experiences highest maternal mortality ratio of 229 per 1 lakh live births whereas Kerala experiences lowest MMR of 42.*** Thus, as compared to India, MMR in Assam is more than doubled whereas as compared to the developed state Kerala, it is more than five times. This figure of MMR reflects the underdevelopment of socio-economic conditions as well as shows health care deprivation of women in the state.

Objectives: Considering the above background of the study, attempt is made to analyse

1) The trend of maternal mortality rate in India and Assam from different sources.
2) The district level maternal mortality ratio in Assam

Material and Method: This study is based on secondary data. Data are collected from different sources like Ministry of Health and Family Welfare, Sample Registration System, Annual Health Survey Report, National Rural Health Mission, MMR and IMR Survey Report, Assam 2009; websites of Govt. of India data, website of WHO, Ph. D. thesis and articles published in different journals. The study is analytical. Analysis is done by finding out percentage change and using table, graphs and diagrams. The Sample Registration System, the largest demographic sample survey in India that among other indictors provide direct estimate on maternal mortality by using verbal Autopsy instrument through a nationally representative sample. Since 1997 to 2017, SRS data on maternal mortality is available for 21 years. In order to understand the maternal mortality situation in the country better and to map the changes that have taken place, specially, at the regional levels, States have been categorized into three groups namely, "Empowered Action Group" (EAG) States comprising Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Odisha, Rajasthan, Uttar Pradesh & Uttarakhand and Assam; "Southern" States which include Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu; and "Other" States covering the remaining States/UTs as was done in respect of Maternal Mortality Report (1997-2003) and also in the subsequent Maternal Mortality Bulletins of Sample Registration System. Again district level data on MMR of Assam are collected from "MMR & IMR Survey Report Assam 2009" and estimated MMR by Dutta (2018) using the NRHM data 2013-14. While former is conducted by Regional Research Centre for North East States, Ministry of Health & Family Welfare, Govt. of India in 25 districts out of 27 districts covering the period of maternal deaths and live births from July 2006 to July 2009, the later is estimated by Dutta (2018) for her research work by using the data of maternal death and live births from NRHM, 2013-14 where data are given for 27 districts. Assam has four administrative divisions up to 2015 .The Annual Health Survey 2010-2011 has classified 23 districts of Assam (as per Census 2011) into four administrative divisions: Upper Assam Division includes Tinsukia, Dibrugarh, Sibsagar, Jorhat and Golaghat; Lower Assam Division includes Kokrajhar, Dhubri, Goalpara, Darrang, Bangaigaon, Barpeta, Kamrup and Nalbari. North Assam Division includes Marigaon, Nagaon, Sonitpur, Lakhimpur and Dhemaji. Hills and Barak Valley Division includes Karbi Anglong North Cachar Hills, Cachar, Karimganj, Hailakandi.

Ethical Issue

Exempted as this is a explorative study on secondary data of Maternal Mortality. Here, no human and animal experiment has been done.

Result and Discussion

The Registrar General of India studies show varying maternal deaths distributed over the states. Among the total maternal deaths 60.95% deaths are from empowered action group states (SRS, 2019). Table-1 and table 2 show the trend of MMR and percentage decline of MMR from 2004-06 to 2015-17 respectively. It is heartening that the Maternal Mortality Ratio of India has declined from 254 in 2004-2006 to 122 in 2015-17 i.e., 51.59% reduction over the 17 years with some variations of reduction between two consecutive periods of estimations. Region wise, the decline has been most significant in EAG States & Assam from 375 to 175 which experience 53.33% reduction over the 17 years. Among the Southern States, the decline has been from 149 to 72 (51.68% reduction) and in the Other States from 174 to 90 (48.28% reduction). The percentage reduction of MMR in Assam over the period of 17 years is 52.29 whereas same is 55.79 in Kerala.

T**able-1: Trends of MMR in India and at Regional Level**

Region	2004-2006	2007-2009	2010-12	2011-2013	2014-2016	2015-2017
India	254	212	178	167	130	122
Assam	480	390	328	300	237	229
EAG and Assam sub total	375	308	257	246	188	175
South Sub Total	149	127	105	93	77	72
Other Sub Total	174	149	127	115	93	90
Kerala	95	81	66	61	46	42

Source: Different SRS Bulletins, **Sample Registration System, Office of the Registrar General of India**

Table-2: Rate (Percentage) of Decline of Maternal Mortality Ratio in India and Different Region

Region	2004-06 to 2007-09	2007-09 to 2010-12	2010-12-2011-13	2011-13 to 2014-16	2014-2016 to 2015-17	2004-06 To 2015-17
India	16.54	16.04	6.18	22.16	6.15	51.97
Assam	18.75	15.90	8.54	21.00	3.38	52.29
EAG and Assam sub total	17.87	16.56	4.28	23.58	6.91	53.33
South Sub Total	14.77	17.32	11.43	17.20	6.49	51.68
Other Sub Total	14.37	14.77	9.45	19.13	3.23	48.28
Kerala	14.74	18.52	7.58	24.59	8.70	55.79

Source: Author's estimation by using data from SRS bulletins, Sample Registration System, Office of the Registrar General of India

The report of SRS for various years provide a historical trend of Reduction of MMR in Assam showing subsequent improvement of reduction of MMR from 568 to 229 per 100,000 live births during the period 1997-2017. At the national level for the same reference period, it has declined 398 to 122 per 100,000 live births. State Kerala which experiences lowest MMR all over the years, MMR has declined from 150 to 46 per 100,000 live births for the same reference period.

Fig-1 shows the declining trend of Maternal Mortality Ratio from 1997 to 2017. There was a sharp decline (30% reduction) of MMR during the period 1999-01 after that there was sharp increase of MMR during 2001-03. After 2001-03 there was gradual reduction of MMR till 2017. The reason for sharp decline of MMR during 1999-01, as Dutta (2018) cited Deka's (2014) study is that due to effective promotion and awareness of Reproductive and Child Health (RCH) programme such as Mahila Samridhi Yojona (1993), Indira Mahila Yojona (1995), Balika Samridhi Yojona (1997), Integrated child Development Schemes III (NSSO, 2014). Jeo et al., (2015) also argued that the sharp reduction of MMR by highlighting that the first and second phases of the Reproductive and Child Health (RCH) Programmes (1997-2005 and 2005 onwards) focused on reducing MMR through various vertical programmes[4]. However, the reason for subsequent increase of MMR after 1999-01 may be the case that Sample registration System (SRS) has undertaken a special survey of death based on the 10th revision of the International Classification of Diseases (ICD-10) in the period of 2001-03, which is an improved form of verbal Autopsy (Dutta,2018).

Though the decline in MMR in India seems to be large, but it could not reach the Millennium Development Goal (MDG) of 200 by 2007 (Radkar and Parasuraman,2007).The successor of MDG, the sustainable Development Goals (SDGs) 2015, attempted to reduce MMR to 70 per 100,000 live births by 2030. Table-3 shows MMR of India and its different regions. India's MMR which is 122 in 2015-17 (SRS Bulletin, 2019) requires 42.63% reduction over the coming period of 13 to 14 years to achieve the Sustainable Development Goal of MMR. But this rate of reduction is not same for all the states. The regional level data indicates that it will be easier for the South (72) and other region (90) to achieve the target before the targeted period of 2030. In the South Region, state Kerala (42) and Tamil Nadu (63) and in other region, state Maharashtra (55) has already achieved the target. Except Punjab (122), all states of other region and all states of South region have reduced their MMR to double digit. MMR in EAG and Assam is 175 per 100,000 live births which is 43.44% more than all India MMR, 143.05% higher than in South region and 94.44% higher than in Other Region. To achieve MMR 70 per 100,000 live births by the stipulated time, MMR in this region has to be reduced by 60% by the stipulated period. All the states of EAG and Assam need special attention. Assam (229) and Uttar Pradesh (216) are the two states experience more than 200 of MMR. Assam which experiences highest MMR over the years requires 69.43% reduction of MMR to achieve the sustainable development goal by the stipulated time.

Table-3: Maternal Mortality Ratio India, EAG & Assam, South and Other States, 2015-17

India & Major States	**MMR**
INDIA	122
Assam	229
Bihar	165
Jharkhand	76
Madhya Pradesh	188
Chhattisgarh	141
Odisha	168
Rajasthan	186
Uttar Pradesh	216
Uttarakhand	89
EAG and Assam Sub total	175
Andhra Pradesh	74

[4] Vertical programmes can be defined as a set of activities that has specific and defined objective to provide primary health care services such as antenatal care, family planning services, vaccinations etc., Camcross, Peries & Cutts , 1997; Elzinga, 2005

Telangana	76
Karnataka	97
Kerala	42
Tamil Nadu	63
South Total	72
Gujarat	87
Haryana	98
Maharashtra	55
Punjab	122
West Bengal	94
Other State	96
Other Sub total	90

Source: Special Bulletin on Maternal Mortality Ratio in India, 2015-17, Sample Registration System (2019), Office of the Registrar General of India.

Fig-2 shows MMR in four administrative divisions of Assam. As per Annual Health Survey 2012-13, MMR in Assam is 301 per 100,000 live births and highest MMR is found in Upper Assam Division (404) which is 34.21% higher than state's MMR and 141.91% higher than the national MMR (167, 2011-13, SRS) and 60.95% higher than the MMR of North Assam Division (251) which experience lowest MMR in the four administrative divisions. Hills and Barak Valley Division and Lower Assam Division experience 281 and 254 MMR respectively.

However, district level data (Table-3) of MMR from "MMR & IMR Survey Report Assam 2009" and estimated MMR by Dutta (2018) using the NRHM data 2013-14 shows some surprising results. Though over the period from 2009 to 2013-14, there has been reduction of MMR from 330 to 228, but at districts level, data are found inconsistent. MMR in Dibrugarh which was 252 in 2009 has increased to 413 in 2013-14 and has been accounted as district with highest MMR. Udalguri (597) and Dhubri (590) were the two districts which experienced highest and second highest MMR have experienced considerable reduction i.e. 267.64 and 166.89 respectively. The inconsistent result of districts level MMR may be due differences in methodologies adopted in the two surveys.

Table3: District Wise Maternal Mortality Ratio in Assam

Districts	**MMR 2009[1]**	**MMR 2013-14[2]**
Tinsukia	205	136.66
Sibsagar	306	192.21
Dibrugarh	252	413.31
Golaghat	342	325.31
Jorhat	264	306.93
Kamrup (R)	137	357.39
Kamrup(M)	269	57.77
Darrang	270	200.50
Barpeta	254	195.14
Bongaigaon	95	153.57
Dhubri	590	166.89
Goalpara	398	86.86
Nalbari	178	119.17
Kokrajhar	263	212.35
Nagaon	440	171.30
Sonitpur	484	297.34
Marigaon	579	123.78

Lakhimpur	104	115.55
Dhemaji	416	128.50
N C Hills	NA	335.57
Karbi Anglong	NA	289.66
Karimganj	474	197.25
Hailakandi	375	236.69
Cachar	221	516.63
Baksa	208	225.93
Chirang	183	229.15
Udalguri	597	267.64
Assam	333	228.03

Source: [1] MMR & IMR Survey Report Assam 2009; [2] Dutta's (2018) estimation by using Data NRHM 2013-14

Discussion: In comparison to the developed countries and most of the developing countries, the maternal death situation in India particularly the EAG states is a serious issue which experience two third of the maternal deaths of the country. Among the EAG states, Assam and Uttar Pradesh experience more than 200 MMR respectively. Though MMR of Assam has been reduced to a considerable extent but this reduction is lagging behind the Millennium Development Goal target of reducing MMR by three quarter by 2015. Now we have another Sustainable Development Goal of reducing MMR to 70 by 2030 which is a major challenge before us. Considering the present MMR, where India needs a reduction of MMR by about 42.63% over the coming period of 13 to 14 years, Assam requires about 69.43% reduction of MMR to achieve the sustainable development goal within the stipulated time. Though analysis of districts level MMR by using two series of data from two different sources of govt. gives some inconsistent result, but it is found that level of MMR is not uniformly distributed over the districts of Assam. As per Dutta (2018) estimation of MMR, districts Cachar (516.63) Dibrugarh (413.31), Kamrup (R) (357.39), N.C. Hills (335.57) Golaghat (325.31) and Jorhat (309.93) are more vulnerable districts of MMR. An interesting finding of Dutta's (2018) studies is that districts with higher socio-economic status and better availability of medical care experience higher maternal death. Analysing maternal mortality by taking data at macro (district) level data may be bad choice rather emphasis should be given to study data at disaggregated micro level (Dutta, 2018).

Conclusion: To achieve SDGs goal of maternal death reduction, continuous investment in maternal health care research, programs and policy at global level and focused action in targeted areas are needed. Expectant mothers need special care from all aspects viz., proper nutrition, proper health care, rest, psychological development so that they become strong enough to care for themselves and their children.

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