“Millennium Development Goals” : A Study of Maternal mortality in India on the right path !!

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Abstract

Internationally, the position of India’s maternal death is worse still in the early 21st Century. And there lies the crux of the situation prevailing in India. Henceforth, the interest of researchers grows to study the situation in their own way based on available data to understand the present situation and the future trend, if any. The present paper as such tries to investigate the present situation of maternal mortality vis-à-vis the different indigenous and exogenous factors which are necessary to effect on the level and trend in maternal mortality. Due to paucity of data a special type of statistical analysis has been conducted to know the level and trend of MMR along with the same in socio demographic economic and infrastructural variables among the major states in India. The findings show some encouraging results having a parity with the reducing level of MMR as well as different indicators.

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Introduction

Every attempt is made in India to reduce the maternal mortality to a level at par with that of several countries like, Sri Lanka, China, Japan etc. as per WHO (2001), 199,000 maternal deaths in South Asia, nearly 74 per cent would be accounted for by India. This amounts to about 140,000 maternal deaths, which is far above the upper range of SRS estimates for that time period. It may be pertinent that WHO estimates are based on indirect methods whereas those of SRS are on direct methods (Government of India, 2006). However, there is no chance to escape from India's responsibility to enhance the status of mothers. Still in the recent time, 15 per cent of all pregnancies are said to result in an obstetric emergency that cannot be predicted and can happen in any pregnancy.

Although Indian Constitution guarantees to all citizen equality of status and opportunity and article 15 expressly "Prohibits any discrimination" (UN, 1982), women are debarred from their constitutional rights in male dominated societies particularly still prevailing in many parts of India. Girl children since their childhood to adolescence to adulthood are not being cared properly in the families. It is conjectured that because of what may result in high maternal morbidity and mortality, high rates of nutritional anemia, etc., on the part of responsibilities of the seniors in the households. A detailed discussion on discrimination of females (Gender gap) in Indian household starting right from infancy to childhood to adulthood (Mukhopadhyay,1994). And to a greater extent, these are all to be taken care by the Government itself. As a matter of fact, maternal and child health issues have been recognized as priority development issue and maternal and child health services have been identified as a priority for health services development in the country as is reflected through different Five-year development plans as well as through national health policies and national population policies (Government of India,1983; 2000; 2002 a). One of the persisting features of the maternal mortality in India are some very strong inter-state variations. This is the main reasons to take up this kind of study to have an idea from the trained analysis among the different categories of states in so far as maternal mortality rates are considered on the one hand and on the other several related indicators such as health, socio-demographic-economic and infrastructural variables. Due to non availability of long period data, the present study is based on the data from the government sources which gives only a shorter period. Before going to detailed analysis, a resort is made to define the maternal mortality.

As per the definition of WHO, "A maternal death is defined as the death of a woman while pregnant or within 42 days of 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 or incidental causes". But there are other concepts as well, the period of 90 days is defined by the American college of Obstetrics and Gynaecology and 12 months by Rochat (Fortney, 1987). They are of the view that the development of medical technology may prolong life beyond 42 or 90 or even one year of post partum period because of some particular diseases like, infections, chorio carcinoma, depression leading to suicide etc. As far as definitions are concerned, out of two definitions, i.e., i) Number of maternal deaths to women in 15-49 years per 100 thousand live births to them in a calendar year, and ii) Number of

maternal deaths to women in 15-49 years per 100 thousand living women in the same ages in a calendar year (Government of India, 2006), the former one is used in the paper.

Overall level and trend of Maternal Mortality Rate in India

To explain a few words (Table 1 given below) from the declining values of maternal mortality ratios from 398 in 1997-1998 to 301 in 2001-2003, i.e., during the period of seven years is of the order of around 25 per cent. An earlier study estimated a declining trend from around 1355 maternal deaths per every 100 thousand live births during 1957-'60 to about 330 maternal deaths, in the year 2002 (Ranjan, 2004). In NFHS studies maternal mortality rates had not decline during nineties, rather increased from 424 in 1992-'93 (NFHS-1) (95 per cent CI: 324-524) to 540 in 1998-'99 (NFHS 2) (95 per cent CI: 428- 653). The large confidence intervals were due to smaller number of maternal deaths in these surveys. In this respect a downward linear trend was found during 1966 to 1992 in rural areas of India (Mukhopadhyay, 1996) from estimated figures of 676 in 1966 to 352 in 1992. The linear trend ($y=a+bx$) was tested through best fit of the data using ($p<0.00$).

Having obtained a broad view of the trend in MMR over a short time period at national level, it may be of interest to see the positions in respect of different major states in India, as India consists of states with diversified characteristics which influence the overall level.

Table 1 Maternal mortality ratios and per cent change in India , 1997-2003

Year	Maternal mortality ratios	Per cent changes in MMR
1997-'98	398	-
1999 -'01	327	-17.84
2001 – '03	301	-8.00

There are large variations observed in whatever the level of mortality ratios have been estimated among the sixteen major states namely Andhra Pradesh , Assam, Bihar/Jharkhand, Gujarat , Haryana, Karnataka, Kerala, Madhya Pradesh/Chhattisgarh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil-Nadu, Uttar Pradesh/Uttaranchal and West Bengal of India at different time points from 1997 to 2003 (see Table 2) . The three states namely , Bihar, Madhya Pradesh and Uttar Pradesh have been broken into three other states namely, Jharkhand from Bihar, Chhattisgarh from Madhya Pradesh and Uttaranchal from Uttar Pradesh. However, they have been clubbed in the present data into their respective states as

obtained from elsewhere (Government of India, 2006). Moreover, there are other non major states not being considered by the same organization in India.

Table 2 Maternal mortality ratios of the major states in India and rate of change, 1997-2003

Major States	Maternal Mortality Ratio			Rate of Change (percent)	
	1999-98	1999-2001	2001-2003	(1997-98)-(1999-2001)	(1999-2001)-(2001-2003)
Andhra Pradesh	197	220	195	-11.68	-11.36
Assam	568	398	490	-29.93	+23.12
Bihar/Jharkhand	531	400	371	-24.67	-7.25
Gujarat	46	202	172	_	-14.85
Haryana	136	176	162	+29.41	-7.95
Karnataka	245	266	228	+8.57	-14.29
Kerala	150	149	110	-0.67	-26.17
MadhyaPd/Chhattisgarh	441	407	379	-7.71	-6.87
Maharashtra	166	169	149	+1.81	-11.83
Orissa	346	424	358	+24.54	-15.57
Punjab	280	177	178	-36.79	+0.56
Rajasthan	508	501	445	-1.38	-11.18
Tamil Nadu	131	167	134	+27.48	-19.76
UttarPd./Uttaranchal	606	539	517	-11.06	-4.08
West Bengal	303	218	194	-28.05	-11.01
India	398	327	301	-17.84	-7.95

A perusal of the above table reveals a large extent of differences in the level of MMR among the states in 1997-1998 at the initial point of time, i.e., 1997-1998. States like Tamil Nadu ,Haryana and Kerala depicted lower level of MMR being respectively 131, 136 and 150 in 1997-'98. On the other hand, states like Uttar Pradesh/Uttaranchal, Assam, Bihar/Jharkhand and Rajasthan possessed the level at much higher values at the rate higher than 500 mark. Madhya Pradesh/Chhattisgarh depicts slight lower level of 441 which is itself still much high. The levels of the remaining states lie in between these two categories of states. The figure for Haryana being 46 is a doubtful one.

Now the trend of the values during the seven year periods into two periods of 1997-2001 and 2001-2003 clearly show some trend of declining values excep

the period of study is very short, hence no definite conclusion can be made so far as trend analysis is

concerned. Due to paucity of data, that can not be done in a proper manner. However, apart from all predicaments, it may be said that a trend of decline at one hand is observed among all the states and on the other the variations are found among the states. As such any developmental programme, if it is done this must go through the indepth analysis before actual application. Otherwise only on the basis of overall Indian values, it would be a waste either of energy or of money etc., as far as national policy is concerned.

A detailed analysis is resorted to the pattern and trend of MMR vis-à-vis some important attributable direct factor which much influence on the mortality of mothers while at child birth and pregnancy.

The most important factors for lowering maternal mortality are considered as the type of medical attention given at the time of delivery and the antenatal care of expectant mothers. These two are termed as direct causes for the death of mothers. The medical attention at the time of delivery means institutional delivery or safe delivery at home but attended by either by Doctor, Nurse and ANMs . In India particularly in remote villages deliveries are used to take place at home with some untrained dais about which the present data are lacking. But as an idea, given below for the data for the past period.

Table 3 Domiciliary delivery conducted by untrained persons/relatives, India in 1992

States	Percentage of Delivery Conducted by Untrained persons/ relatives		
	Rural	Urban	Total
India	60.2	17.2	52.7
Andhra Pradesh	48.1	12.4	38.3
Assam	75.7	31.3	69.6
Bihar	76.3	38.6	72.4
Gujarat	45.5	17.1	41.7
Haryana	18.1	1.1	15.0
Himachal Pradesh	62.5	7.1	53.5
Karnataka	41.5	10.9	34.3
Kerala	3.4	0.9	2.9
Madhya Pradesh	80.2	27.7	72.6
Maharashtra	62.9		
Orissa	76.4	37.5	71.6
Punjab	3.2		

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Rajasthan	80.0	49.0	75.4
Tamil Nadu	29.2	2.6	22.9
Uttar Pradesh	74.0	22.1	66.1
West Bengal	66.2	9.9	59.1

A perusal of the above table gives an impression about the large proportion of home deliveries are conducted in less developed states nick named as BIMARU (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh) and some other states namely, Orissa, Assam and West Bengal constituting maximum share of Indian population. On the other hand, Punjab possesses the lowest (3.2 per cent) with Kerala (3.4 per cent) as well. A slightly higher values possessed by Haryana (18.1 per cent) and Tamil Nadu (29.2).

In the present context it is aimed at to give a picture of institutional delivery which has much influence on MMR. For this a state-wise breakup of the table is given below.

Table 4 Type of medical attention at birth (Institutional), major states, India, 1997-2003

Major States	1997	1998	1999	2000	2001	2002	2003
Andhra Pradesh	42.5	42.8	43.0	43.2	43.3	43.7	43.8
Assam	21.2	21.1	21.0	21.2	21.4	21.5	21.9
Bihar/Jharkhand	15.3	15.4	15.8	15.9	15.9	16.0	16.3
Gujarat	36.5	36.3	36.3	36.4	36.6	36.6	36.7
Haryana	24.6	24.7	24.8	25.1	25.1	25.2	25.5
Major States	1997	1998	1999	2000	2001	2002	2003
Karnataka	49.3	49.2	49.0	49.2	49.1	49.4	49.8
Kerala	97.1	97.1	97.1	97.1	97.1	97.1	97.1
MadhyaPd/Chhattisgarh	14.5	14.7	16.4	16.5	16.3	16.4	17.1
Maharashtra	47.7	47.8	48.6	48.9	48.6	48.9	49.3
Orissa	13.6	13.9	14.1	14.3	14.9	18.8	19.3
Punjab	12.6	12.7	12.8	13.1	16.2	17.0	20.2
Rajasthan	8.0	8.0					
Tamil Nadu	65.2	64.8	64.7	64.8	64.3	63.1	63.3

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Uttar Pd./ Uttaranchal	7.7	7.8	8.0	8.4	8.7	9.1	10.1
West Bengal	36.2	36.2	35.8	35.8	36.1	36.9	37.1
India	25.4	25.4	26.6	25.2	26.3	27.7	28.3

The data in table 4 clearly present the medical attention given at the time of delivery (Institutional delivery). It is found more and more in favour of Kerala throughout the entire period (Exactly 97.1%institutional delivery) as compared to rest of the states. However, there are states namely Tamil Nadu in the next higher category (Around 65%) to Karnataka (around 49%), Maharashtra (around 48%),and Andhra Pradesh (Around 43%), Gujarat (around 36%), West Bengal (around 36%),Haryana(around 25%) throughout the entire period from 1997 to 2003.At the same time point very grim situation is again prevailing in Rajasthan and Uttar Pradesh/Uttaranchal. A slightly better position may be observed from the above table like Assam, Bihar/Jharkhand, Madhya Pradesh/Chhattisgarh, Orissa (the figures show a trend of values from 13.6 per cent in 1997 till 19.3% in 2003) and Punjab (from 12.6 per cent in 1997 up to 20.2 per cent). Eventually it may be concluded from the above table that more or less same trend is observed in respect of better states and a slightly developmental trend is observed in respect of those states where in general institutional delivery is itself less.

Now it may be important to have a look on the data pertaining to the population in particular females of the different states where safe delivery occurring at home in presence of Doctor/Nurse/ANMs who can take care of any exigencies if at all occurred at the time of delivery. This kind of activity may help reducing the maternal deaths at the time of child birth and puerperium. However, due to paucity of data a single time point data are given below for an overall perusal. In addition there is an item like awareness of AIDs among both the sexes. This is given only to have some idea about the knowledge of Indian population especially females whose importance is more in the present context of study as far as recent medical terminology is concerned.

Table 5 Type of safe delivery and an awareness of AIDs for the major states, India, 1998-'99

Major States	Safe Delivery	AIDs Awareness	
		Female	Male
Andhra Pradesh	59.8	57.9	70.2
Assam	31.9		
Bihar	19.0	15.1	40.7
Gujarat	55.9		

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Haryana	32.7	38.9	75.9
Karnataka	59.9	16.3	76.9
Kerala	27.5	24.5	44.8
Madhya Pradesh	97.4	27.7	97.1
Maharashtra	61.2	62.3	44.7
Orissa	32.7	40.6	56.9
Punjab	54.7	54.1	81.5
Rajasthan	33.4	22.3	51.9
Tamil Nadu	82.4	89.6	85.7
Uttar Pradesh	20.8	22.8	49.1
West Bengal	45.6	30.9	51.3
India	40.2	41.9	60.3

From the above table it may be found that 40.2 per cent of safe delivery occurred in India in 1998-1999. As usual, there seem to be a wide variation among the states. Kerala, in particular shows the maximum percentage figure of 97.4. The figure for Tamil Nadu, 82.4 per cent immediately follows Kerala. Bihar shows the minimum 19 per cent, the position of Uttar Pradesh marginally follows Bihar(21 per cent). More or less better positions are held by Maharashtra (61.2), Karnataka (60), Andhra Pradesh (60), Gujarat (56), Punjab (55) and West Bengal with a lower value (46). The situation for rest of the states remain at a lower side of the items. The most recently discussed health hazard item i.e ., AIDs is a subject for Indian population at a national perspective. Hence it is important to know how far our people are aware about this kind of curse although which may not be directly related to MMR (the cause of death due to child birth and pregnancy does not include AIDs as such at this moment of time). However, implication of AIDs is not yet known so far as MMR is concerned (conjecture). Now awareness about this cruel thing of health hazard issue among both the sexes follow a similar kind of differential among the population residing at different states of India. Interestingly Kerala males (97 per cent) are more aware than their female counterpart (28). Here, Tamil Nadu tops the list both for male and female (around 90). Punjab, Karnataka, Haryana, Andhra Pradesh getting male figure higher than females which is unfortunate as females should also be conscious about the recent news in several medias.

Table 6 Per cent achieved of tetanus target and similar figures for prophylaxis against nutritional anemia, 1997-20031997-2003

States	Percent Achieved of Target of Tetanus			
				Change

	1997-98	1998-99	1999-00	2000-01		1997-98	1998-99	1999-00	2000-01	1997-'01
Andhra Pd.	103.0	104.6	101.7	97.5	-5.34	69.9	60.6	85.9	94.6	+35.34
Assam	66.3	60.3	25.0	49.1	-25.94	42.5	35.8	32.6	38.2	-10.12
Bihar	31.9	32.5	29.0	26.2	-17.87	8.9	11.1	18.2	24.4	++
Gujarat	93.6	98.8	97.0	94.7	+1.18	66.5	47.4	78.0	86.8	+30.53
Haryana	88.7	90.9	89.5	92.0	+3.72	69.6	46.0	78.6	83.3	+19.68
Karnataka	96.8	95.1	94.8	95.6	-1.24	72.0	49.7	66.7	70.1	-2.64
Kerala	86.0	89.0	87.5	84.2	-2.09	94.3	36.0	97.2	94.5	+0.21
Madhya Pd.	89.7	90.9	94.2	75.6	+5.02	79.6	60.8	88.2	72.2	+10.80
Maharashtra	87.5	93.4	94.8	97.0	+10.86	37.3	19.3	68.0	75.7	+11.32
Orissa	81.0	82.5	78.6	83.2	+2.72	50.3	39.3	71.2	71.1	+41.35
Punjab	96.2	98.8	96.5	97.7	+1.56	100.0	107.9	124.1	31.8	+24.90
Rajasthan	80.8	95.6	86.3	88.7	+9.78	41.5	44.8	62.2	48.2	+16.14
Tamil Nadu	103.3	107.5	100.0	103.5	+0.20	115.8	35.2	-	83.0	-
Uttar Pd.	90.0	88.2	86.3	90.1	+0.11	6.9	19.1	18.1	82.7	-
W.Bengal	91.9	90.6	84.9	90.4	-1.63	77.4	56.8	73.9	98.2	+26.87
All India	82.6	83.9	81.3	8.60	+4.12	48.7	37.6	60.0	104.	113.55

Some other very vital issues directly related with MMR should be studied in this research of antenatal care of mothers while at pregnancy. The first item, Tetanus immunization for expectant mothers and prophylaxis against nutritional anemia among women in the next studied on after another in the following paragraphs. However, the following table gives the detailed about both the items in different states in India.

A perusal of the above table gives an impression about some inconsistencies in the data. On the one hand there is some cases where very fluctuating figures in respect of both the health inputs required for health of the mother particularly while at pregnancy. Sometimes per cent achieved figures are observed to have increased 100 mark. This happens simply because the achievement is fulfilled even higher than the targeted population. Now before finding the per cent change over the time period of 1997-'98 to 2000-2001, there is some deliberate attempt to leave one or two figures in order to have some consistent values since in those cases data seem to be very erratic

remain almost high during the entire period except some variations in between the two extreme time

points. However, Tetanus targeted figures for Bihar are not satisfactory, whereas Prophylaxis values for both Bihar and Uttar Pradesh seem to be very discouraging.

So far discussions were made above only in direct association with the present context of study. There are many exogenous factors like, literacy of females, infant mortality etc., and on the other variables like expenditure on medical and public health, infrastructural variables such as motor vehicles available to the people and many others which indirectly affect MMR. Due to restrain in the availability of data, the study is further continued on the basis of restricted data. The table given below gives some idea of literacy of females etc.

Table 7 Socio-demographic and economic indicators, India

States	Literacy of females 7+ age,2001	Sex-Ratios, females per 1000 males in 2001	Infant Mortality Rates,2001	Mean age at effective marriage,1999	Couple protection rate(percent), 2000	Population Below Poverty-Line, 1993-94
Andhra Pradesh	51.2	978	66	18.1	52.8	48.9
Assam	56.0	932	73	20.4	15.2	51.2
Bihar	33.6	921	62	18.9	21.2	61.9
Gujarat	58.6	921	60	20.1	52.8	48.2
Haryana	56.3	861	65	19.3	49.4	35.4
Karnataka	57.4	964	58	19.7	56.3	54.5
Kerala	87.9	1058	11	22.1	39.3	58.8
Madhya Pradesh	50.3	920	86	18.6	45.9	61.8
Maharashtra	67.5	922	45	19.3	49.3	53.2
Orissa	51.0	972	90	19.8	37.6	66.2
Punjab	63.5	874	51	21.0	65.5	28.2
Rajasthan	44.3	922	79	19.3	36.1	46.1
Tamil Nadu	64.5	986				
Uttar Pradesh	43.0	898	82	20.1	38.0	57.1

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West Bengal	60.2	934	51	19.6	32.2	63.4
India	54.3	933	66	19.6	46.2	54.9

As already mentioned, any health related incidents occurs one, due to direct cause and indirect as well. The Table 7 is put here only because of showing the differentials in indirect factors among the major states of India. First of all literacy of females is a social / cultural factor which has much indirect influence on many health demographic and other indicators about which much is concerned in the national perspectives. In the table it is evident that there is wide variations among the states. First of all Kerala possesses the highest figures (about 88 per cent), whereas the minimum goes to Bihar (about 34 per cent). The position of Maharashtra (68), Tamil Nadu (65), Punjab (64), West Bengal (60) and many other states possessing mediocre level. However, Rajasthan (44) and Uttar Pradesh (43) have to increase their level in future. Next four demographic factors, sex-ratio, infant mortality, mean age at effective marriage and couple protection rate (in per cent) which have similar differentials among the states. As far as sex-ratio is concerned developed states possess higher values as against lower values for undeveloped areas. Interestingly in Kerala females are more than males. In case of infant mortality rate, Kerala again tops the list with minimum figure (11) and differentials as usual for other states. For mean age of effective marriage, the highest goes to Kerala with 22 and Tamil Nadu takes the second position, 21 and rest of the states varies within 18 to 20. Economic aspect in terms of population below poverty line has been studied in the last column of the table. As the figure gets lower, better is the economic condition. Here Punjab's position is the best with minimum figure of 28.2, whereas Orissa possesses the maximum value of 66.2 among all the states. The situation for Bihar (62) and Madhya Pradesh (62) is still not good. As far as the figure of West Bengal (63) seems to be erratically high.

Table 8 Money allocation indicators (MAI) and some infrastructural variables, India

States	Expenditure on Education			Expenditure on Medical & Public Health & Family Welfare			Motor Vehicles/lakh population, 2003
	2003-'04	2005-'06	Change In Size	2003-'04	2005-'06	Change	
Andhra Pd.	3.4	8.5	+2.5	1.1	2.6	+2.4	6,443
Assam	11.4	15.6	+2.0	1.8	2.8	+1.6	2,380
Bihar	14.3	14.2	-1.0	2.9	2.6	-0.9	1,296
Gujarat	5.2	4.5	-0.9	1.2	1.1	-0.9	12,415
Haryana	4.7	7.3	+				
Karnataka	5.4	9.9	+1.8	1.4	1.6	+1.1	6,899
Kerala	5.8	6.8	+1.2				

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Madhya Pd.	4.2	4.2	+1.0	1.4	2.0	+1.4	5,487
Maharashtra	9.1	9.3	+1.0	1.9	1.5	-0.8	8,140
Orissa	8.2	6.0	-0.7	1.6	2.0	+1.2	3,605
Punjab	4.0	3.3	-0.8	1.0	2.8	+2.8	13,218
Rajasthan	6.4	4.9	-0.8	1.4	1.2	-0.9	5,908
Tamil Nadu	6.0	4.8	-0.8	1.4	1.7	+1.2	12,622
Uttar Pd.	8.0	2.9	-0.4	0.9	2.1	+2.3	3,417
West Bengal	5.0	3.7	-0.7	1.1	1.6	+1.4	2,866
All States	7.2	5.0	-0.7	1.4	2.1	+1.5	6,302

Now switching over to some kind of other exogenous factors which may have some relation with MMR.As considered in the study three different type of such variables are shown in Table 8 in which the first column gives the picture of government's attitude towards allocating its budget to the development of social aspect of education which has effect on reducing maternal mortality rates thereby improving the condition of women and child in India. Education fund as shown in the table has decline from 7.2 lakhs of rupees in 2003-'04 to 5.0 in 2005-'06 in the overall India with a downward trend of 0.69 times. As far as states are concerned increment of fund occurred to about 50 per cent of the states, namely Andhra Pradesh, Assam, Haryana, Karnataka, Kerala, Madhya Pradesh and Maharashtra during 2003 to 2006 whereas decrement occurred to the rest of the states like Bihar, Gujarat, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal during the same period.

While the second column gives the picture of budget allocation towards medical and public health and family welfare. No doubt this aspect has greater influence on reducing MMR in India. This fund as shown in the above table has, hopefully increased from 1.4 in 2003-'04 to 2.1 in 2005-'06 with a positive change of the order of 1.5 overall India. As usual while state figures are seen, it may have almost the similar bifurcation among all the states as above. Higher than 50 per cent of the states are observed to have been fund allocation increased during 2003-'04 to 2005-'06. While fund deduction occurred to the four states. As such, it may be encouraging, to some extent to say that Government has put emphasis on health related matters of Indian populations which ultimately affects the female status.

The last column of the table is considered here to have some infrastructural effects as it is very clear that any health related matters require good communication system. An earlier study in rural India gave a clear picture of motorable roads to have much influence on MMR to reduce (Mukhopadhyay, 1996). Here due to unavailability of such kind of data, motor vehicles per lakh population at a fixed time point of 2003 has been studied in order to fulfill the gap and gives an idea of usefulness of motor vehicle which are mostly used in exigencies in delivery case particularly in rural areas, in particular and urban areas too. Indian overall availability of vehicles show 6,302 vehicle per lakh population in 2003. But some of the states have much higher figures than all I
(12,622), Gujarat (12,415) and Haryana (10

Assam (2380) West Bengal (2866), Uttar Pradesh (3417), Orissa (3605), Madhya Pradesh (5487) and Rajasthan (5908).

Statistical analysis of overall data

The crux of India's problem in so far as maternal mortality rate (MMR) is concerned lies in the fact of diversified problems among the states in India. In simple language it may be clear that while Kerala's situation may be compared with many demographically developed regions of the worlds, at the same time there are states like Bihar, Uttar Pradesh, etc…, the problem is as worse as many undeveloped areas of the world. Now, individually each state cannot be possible to be studied if any developmental process started to have occurred, hence an attempt is finally made in the paper by grouping of the states as per their more or less similar characteristics. For this purpose the paper adopts the classification of themajor states into three categories of states as are done by the Registrar General Office in New Delhi. They have grouped the states into, i) EAG (Bihar, Jharkhand, Orissa, Madhya Pradesh and Chhattisgarh, Uttar Pradesh and Uttaranchal) and Assam, ii) Southern (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) and finally iii) Others (Gujarat, Haryana, Maharashtra, Punjab and West Bengal). Their classifications have been considered in the present study. The classification according to the different standard of the states given by the GOI through Registrar General office an important department with so many experts including Registrar General seems very legimate. The table given below may give an idea of transition of the status of maternal mortality rates vis-à-vis the other related direct and indirect factors among the different categories of the states. Different clusters of states are formed in the paper according as the GOI's classification.

Table 9 Mean and Standard Error of Maternal Mortality Rates (MMR) and health-socio-demographic-economic-infrastructural-other factors in different clusters, India

Different Indicators	Year	Clusters					
		1(N=6)		2(N=4)		3(N=5)	
		Mean	Std. Error	Mean	Std. Error	Mean	Std. Error
Maternal Mortality Rate	1998-'99	500	93.90	181	51.03	186	106.10
	2001-'03	426	67.22	167	54.29	106	16.91
Health:							
Institutional Delivery	1997	13.38	5.04	63.52	24.32	31.52	13.36
	2003	15.77	4.87	64.00	23.85	33.76	11.32
Tetanus to mothers	1997-'98	73.28	22.03	97.27	8.09	91.58	4.09
	2000-'01	68.82	25.71	97.27	8.07	95.96	2.61

Continued in next page

Prophylaxis against Nutritional Anaemia	1997-'98 2001-'01	38.28 56.13	27.31 22.71	88.00 85.55	21.57 11.65	70.16 76.16	22.56 23.45
Socio-Demographic:							
Literacy Of Females age 7+	2001	46.36	7.86	65.26	16.03	61.24	4.39
Sex Ratio	2001	927.5	24.5	966.5	42.0	902.4	32.6
Infant Mortality	2001	78.7	10.0	46.0	24.3	54.4	8.0
Mean age at Effective Marriage	1999	19.5	0.6	20.2	1.7	19.9	0.7
Couple Protection Rate	2000	32.3	11.6	49.7	7.3	49.8	11.9
Economic:							
Population below Poverty-Line	1993-'94	57.5	7.3	54.3	4.1	45.7	14.0

A perusal of the table based on mean and standard error clearly shows the distinct differences among the three clusters of states. From the respective standard error values the extent of variations are known. Sometimes it is very less, higher values also are found in some cases. The EAG and Assam group possesses MMR of 500 deaths on an average in 1997 to 426 in 2003. In "Southern" group the values are slightly higher than 'Other' group, although both these two clusters much lower values of MMR as compared to cluster 1 in terms of both the level and trend.

As far as health indicators are concerned, "Southern" as cluster 2 possesses much higher figures of institutional delivery as compared to other two clusters and a slight increase during the short period. Cluster 1 states show the worst picture. Similar pattern may be observed in respect of Tetanus immunization aspect and Prophylaxis against nutritional anemia as health inputs.

While considering the socio-demographic aspects, four items are considered namely, literacy of females, sex-ratios, infant mortality, mean age at effective marriage of females and couple protection rate (CPR), at a single time point, in order to give some idea about the differences among the three distinct clusters. All the items show positive angle according as the higher state category from "Southern" to 'Others' to EAG and Assam. Economic aspect in terms of below poverty line has almost closer values between EAG and Assam and "Southern" states, whereas a slightly better position may be said in 'Other' category.

There seem to be a parity in budget expenditure of the GOI towards the vulnerable group, i.e., cluster 1 spending more money towards education and medical, public health and family welfare as compared to other two clusters possessing almost same values. In other words, it may be said government might have put more emphasis on the under developed states for their development.

As an important item which might require to reduce the level of MMR is the infrastructural aspect. In this angle so many items could have been taken into account. However, with the unavailability of such kind of

data corresponding to the same time period, only one item is considered here to have some indirect way of infrastructural facility that may be used for the transportation of patients from household to the hospital in exigencies of delivery, check up of serious mothers and so on in other vital items. Keeping in view, number of motor vehicles per lakh of population has been used in the present study in order to have a glance on the picture of infrastructural support , to some extent among the three clusters of states. EAG and Assam got the lowest figure of 3682 vehicles per lakh population in 2003, the maximum is possessed by the 'Other' category, 9405 and the "Southern" figure of 8452 vehicles per lakh of population.

Conclusion

Maternal mortality is a subject of current topic which draws attention not only of the researchers of the developed countries registered substantial reduction in maternal morbidity and mortality but also of the developing countries in particular constituting ninety nine per cent of the total maternal deaths which are occurring throughout the world. The figures are usually very high in the sub-saharan African countries. Indian overall estimates of MMR remain as high as around 300 in 2003. So many reasons for this high value of MMR have been discussed in the paper. In so far as the data are concerned, experts in the RG office of the GOI in association with many other scientists realised the Indian overall position to be divided into different categories of states in India. Hence to eradicate any problem, diversified attempt is a must. As such, GOI classified the states into three categories. The first category comprises the "Empowered Action Group" (EAG) states of Bihar and Jharkhand, Madhya Pradesh and Chhattisgarh, Orissa, Rajasthan, Uttar Pradesh and Uttaranchal. Assam is also included in this list. Nearly two-third of the maternal deaths in the country are reported to occur in the EAG states and Assam. Among the three categories, this category accounts for nearly 47 per cent of the births. Moreover, these states have had, historically higher child mortality, higher poverty levels and lower life-expectancy and other indicators than other states. The second category (Region) covers the "Southern" states of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. These states traditionally have had better child mortality and other health indicators. The remaining major states formed the third category (Region) and have been classified as 'Others' (Office of the RG in India, 2006).

Initially the present study was conducted for the different major states individually in respect of the level and trend of MMR during 1997-2003 and the same states for the different direct and indirect indicators as well. As usual state like Kerala, in particular all along depicted very good condition in respect of MMR to have declined much during 1997-2003 and possessed the lowest figure of 110 maternal mortality rate in 2003 with different better socio-demographic characteristics, their level and trend as well. The situation for neighbouring states such as, Tamil Nadu, Karnataka and Andhra Pradesh, to a greater extent follow the path of Kerala. On the other hand the same indicators for the states like Bihar, Uttar Pradesh, Rajasthan and Madhya Pradesh showed very discouraging picture with higher level and lower trend. The situation, in this respect, to some respect better in Maharashtra, Punjab and Haryana.

The final analysis based on grouping of the states as per the decision of the GOI (2006) was also followed in the present paper. Now the decision of the GOI in this regard might have been tested in the present paper to substantiate the decision is in a right direction as per as different indicators are concerned. Statistically the group means and standard errors as are done newly in the present research clearly differentiate the three different groups of major states in India. From this kind of analysis many things may be done properly on the part of any agency in order to reduce the MMR which is the India's overall

goal in national and international perspectives. In this respect it is envisaged that although MMR declined from about 400 maternal mortality rate in 1997-'98 to about 300 in 2001-'03 gives satisfaction but at the same time tells that reducing MMR to 195 by 2012 of National Commission of Population (NCP) and National Rural Health Mission (NRHM) and to 109 by 2015 of the Millennium Development Goals (MDG) is going to be a real challenge. Particularly when most of the deaths occurred in the states included in the "Empowered Action Group" (EAG) of states an Assam. For further decline, rapid progress in health sector schemes would be needed in these states, in particular. And, these states are thus focus of the National Rural Health Mission (NRHM) as are quoted elsewhere (Government of India,2006). For future research more indepth study is urgently needed taking first of all the entire region of India including all the states and union territories so that execution on the part of government could be taken in order that perpetual tragedy of mother and children be stopped in near future.

Last but not the least the author could not scare to mention an encouraging news on the part of some dignified personality, Dr.Sarah Zeid (The Times of India, 2010) regarding her bitter experience: She launched a multimedia campaign of the White Ribbon Alliance for safe motherhood, visited villages in Orissa and talked to mothers about health facilities available to them. Her opinion is that India accounts for a quarter of all maternal deaths globally. Over 70,000 women die in India every year due to complications related to child birth. She also tells her own experience about some complicated disease called 'Amniotic Fluid Embolism' which she suffered during her gestation period with her third parity of childbirth. Most women do not survive with this condition. She was lucky enough to be admitted in an excellent hospital with a best medical care in Washington. She eventually survived and gave birth with good medical intervention. After this incidence she travelled a lot and raised awareness on the issue of maternal health. According to her statement she is of the opinion that it is a human disgrace that anyone should die giving life. Every woman has the right to survive. And at this juncture, the paper is deemed to be much successful in regard to the sad experience of someone who also belongs to the community of social evil of 21st Century..

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