

Maternal deaths in India – Preventable Tragedies (An ICMR Task Force Study)

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Summary:

The study covers maternal deaths in 31 teaching hospitals from 16 States/Union Territories and is based on information collected for a period of one year from April, 1993 to March, 1994. There were 1,66,996 live births and 973 maternal deaths giving a total maternal mortality ratio of 582/100,000 live births. Hospitals from Eastern region reported more maternal deaths as compared to other parts of the country. Among the maternal deaths, more than half belonged to rural areas (55%) and were amongst uneducated women (62.7%). 41 per cent of the maternal deaths were amongst referral admissions. Maximum mortality (49.5 per 1000 admissions) was among women who were admitted during post-natal period. 70.1 per cent of the deaths were due to direct causes. Pregnancy Induced Hypertension (24.0%) and Haemorrhage (23.6%) each accounted for nearly one quarter of the deaths. Septic abortion was the cause of death in 83.2% of the abortion related deaths (12.2%). Other reasons for maternal mortality included anaemia (11.5%), viral hepatitis (7.1%) and puerperal sepsis (3.7%).

Introduction:

Pregnancy and child birth is a universally celebrated event. Yet for many thousands of women it is a private hell that may well end in death. Maternal death is often attributed to fate and remains to a large extent uncounted and unreported. The reasons that women die in pregnancy and child birth are many layered. Behind the medical causes are logistic causes – failure in the health care system, lack of transport etc. and behind these are social, cultural and political factors which together determine the status of women, their health, fertility and health seeking behavior. (Royston 1989). Preventing maternal deaths remains one of the most important goals of National Family Welfare Programme. Although a significant decline in maternal deaths has been reported from the developed world, it is still a major health problem in the developing countries. (Abou Zahe & Royston 1993)

Efforts for monitoring it are limited due to lack of reliable population based reporting of vital events. However, magnitude and valuable information on causes of death can be obtained from hospital records and these can be useful to Health administrators and managers in developing specific interventions to curtail these preventable tragedies.

Material and methods:

Realising that hospitals are an accessible source of reliable and current information, monthly statistics of in-patients from the Department of Obstetrics & Gynaecology as well as death summaries giving detailed information about maternal deaths were collected on a monthly basis by the Indian Council of Medical Research through its 31 Human Reproduction Research Centres (HRRC) located in the medical colleges/teaching

hospitals throughout the country. This included aggregate information on reasons for admission. Institutionwise maternal mortality rates were calculated from monthly statistics. Detailed analysis of death summaries was carried out to study the profile of maternal mortality cases and the direct and indirect causes of death. This paper is based on information collected for a period of one year from April 1993 to March 1994.

Observations:

During the study period, 78.2 per cent (2,59,164) of the total admissions in the Dept. of Obst. and Gynae. were for obstetrical problems. These included 18 per cent admissions for abortion including MTP, 15 per cent for antenatal complications, 60 per cent for delivery or intranatal complications and about 1 per cent for puerperal complications.

There were a total of 973 maternal deaths and

1,66,996 live births giving a maternal mortality ratio of 582/100,000 live births. This varied from nil to 3768 in different hospitals. In this series, hospitals from the States of Uttar Pradesh, Orissa, Bihar and Gujarat showed a higher maternal mortality ratio as compared to hospitals from the State of Jammu & Kashmir, West Bengal, Rajasthan with moderate and hospitals from the southern region which showed a lower mortality. On analysing the data by cause of death, it was observed that majority of the deaths in hospitals showing higher mortality was due to direct causes. (Table 1).

More than half (55%) of these maternal deaths were among women from rural areas and 62.7 per cent among uneducated women. This series of maternal deaths included 8.4% of teenage mothers (< than 19 years) and on the whole 38.3% primigravida. On the whole about 41 per cent of the maternal deaths were among referral admissions. 25.9 per cent were referred from other hospitals and 14.7 per cent from the primary health care

Table I
Obstetric Admissions, deliveries, livebirths & maternal mortality by medical college

State/UT/Institution		Total Obstetric admission	Deliveries	Live births	Maternal Deaths No.	Rate/100000 LBs	Proportion of deaths due to direct causes %
U.P.,	KGMC, Lucknow	7179	3539	3332	39	1170	89.7
	MLNMC, Allahabad	2210	763	690	26	3768	84.6
	GSVMMC, Kanpur	3174	1534	1396	46	3295	93.4
Orissa,	LLRMMC, Meerut	2983	621	565	11	1946	54.5
	Medical College, Cuttack	5623	2800	2576	58	2251	86.2
Bihar	Patna Medical College	10028	6678	6333	123	1942	64.2
Gujarat	Baroda Medical College	4417	22919	2710	38	1402	60.5
Assam	Medical College, Gawahati	7716	5391	5119	63	1230	82.5
Chandigarh	PGI Chandigarh	4779	3129	2901	36	1241	72.2
J&K	Jammu Med. Coll	8857	4809	4598	26	565	80.7
Karnataka	JNMC, Belgaum	2950	2106	2017	12	595	41.6
Rajasthan	SMSMC, Jaipur	13225	7750	7386	30	406	66.7
	SPMC Bikaner	9232	5010	4782	25	522	56.0
West Bengal	RGKARMC, Calcutta	12073	9856	9193	62	674	88.7
	Eden Hospital, Calcutta	9570	7725	7213	104	1442	74.0
	PGMER, Calcutta	2602	1295	1257	5	397	80.0
Maharashtra,	KEM, Bombay	7502	4333	4186	20	477	50.0
	KEM, Pune	2730	1476	1395	11	788	45.5
	JJ Hospital, Bombay	3044	1813	1774	0	0	-
	BJMC, Pune	10326	6069	5742	28	488	46.4
Pondicherry,	JIPMER Pondicherry	4720	4456	4274	19	444	84.2
Delhi,	Kasturba Hos. Delhi	19201	10462	10006	28	279	35.7
	SJ Hos. New Delhi	18387	14379	12749	31	243	67.7
	AIIMS, New Delhi	3567	1603	1605	0	0	-
Tamil Nadu	IOG, Chennai	19670	15170	14697	38	259	55.2
	KMC, Chennai	8551	6210	6503	1	015	-
	KG Hospital, Chennai	13570	10084	9960	17	171	29.4
	RSRM Hospital, Chennai	11937	10169	9859	15	152	80.0
	Madurai Medical College	11846	8240	7885	35	444	65.7
Kerala	SAT Hospital, Trivendrum	13430	12357	12093	26	215	57.6
Goa	Medical College Goa	4065	2181	2200	0	0	-
Total		2,59,164	1,74,927	1,66,996	973	582	70.1

system (Table-II). Thirty six per cent of the maternal deaths had occurred during antenatal period including 12.2 per cent abortion death. About 20 per cent of these maternal mortality cases were admitted during antenatal period but expired during intranatal or post natal period. From amongst the 64 per cent cases of maternal mortality during delivery or post-natal period, 17.0 per cent had delivered outside this hospital. This included 5.5 per cent in some other hospitals or MCH centre; 2.0 per cent at peripheral health facilities; 3.1 per cent at private clinics and 6.5 per cent at home. About 5 per cent of these deaths which occurred in women who had already delivered at home were actually delivered by either untrained dai or family member. (Table-III).

Though majority (64.6%) of the obstetric admissions were during intra-natal period, this group had lowest (1.41/1000 admissions) mortality. Maximum mortality (49.5 per 1000 admissions) occurred among post-natal admissions followed by mortality rate of 10.45 per 1000 among ante-natal admissions (Table-IV).

70.1 per cent of the deaths were due to direct causes. PIH, Haemorrhage, abortion related and sepsis were the main contributory causes (Table-V). Pregnancy induced hypertension was the leading cause of death and contributed 24.0 per cent of total mortality. Nearly 61 per cent of these cases belonged to the rural areas and 39.5 per cent were referred cases. Majority (76%) of these women died before delivery.

Table-II
Distribution of Maternal Deaths by Different Factors

Total Nos. Of Deaths:		973
	No. of deaths	Percentage
Place of Residence:		
Urban	286	29.4
Urban slums	133	13.7
Rural	535	55.0
Not known	19	1.9
Education:		
NIL	610	62.7
Primary & above	307	31.5
Not known	56	5.8
Age:		
< 19 years	82	8.4
20-24 years	335	34.4
25-34 years	448	46.1
> 35 years	108	11.1
Gravida:		
Primi	373	38.3
Multi	335	34.4
Grand Multi	265	27.2
Referral:		
Other hospital	252	25.9
CHC/PHC/SC	144	14.7
Not referred	577	59.3

Table-III
Distribution of Maternal deaths to status at admission, death and place of delivery

Total Nos. of Deaths:		973
	No. of deaths	Percentage
Status at admission		
Abortion	119	12.2
Antenatal	426	43.8
Intranatal	239	24.6
Postnatal	189	19.4
Status at death:		
Abortion	119	12.2
Antenatal	231	23.8
Intranatal/Postnatal	623	64.0
Place of Delivery:		
This hospital	440	45.2
Other hospitals/MCH Centre	53	5.5
CHC/PHC/SC	20	2.0
Private Clinic	30	3.1
Home delivery	63	6.5
Total	606	62.3
Abortion	119	12.2
Not delivered	248	25.5
Total	973	100.0

Table-IV
Mortality Rate by type of admission

Status	Total admissions	Maternal deaths	Rate/1000 admissions
Abortions	47151	119	2.98
Antenatal	40750	426	10.45
Intranatal	169353	239	1.41
Postnatal	3822	189	49.50

Haemorrhage was a close second accounting for 23.6 per cent of mortality. PPH was responsible for 114(11.7%) and APH for 71(7.5%) deaths. There were 44 (4.5%) deaths due to rupture uterus, 75 per cent of these deaths were in women from rural areas and 61 per cent were referred. Underlying anaemia in a large number was responsible for high mortality due to haemorrhage.

12.2 per cent of deaths were abortion related. 99(83.2%) died because of septic abortion. History of interference before coming to hospital was given in 92.3

per cent of septic abortion deaths. Most of these abortions were induced in Private hospitals/nursing homes. Interference was done by RMP or doctor in 40.5 percent, by untrained dai in 26.8 per cent women. Mortality was higher in women with history of interference by untrained dai (27%) as compared to RMP) (15%) or doctor (14%).

It was observed from the aggregate information collected during the study period that 637 women had puerperal sepsis of which 36 women (3.7%) died.

Table - V
Causes of Maternal Mortality

	This Study 1993-94	Fogsi WHO Bhatt et al 1992-94	Majhi et al 1985-94	Registrar General 1993
Maternal Mortality/ 100,000 live births	582	572	656	-
Cause of Deaths	No. of cases	%age	%age	%age
Direct:	682	70.1		
PIH	233	24.0	25.5	12.8
Haemorrhage	230	23.6	19.8	22.6
Abortion related	119	12.2	11.1	11.7
Sepsis	70	7.2	20.6	12.5
Obstructed labour	30	3.1	-	5.5
Indirect:	291	29.9		
Anemia	112	11.5	-	20.3
Infective Hepatitis	69	7.1	8.7	-
Heart Disease	32	3.3	5.3	-
Other Medical Disorder	30	3.1	-	-
Pulmonary embolism	16	1.6	-	-
Amniotic Fluid Embolism	14	1.4	-	-
Post operative complication	8	0.8	-	-
Others	10	1.0	2.5	14.5

(*) Includes puerperal and post abortal sepsis.

On analysing the hospital admissions for a period of one year it is seen that about half of antenatal admissions as well as admissions in labour had anemia indicating the high incidence of anemia. Anemia accounted for 11.5 per cent of maternal mortality. However in another 10 per cent the underlying anemia when accompanied with an obstetric complication (Haemorrhage, Eclampsia) tilted the woman's balance towards death. Nearly 30 per cent of deaths due to anemia were from Patna, Bihar whereas fewer deaths were reported from the southern states.

Viral Hepatitis was the other major cause of death among indirect causes and contributed to 7.1 per cent of the mortality. There were 3.3 per cent deaths due to heart disease, 3.1 per cent due to other medical disorders, and 1.4 per cent due to amniotic fluid embolism. Post operative complication and others were 1.3 per cent.

Discussion:

The study covers maternal deaths in 31 teaching hospitals from 16 states/union territories of the country. The MMR of 582/100,000 live births is comparable to that of other hospitals based studies. (Bhatt 1997, Majhi

1996). The precise estimates may be different as there is lack of reliable population based data. Community studies of maternal mortality in developing countries show that most maternal deaths happen outside the medical system either at home or on the way to hospital. (Maine 1991). Moreover, hospital data reflect an unknown proportion of deliveries, complications and deaths which occur in a population. (WHO, 1987). The majority of women in India do not deliver in a hospital and therefore the incidence and proportion of complications seen is probably very different from what occurs in the community. The NFHS (1995) reported a maternal mortality ratio of 437 with a cautionary note that direct survey estimates often underestimate maternal deaths. At the same time hospital data estimation may be more than community mortality rates as high risk women are referred to hospital for delivery and often the women are only transported to hospital when they develop life threatening complications, which is too late and swells the number of hospital deaths. Studies indicate that women from rural areas of India seek hospital care in case of emergencies, thereby attributing to the hospital incidence of maternal mortality (ICMR 1990). Nevertheless, till such time as the overall recording system in the country both at primary as well as tertiary

level improve to an extent possible to give correct estimates of MMR, the Institutional MMR will have to be depended upon to reflect the magnitude of the problem.

Large variation in mortality was seen in different parts of the country and from hospitals in the same city. It was observed that generally hospitals with large number of obstetric admissions and deliveries reported less mortality. The reason could be that these hospitals are used for normal deliveries thus bringing down maternal mortality ratio, whereas in hospital from UP, Bihar, Orissa etc. where most of the deliveries take place at home (NFHS 1995), women generally seek hospital care in emergency attributing to higher mortality. This was also indicated by the fact that proportion of deaths due to direct causes was higher in the hospitals with high maternal mortality ratio. Direct causes, e.g., Haemorrhage are easily recognizable as an emergency and women are brought to hospitals whereas many of the indirect causes of death are not detected by lay persons and women die before they can reach a medical facility. Other factors could be general awareness, antenatal care, women status and due to individual hospital admission practices as well as the fact that trends in the utilization of facilities for normal delivery may be very different from the trends in the utilization of facilities for complicated cases, the ones likely to result in death. (Prevention of Maternal Mortality Network, 1995)

Higher mortality was seen in uneducated primigravida women from rural areas. Poverty and female illiteracy are important social risk factors and along with woman's status closely interlinked with maternal health (Rao, 1993.)

Forty one per cent of the maternal deaths were among referral admissions indicating the need of a good referral system supported with transport. Nearly 60 per cent of the women came to the hospital on their own and also included women who were attended by Dai/ untrained person for unsuccessful attempt at delivery or induced abortion.

PIH, Haemorrhage, Sepsis including septic abortion anemia and hepatitis were the major causes of maternal death in contrast to the developed countries defining embolism cardiomyopathy, anaesthetic complications, adult respiratory distress syndrome and recently AIDS as the leading cause of maternal mortality (Tuncer, 1995). A recent study from Calcutta (Majhi, 1996) report 34.4 percent maternal deaths due to PIH as compared to 23.9 per cent in this study. More than fifty per cent of the deaths among teenage mothers and almost seventy per cent among primigravida were due to PIH. Similar findings have been reported in other hospital

based studies (Anandalakshmy & Buckshee 1993). In an earlier ICMR study (ICMR 1990), 12 per cent of maternal deaths were due to PIH thus showing a two-fold shift in deaths due to this cause.

Nearly 24 per cent deaths were due to haemorrhage and is comparable to that seen in other studies (Registrar General (India) 1993), (Majhi 1996, Bhatt, 1997). 4.5 per cent deaths were due to rupture of uterus, three-quarters belonged to rural areas and more than half were referral. Intranatal care by trained personnel, timely management and replacement of lost blood volume will reduce deaths from haemorrhage.

Despite legalisation of abortion, facilities for abortion are far from satisfactory with about 10 per cent referral deaths being due to abortion (Health Information-India, 1990.) In our series there were 12.2 per cent abortion related deaths and history of interference was given in 92.3 per cent of women dying due to septic abortion. Mortality was higher in women with history of interference by untrained dai (27%) as compared to trained Dai (15%), RMP (15%), Doctor (14%) or ANM/ LHV (7%). Many of these lives could have been saved if the abortions had been performed by qualified medical personnel. An earlier ICMR study showed an overall illegal abortion rate of 13.8%/1000 pregnancies and that nearly 80 per cent of septic abortion were induced at an unauthorized place (ICMR 1989).

Anemia accounted for 11.5 per cent of maternal deaths. Previous ICMR collaborative study on high risk pregnancies showed that anemia in pregnancy was reason for admission in 29.7/1000 admission (ICMR 1990). In our series about half of the antenatal admissions as well as admissions in labour were due to anaemia. Anemia is mostly due to nutritional factors and parasitic infestations (De Mayer & Adicle-Tegman 1985). Pre-existing anemia is worsened as pregnancy advances leading to congestive heart failure and death (Rao 1993). It also impedes the mothers ability to resist infection or survive haemorrhage and increase the likelihood of her dying in child birth by a factor of four (Chi 1981, Llewellyn Jones 1965).

Seven per cent of the maternal deaths were due to viral hepatitis. In most of the cases Hepatic failure or PPH due to coagulation failure lead to the deaths. Jaundice in Pregnancy has a case fatality rate as high as 10-33 per cent in pregnant women (Rao, 1993). In a large multicentric study of 4,703 maternal deaths in India, 535(11%) were due to jaundice in pregnancy.

What is tragic is that most of these deaths are preventable. Though institutional delivery is safer, it is

not possible in all cases and, therefore, we need to ensure that all women have access to high quality essential and emergency obstetric services alongwith provisions for effective contraceptive and safe abortion services at FRU level to reduce mortalities due to unplanned pregnancies. Essential standards need to be set, not only for service delivery but also its management and supervision and must cover client satisfaction, appropriate use of technology, availability of medical supplies and equipment, besides provide competence in the form of their training and certification. For all this, intensive efforts need to be directed at policy, programme, training and research activity. Only then will we be able to reduce these preventable tragedies.

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