

Changing trends in the cumulative & cause specific maternal mortality ratio over three decades

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Summary: This is an analysis of maternal deaths occurring over three decades from 1966 to 1995 carried out at the department of Obstetrics & Gynaecology, Medical College, Baroda. The data has been analysed in two comparable time frames from 1966 to 1980 and 1981 to 1995. The cumulative MMR per 100,000 total births has shown a significant increase from 862/100,000 in 1966-1980 to 1956 / 100,000 in 1991 - 1995. 25.82% deaths across both groups occurred in primigravid patients. Emergency referrals increased from 89.19% in 1966-1980 to 94.6% in 1981-1995. We have observed a significant ($P<0.05$) increase in deaths due to sepsis and haemorrhage in 1981-1995 time period and a significant reduction in deaths due to accidents of labor. No change was observed in proportion of deaths due to eclampsia. The proportion of all maternal deaths due to indirect causes has increased significantly ($P<0.05$) with severe anaemia and infective hepatitis being the leading causes.

Introduction

India has one of the highest maternal mortality in the world, with 10 percent of women in the reproductive ages dying from pregnancy and delivery related causes (UNICEF, 1991, Acsadi and Johnson Acsadi, 1990). India accounts for over a quarter of maternal deaths world wide, with an estimated maternal mortality rate of over 400 per 100,000 live births. The high risk of dying from maternal causes is compounded by high fertility marked by closely spaced pregnancies, low health service utilization and poor overall health.

It is well known that getting accurate and reliable National Data on Maternal Mortality from developing nations is not easy and there is a great deal of under reporting. The FOGSI-WHO study (1992-1994) (Bhatt RV, 1992) reported a maternal mortality ratio of 572.3 deaths per 100,000 births with a wide range varying from 1668.1 per 100,000 in Bihar to 223 per 100,000 in Kerala. These wide regional disparities are due to wide variation in the level of contraception, utilization of health services and reproductive behaviour across the states of India. These coupled with social and economic organization, account for the regional differences.

Haemorrhage, infection and sepsis together make up at least half of all maternal deaths in developing countries, with rupture uterus, hepatitis and anaemia also ranking high. Other reproductive factors such as extremes of age, primi and grand multiparity, unplanned pregnancy etc contribute as well.

The study was carried out at the department of Obstetrics & Gynecology, SSG Hospital and Medical College, Baroda using a retrospective analysis of maternal deaths over a three decade time span from 1966 to 1995. The aim of the study was to review the change in trend in the cumulative maternal mortality ratio and cause specific mortality ratio in our institution.

Subjects & Methods :

Medical College, Baroda and the associated Shree Sayaji General Hospital is one of five teaching institutions in Gujarat. It is a tertiary care centre and constitutes the largest referral centre in central Gujarat, catering particularly to High Risk Obstetrics. The hospital's patient population comprises mainly of the lower income group from urban slums, referred patients from surrounding rural areas and patients referred from private clinics, and district hospitals in the city.

We retrospectively reviewed the maternal mortality statistics for the periods from January 1966 to December 1980 and from January 1981 to December 1995. Causes of death were considered under two broad categories of Direct and Indirect deaths. In addition to calculating the variation in cumulative Maternal Mortality Ratio (MMR) per 100,000 total births, we used a cause specific mortality ratio to determine whether there had been an increase or decrease in any specific cause of mortality.

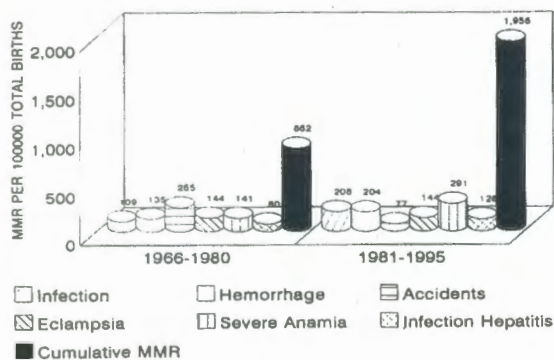
Statistical analysis was carried out using the Standard Error of Difference of Proportion (SEdf P) to determine whether the variation in cause specific mortality was significant or due to chance. $P < 0.05$ was considered as significant. A value was considered to be significant at $P > 1.96$. $P \pm 1.96$ implies the the value as lying within the 95% confidence limits.

Observations:

Table I shows the maternal deaths and MMR per 100,000 births over the two time frames from 1966 to 1980 and from 1981 to 1995. There were 458 deaths in the fifteen year period from 1966 to 1980, constituting 0.86% of the 53,072 total births in this period and an MMR of 862 per 100,000 births. From 1981 to 1995, the maternal deaths increased to 656, the total births declined to 33533 corresponding to an MMR of 1956 per 100,000 births.

Table 2 shows that 89.95% and 94.66% subjects were emergency admissions in 1966-1980 and 1981-1995 respectively whereas the admissions from an urban residence declined from 46.06% in 1966-1980 to 26.37%

Fig. 1: Total and cause specific maternal mortality ratios (MMR) over 3 year periods, 1966-1980 and 1981-1995



in 1981-1995; there was a corresponding increase in admission from rural residences in 1981-1995.

Table 3 and 4 shows the distribution of subjects by age and parity. 459 (41.2%) subjects were in the 20-25 year age group and 254 (22.8%) were in the 26-30 year age group. 288 (25.8%) women who died were primigravid and 581 (52.15%) had parity 1 to 3. In 1966-1980 32.96% women who died had a parity of more than 4 whereas the corresponding figure in 1981-1995 was 14.32%.

Table 5 and figure 1 show the direct and indirect causes of maternal deaths over the two time periods and the trend in the cause specific mortality rates. It can be seen here that there is a significant ($P = 0.01$) increase in the proportion of deaths due to infection and haemorrhage, a significant reduction ($P < .01$) in the proportion of maternal deaths due to accidents of labour. Contrary to expectation, no change is seen in the proportion of deaths due to eclampsia. Among the indirect causes, the proportion of deaths due to all indirect factors has gone up significantly ($P = 0.05$) with the most striking increase being that of severe anaemia. Amongst deaths due to other indirect causes, cerebral malaria in pregnancy account for 39% of the deaths in 1981-1995.

Discussion:

Both hospital based and community level studies have limitations sources of information on maternal mortality. Hospital based studies tend to be highly localized and suffer from problems on nonrandom case selection, inadequacies of sample size, incomparable reference periods, and changing patterns of referral, while estimates from community studies may be representative of the specific study area, generalizing their results to a country as vast as India is difficult.

This study is an analysis to review a changing trend in cumulative as well as cause specific Maternal Mortality Ratio over a three decade period at the department of Obstetrics and Gynaecology, SSG Hospital and Medical College, Baroda. The data has been analysed in two

Table - 1

Changing Trends in Maternal Mortality over three decades

Year	No. of maternal Deaths	Total Births	Maternal mortality Ratio per 100,000 births
1966 - 1980	458 (0.86%)	53072	862
1981-1995	656 (1.95%)	33533	1956

Table - II

Distribution of subjects by Residence and Nature of Admission

	Year			
	1966 - 1980		1981-1995	
	No.	%	No.	%
Emergency	412	(89.95)	621	(94.66)
Booked	46	(10.04)	35	(05.33)
Urban	211	(46.06)	173	(26.37)
Rural	247	(53.93)	483	(73.62)

Table III

Distribution of subjects by Age group

Age group in yrs.	Year			
	1966-1980		1991 - 1995	
	No.	%	No.	%
Less than 20	31	(6.76)	85	(12.95)
20-25	162	(35.37)	297	(45.27)
26-30	96	(20.96)	158	(24.08)
31-35	95	(20.74)	98	(14.93)
More than 35	74	(16.15)	18	(02.74)
Total	458	(100.0)	656	(100.0)

Table 4

Parity wise distribution of subjects

Parity	Year			
	1966 - 1980		1991-1995	
	No.	%	No.	%
0	152	(33.18)	136	(20.73)
1-3	155	(33.84)	426	(64.93)
4-6	151	(32.96)	68	(10.36)
> 6	-		26	(03.96)
Total	458	(100.0)	656	(100.0)

Table 5

Direct & Indirect Causes of Maternal Deaths

Causes	1966-1980		1981-1995		St. dl. P
	No.	%	No.	%	
Direct					
1. Infection	50	(10.91)	137	(20.88)	4.64
2. Haemorrhage	62	(13.53)	134	(20.42)	4.80
3. Accidents of Labour	117	(25.54)	51	(07.77)	7.76
4. Eclampsia	66	(14.41)	95	(14.48)	0.03
5. Abortions	34	(07.42)	43	(06.55)	1.56
6. Others	69	(15.06)	28	(04.26)	1.85
Indirect					
2.87					
1. Severe Anaemia	65	(14.19)	191	(29.11)	6.21
2. Infective Hepatitis	37	(08.07)	84	(12.8)	
3. Heart Disease	30	(06.55)	56	(08.53)	
4. Cerebrovascular causes	05	(01.99)	42	(06.4)	
5. Respiratory Diseases (including TB)	07	(01.52)	18	(02.74)	
6. Others (Malaria, Tetanus, Accidental Burns, Surgical emergencies).	19	(04.14)	64	(09.75)	
Total Maternal Deaths	458	(100.0)	656	(100.0)	

comparable time frames from 1966-1980 and 1981 to 1995. The cumulative MMR per 100,000 births has shown a significant increase from 862 in 1966-1980 and 1981 to 1995. The cumulative MMR per 100,000 births has shown a significant increase from 862 in 1966-1980 to 1956 in 1981-1995. 94.66% in the latter period were emergency referrals. Thus whereas the total births have declined from 53072 in 1966-1980, to 33533 in 1981-1995, the number of maternal deaths has increased. 25.82% deaths across both groups occurred in primigravid patients.

66.78% patients were in the age group 20-30 yrs. This is

endorsed by the study by Bhatt P. N. et al (1995) in Anantpur district of Andhra Pradesh. The authors found here that the age related maternal mortality does not follow the expected 'U' shaped curve. In fact the MMR was significantly lower than expected in mothers less than 20 and more than 40.

The above observations are contrary to those found in similar hospital based studies by Pandit R. D (1987) and Juneja et al (1994) wherein substantial reduction in maternal mortality is observed. Pandit had noted a significant decline in the emergency referrals from 88% in 1929 - 1939 to 57.14% in 1980-1983. Juneja et al noted a 7% reduction in sepsis related deaths, 5% increase in haemorrhage related deaths and deaths due to toxemia have almost doubled from 6.33% in 1979-1981 to 13.42% in 1989-1991. We have observed a significant ($p < 0.05$) increase in deaths due to sepsis and haemorrhage and a significant reduction of deaths due to accidents of labor. Septic induced abortions accounted for 25% of all maternal deaths and 50% of deaths due to infection. Timely diagnosis of CPD and abnormal presentations and positions, appears to have reduced the risk of obstructed labor and rupture uterus, thereby reducing the mortality from accidents of labor. Deaths due to haemorrhage have increased from 13.53% in 1966-1980 to 20.42%. Due to non-availability of transport facilities had motorable roads most patients with haemorrhage are brought to the hospital too late and even then adequate blood for transfusion is not always available.

No change is observed in the proportion of deaths due to eclampsia. The proportion of all indirect causes leading to maternal deaths has increased significantly with severe anemia and infective hepatitis being the leading causes. The problem of inadequate distribution of iron tablets is compounded by poor patient compliance, widespread worm infestation and endemicity of malaria and socio-cultural influences. This could be tackled by educating the peripheral health workers in parenteral prophylaxis for anaemia at community level, and emphasising the need for prophylaxis for intestinal worms and malaria.

Most of the maternal deaths in our country are preventable. Although the common denominator for

prevention involves access to quality health care, some strategies for approach at community and institutional level are suggested.

I. Community Level:

1. Delegation of treatment and prophylaxis modalities at the grass-root level of health care delivery system.
2. Team approach to problem solving.
3. Community orientation and participation by IEC and RDC approach.
4. Make mother responsible in the decision making process.
5. Proper recording and notification of maternal death.

II. Institutional Level for us:

1. Boost district care for essential obstetric services.
2. Make midwifery training a priority and link it up with institutional backup.
3. Include community obstetrics in residency and training programmes.
4. Include TBA into existing health services in a big way.
5. Build supportive supervision into training plan.

Acknowledgement

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