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Demographic, Socio-Economic and Medical Factors Affecting Maternal Mortality- An Indian Experience

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Introduction

India has made appreciable progress in improving its overall health status since the beginning of the century. The crude death rate has declined, but there is no sign of a decline in the maternal mortality rate. Also, most of the evidence relating to high maternal mortality rates is fragmentary. In many parts of the world where maternal mortality is highest, deaths are rarely recorded, and even when they are, the cause of death is usually not given. Thus, it is essential to understand the factors, which cause maternal deaths so as to plan efficient interventions, which can help to reduce maternal mortality.

In this paper an attempt has been made to examine the factors which affect maternal mortality through a case control investigation. Further, the relative importance of each of these factors has been studied by determining their relative risk using odds ratio.

Methodology

The data for the study was collected through a one-to-one pair-wise matched case control study design. The sample comprised of 252 cases (maternal deaths) which occurred during 1983-1985 at the Safdarjung Hospital, New Delhi and an equal number of suitably matched controls (maternal survivors) for the same period. For each maternal death, a maternal survivor of the same age, parity and registration status for antenatal services (i.e. booked or unbooked) was selected. Matching was done to increase the precision of comparison.

The data was subjected to univariate analysis. The contingency table was used to test whether the factors had affected the risk of maternal, mortality. If the factor was found to affect risk, then the relative risk was estimated by odds ratio A. The factors considered were age of mother, parity, birth interval, jestational age and outcome of index delivery, mothers education, residence and family income.

Results

There were 252 maternal deaths during the reference period (January 1, 1983 December, 31, 1985) in the hospital. Table 1 presents the incidence of maternal mortality per 1000 obstetric admissions for selected characteristics of the study population. It shows that maternal mortality was 3.4 times higher among mothers aged 35 or more as compared to mothers aged 20-24 years, and nearly three times higher than that of teenage mothers. Parity specific maternal mortality rates were higher among women who had not had a live birth (nullipara) and women who had experienced five or more child-births. The trend exhibits a typical J-shaped distribution, which is consistent with various findings reported in the literature B. The maternal mortality rate was nearly double when the birth intervals were less than two years as compared to longer birth intervals of three years or more.

Table 1: Maternal mortality by selected characteristics

	Maternal mortality rate	**No. of obstetric admissions**
Total	5.8 (252)	43,749
Demographic :		
Age of mother (in years)		
15 - 19	5.3 (16)	3,019
20 - 24	4.5 (86)	19,250
25 - 29	5.5 (85)	15,399
30 - 34	8.2 (33)	4,025
> = 35	15.6 (32)	2,056
Parity		

0	5.4 (83)	15,269
1	3.8 (52)	13,694
2	6.4 (54)	8,487
3	6.6 (26)	3,937
4 +	12.5 (24)	1,925
Interval since last childbirth		
< 2 years	8.9 (61)	6,869
2 - 3 years	6.1 (30)	4,944
3 + years	5.0 (28)	5,566
Primipara	(79)	14,918
Socio-Economic:		
Education of mother		
Illiterate	11.5 (164)	14,262
Primary level	6.4 (12)	1,881
Middle school	4.0 (7)	1,750
High school & above	2.0 (7)	3,588
Place of residence		
Rural	110.3 (111)	1,006
Urban slum	3.8 (61)	16,012
Urban	3.0 (81)	26,731
Family income per month		
< Rs. 300	16.9 (133)	1,138
Rs. 300 - 1000	3.8 (38)	9,887
> Rs. 1000	0.8 (5)	5,168
Medical:		

Registration status for antenaral care		
Booked	0.5 (11)	21,306
Unbooked	10.7 (241)	22,443
Gestational age (weeks)		
< 32	9.9 (53)	5,381
32 - 36	30.1 (50)	1,663
37 +	4.1 (149)	36,705
Outcome of index delivery		
Live birth	2.6 (94)	36,137
Still birth, abortion etc.	13.8 (105)*	7,612

* 53 mothers died before delivering.

The socioeconomic characteristics revealed a negative association between maternal mortality and mother's educational status (Table 1). Illiterate mothers experienced the highest mortality. The least survival condition was experienced among the poorer strata of the society, and maternal mortality was higher among rural as compared to urban mothers even when rural mothers were brought to the hospital, often in a critical condition for delivery.

Among the medical characteristics, maternal mortality was as much as 21 times higher among unbooked cases (Table 1). Maternal deaths were minimal among mothers who had delivered at term (gestational age of 37+ weeks) as well as among mothers who had delivered a live baby.

The relative risk (RR) (odds ratio) of various risk factors associated with maternal mortality is summarized in Table 2. A remarkable variation was observed in the relative risk associated with various risk factors estimated by the odds ratio. The findings suggest that having many children at short birth intervals or at unfavorable ages endangers a woman's life. The findings (Table 2) convincingly support the fact that anemia resulting from malnutrition is a particular scourge of women in developing countries and may be one of the precipitating causes of

maternal mortality. The results (Table 2) also demonstrate that obstetric risk factors like hemorrhage, PIH and sepsis are significant contributors to the risk of maternal mortality.

Table 2: Relative risk (RR) estimates of various risk factors of maternal mortality with 95% confidence intervals (95% CI)

Risk factor	**R.R. estimates 95% CI**
Demographic	
Mother's age at birth below	
20 years or 35+ years Vs Ages between (20-35) years	2.18 (1.59 - 2.99)
Parity 0 and 4+ Vs Parities (1-4)	1.38 (1.06 - 1.79)
Birth interval of >24 mths Vs longer birth intervals	2.50 (1.49 - 4.32)
Experience of previous delivers Abnormal Vs normal	N.S.
Social/environment	
Non-use of antenatal services Vs use of antenatal services	24.80 (11.24 - 54.10)
Medical	
Presence of hyperyrexia Vs Absence of hyperpyrexia	12.89 (6.92 - 26.55)
Presence of severe anaemia Vs Absence of serve anaemia	6.80 (3.90 - 12.50)
Obstetric	
Presence of hemorrhage as a complication Vs absence of hemorrhage	3.50 (2.06 - 6.38)

Presence of PIH as a complication Vs absence of PIH	2.88 (1.74 - 4.92)
Presence of puerperal sepsis as a complication Vs absence of puerperal sepsis	36.50 (5.73 - 207.33)

Discussion

The study has identified the following risk factors in order of degree of risk.

1. Severe anemia assessed by an hemoglobin level below 8.5 g%.

2. Presence of hemorrhage as a complication of pregnancy.

3. Presence of toxaemia as a complication of pregnancy.

4. A short birth interval of less than two years since the last childbirth.

5. Mother's age below 20 years or 35 years and above.

6. Parity 0 to 5 or more.

The findings clearly reveal that severe anemia is a potent killer of pregnant mothers. Hence there is an urgent need to educate women particularly in regard to prophylaxis against nutritional anemia and to provide iron and folic acid antenatally. The need and importance of antenatal care and a routine check-up should also be emphasized. The findings thus clearly indicate that the timing of conception affects the risk of maternal mortality.

Notes

1. It may be noted that 52.7 per cent of the 33,053 deliveries performed at the Hospital during the reference period were booked for antenatal care. Two hundred forty one of the 252 (maternal deaths) were unbooked. Hence, the risk

factor that is, the non-use of antenatal services seems to show antenatal services seems to show a very high risk in this study. Also, most of mothers were brought to the hospital in a critical condition. Therefore, this high risk is an exaggerated picture of the risk.

2. In this study, among maternal deaths, 49 mothers had heart disease, 41 had tuberculosis and 68 had jaundice during the course of pregnancy. In contrast, among the maternal survivors, except for one mother who had tuberculosis, none suffered from these high risk medical conditions. Therefore, it is not possible to calculate the odds ratio from the data. But the prevalence of these medical conditions suggests a very high risk.

3. The study population showed only two mothers who survived in presence of puerperal sepsis whereas 73 mothers died with sepsis. This risk factor showed a very high odds ratio of 36.5. Hyperpyrexia also showed a very high risk. There were 18 mothers with this factor among the maternal survivors. In contrast, among those who died, 113 mothers had this risk factor.

References

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