Age Profile of Neonatal Deaths

ICMR Young Infant Study Group

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ABSTRACT

Neonatal survival has emerged as the key to further reduction in child mortality. Distribution of neonatal deaths in first week of life in the community is poorly understood. In a cross sectional survey covering a population of 13,16,681, information was collected retrospectively for one-year reference period on 30,473 births, 1,521 neonatal deaths and 2,218 infant deaths from five rural sites in India. Of all neonatal deaths, 39.3% occurred on first day of life, and 56.8 % during the first three days. The study highlights importance of first three days as the most hazardous phase in life and provides evidence-base for postnatal care guidelines.

Key words: *India, Infant, Mortality, Newborn.*

INTRODUCTION

India contributes 2.4 million under-5 child deaths each year, a stunning 22% of the global burden; and nearly half are neonatal deaths(1,2). Substantial reduction in neonatal mortality is, therefore, a crucial pre-requisite for achieving further gains in child survival in the country. Available data shows that deaths in the first week of life constitute around 75% of neonatal deaths(2). However, distribution of deaths in the community within the first week is poorly understood. Studies from rural Maharashtra in the late seventies(3) and early eighties(4) reported 32.6% (*n*=135) and 34.7% (*n*=121) neonatal deaths, respectively. Estimates from a larger population base and in more recent times are not available.

The Indian Council of Medical Research (ICMR) is carrying out an effectiveness trial aimed at assessing the impact of a package of home based newborn care(HBNC) interventions (field tested by SEARCH Gadchiroli(5)) delivered by appropriately trained village level worker in reducing mortality in neonates and young infants. This study is ongoing at five rural sites in the states of Uttar Pradesh (Barabanki), Orissa (Cuttack), Bihar (Patna), Rajasthan (Rajasmand) and Maharashtra (Yeotmal). A cross-sectional survey was carried out in nine PHCs at each site to generate baseline information on neonatal and infant mortality. This communication highlights baseline mortality rates and the timing of neonatal deaths.

METHODS

A cross sectional house-to-house survey was carried out between January to July 2003 and information was collected retrospectively on births, infant deaths, age at death and details of delivery during the reference period of one year (*i.e.* 2002 January to March 2003). Local calendars correlating to important local festivals were used for recording the dates of birth and deaths. Verbal consent was obtained from the community leaders for undertaking the survey in their village area.

Survey tools were developed centrally and field-tested by each center for quality control. Households were enumerated before the survey, detailed maps of villages were prepared with major landmarks, and

births and deaths were crosschecked with other data sources for assuring completeness of coverage, in addition, 10% random checks of the survey data was carried out. Locked houses were revisited. Double data entry was carried out at each center. Data were transferred electronically to the coordinating unit, and were checked for range and consistency. Statistical analysis and tabulation was done by using SPSS. Survival analysis was done for determining time of death.

Verbal autopsies were carried out for neonatal deaths occurring in intervention areas prior to launch of main intervention.

RESULTS

Table I shows the demographic profile and key findings. Of 29850 live births during the study period, 1521 died in neonatal period. The observed Infant mortality rate (IMR), Neonatal mortality rate (NMR) and Early neonatal mortality rates (ENMR) were 74.3/1000 50.9/1000, and 37.7/1000 live birth, respectively. Neonatal mortality constituted around 70 percent of all infant deaths in study site. The highest mortality rates were observed in Rajsamand district of Rajasthan (*Table* I). Three fourths (74.1%) of neonatal deaths and half (50.8%) of infant deaths occurred in the early neonatal period. Of all neonatal deaths, 39.3% occurred on the first day of life and 56.8 % during the first three days (*Fig.* 1).

Preliminary analysis of verbal autopsy data on 161 cases of neonatal deaths revealed that prematurity (16.8%), birth asphyxia (22.3%) and infections including septicemia, pneumonia, meningitis and other infections (32.8%), were the predominant causes of deaths.

DISCUSSION

The survey which covered a population of 13,16,681 with 30,473 births, 2218 infants deaths and 1521 neonatal deaths, represents one of the largest community database reported from India. The survey highlighted unacceptably high mortality rates although there is likelihood of underestimation of mortality counts in retrospective design. It is observed that around 21.5 - 39.5% of infant deaths

across five centers took place on day one and 70-80% deaths occurred during the early neonatal period. The findings of the survey also suggest that the mortality rates during early neonatal period, especially mortality during first 3 days of life is highest. Similar to our observation, a study carried out in 22 villages of Sirur district in Maharashtra also reported 40% neonatal death on the first day(4).

Early neonatal mortality, especially the mortality during first three days of life, appears to be the major contributor to infant mortality. This information provides clues to the approximate timing of provider- contact in postnatal period in child health programs. A contact on day 1 of life would be the most important for initiating essential newborn care (warmth, breastfeeding, cord care, hygiene) and identifying babies who would need referral (*e.g.* a baby with very low birth weight, or malformation), or extra care at home (*e.g.* moderate-sized LBW baby). The first day contact particularly at the time of birth will pave way for improved outcomes of neonates with prematurity/LBW and asphyxia. Second contact on day 2 or 3 would be important to reinforce health education messages and to detect feeding and other problems. Subsequent visits could be confined to the second or third week for low birth weight babies or those with problems. However, infants who are detected to have problems on earlier visits or by the caregivers anytime, or whose mothers are unwell, merit additional visits in the first week.
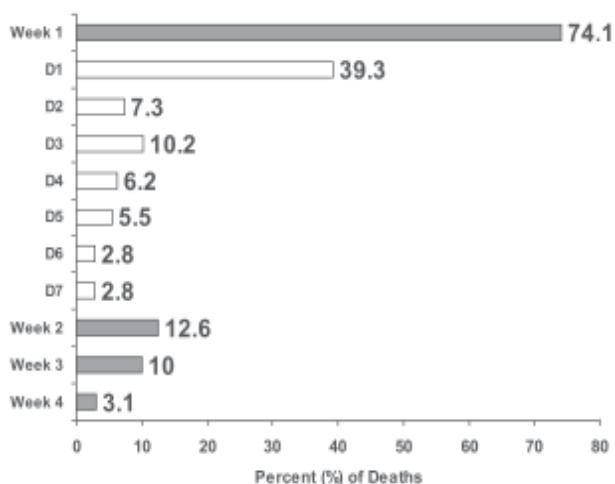

FIG.1. *Proportion of neonatal deaths (by weeks and days) [n=1521]*

TABLE I Sociodemographic Description and Key Findings

Site/district	Uttar Pradesh/ Barabanki	Orissa/ Cuttack	Bihar/ Patna	Rajasthan Rajsamand	Maharashtra/ Yeotmal
Households (*n*=2,52,599)	51452	53260	51520	46385	49982
Population (*n*=13,16,681)	290649	283912	300129	225840	216151
Caste pattern (%)					
Scheduled Caste	35.1	24.0	22.2	13.8	10.2
Schedule tribe	2.9	5.8	0.5	16.8	45.1
OBC and others	61.9	70.2	77.2	69.4	44.7
Maternal education (%)					
Illiterate	78.8	26.7	70.0	75.7	21.9
literate*	21.1	73.3	30.0	24.3	78.1
Place of delivery (%)					
Home	88.3	56.4	69.1	73.2	67.9
Facility**.	11.7	43.6	30.9	26.8	32.1
Delivery conducted by (%)					
Doctor	9.0	40.6	30.3	13.5	23.3
ANM	7.1	4.4	2.2	27.8	11.4
TBA/family members	83.9	55.0	67.5	58.7	65.3
Live births (*n*=29850)	7532	5002	6971	6174	4171
Still births (*n*=623)	194	132	48	180	69
Neonatal deaths (*n*=1521)	363	231	255	479	193
Early neonatal deaths (*n*=1127)	265	163	181	359	159
Infant deaths (*n*=2218)	601	315	364	695	243
NMR/1000 live births	48.2	46.2	36.6	77.6	46.3
ENMR/1000 live births	35.2	32.6	26.0	58.1	38.1
LNMR/1000 live births	13.0	13.6	10.6	19.4	8.1
IMR/1000 live births	79.8	63.0	52.2	112.6	58.2

*Abbreviations: OBC=other backward class, ANM = auxillary nurse midwife, TBA= traditional birth attendant, NMR= neonatal mortality rate, ENMR= early neonatal mortality rate, LNMR= late neonatal mortality rate, IMR= infant mortality rate. *Literate=read and write, primary/ middle / high school /college and above, **Facility=subcenter, primary health center, hospitals/ private nursing homes*

In conclusion, this study highlights the importance of the first three days as the most hazardous phase in life and provides evidence-base for postnatal care contacts in health programs specially in formulating training guidelines and time points for contact by the Accredited Social and Health Activist (ASHA) worker in the recently launched National Rural Health Mission program of Government of India.

WHAT THIS STUDY ADDS?

• Most deaths in neonatal period take place during first three days in the community.

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REFERENCES

1. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? Lancet 2003; 361: 2226-2234.

2. Dadhich JP, Paul V. State of India's Newborns Report. New Delhi: National Neonatology Forum and Saving Newborn Lives/Save the Children; 2004.

3. Shah U, Pratinidhi AK, Bhatlawande PV. Perinatal mortality in rural India: intervention through primary health care. J Epidemiol Comm Health 1984; 38: 138-142.

4. Pratinidhi A, Shah U, Shroti A, Bodhani N. Risk approach strategy in neonatal care. Bull WHO 1986; 64: 291-297.

5. Bang AT, Bang RA, Baitule SB, Reddy MH, Deshmukh MD. Effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India. Lancet 1999; 354: 1955-1961.

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