Maternal and Infant Mortality in Mahottari District of Nepal

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ABSTRACT

Background: Reducing maternal mortality by three quarters and under-five mortality by two-thirds between 1990 and 2015 are the targets of UN Millennium Development Goals as well as of the national safe motherhood programme of Nepal. This study was undertaken by Nepal Health Research Council mainly to identify the maternal and infant mortalities in Mahottari district.

Methods: A descriptive observational study was carried out of maternal and child death over two year period before the time of survey was carried out in eleven VDCs of Mahottari District and two wards of the Jaleshwor municipality. Data were collected in three stages: first, FCHVs collected the information regarding birth, maternal and infant death, which were cross-checked later.

Results: Maternal mortality ratio was estimated at 380 per 100,000 live births, and early neonatal mortality rate, neonatal mortality rate and infant mortality rate were found 32, 39 and 52 per 1,000 live births respectively. The highest deaths in infants were among Dalits, whereas it was among Muslims for maternal mortality. All maternal deaths occurred at a distance of more than 2 hours. Male-to-female ratio for infant mortality was 1:3. The major cause of maternal deaths was post-partum haemorrhage, while it was sepsis among infant deaths.

Conclusions: Both maternal mortality ratio and infant mortality rate of the district were higher than the national average and appeared commensurate with the socio-economic status and health facilities of the district when compared with another similar Terai district of Bara.

Key words: infant mortality rate, maternal mortality ratio, millennium development goals

INTRODUCTION

Millennium development goals (MDGs) 4 and 5 aim at reducing under-five mortality rate by two-thirds and maternal mortality ratio (MMR) by three quarters respectively between 1990 and 2015.[1] Infant deaths occupy a large proportion of under-five deaths, therefore, reducing deaths during the first year of life is vital.[2]

A drop of maternal death from 539 to 281 per 100,000 live births seems controversial since 81% deliveries still take place at home without the presence of a skilled birth attendant.[3] The preliminary analysis of the study called 'assessment of burden of diseases in Nepal' of Mahottari district showed relatively lower estimates of Maternal Mortality Ratio and Infant Mortality Rate in the district. The study was done to ascertain the status of maternal and infant deaths in the same VDCs represented in the burden of diseases study, along with identification of causes of the deaths and quantification of the distribution of the deaths according to some variables.

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METHODS

A descriptive observational study was carried out from July to September 2008. The information was collected over a period before the time of survey: live births occurred in the last fiscal year from July 16, 2007 to July 15, 2008, and maternal and infant deaths occurred in the last two years from July 16, 2006 to July 15, 2008. The live births were multiplied by two to correspond for the study period of two years. Verbal consent of the respondents was taken before starting the interview by explaining the objective of the study and they were assured about the confidentiality of the findings. NHRC Burden of Disease study had selected nine VDCs and two wards of the municipality, including the VDCs- Pigauna, Ankar, Ratauli, Padaul, Khopi, Basbitti, Auri, Hattisarba, and Gauribas by stratified random sampling method, one from each nine health Ilakas of the district, and two municipality wards selected randomly in the same proportion from the total wards. The study was conducted in these VDCs, in addition, two other VDCs - Dhirapur and Harinmari, with unusually more deaths recorded by female community health volunteers (FCHVs) in the first phase, were studied to increase number of maternal deaths.

Data were collected in three stages: first, FCHVs collected the information regarding birth, maternal and infant death, which were cross-checked by a census survey conducted at second time. On the third stage, the deaths recorded in the census were confirmed by revisiting the house where they had occurred.

Direct face-to-face interview was done with family members including mother, during home visit in each household of the selected areas. For maternal deaths, those occurred after 42 days of delivery or from causes other than direct or indirect ones were excluded. A guidance note was prepared and provided to the FCHVs and the enumerators.

To identify the causes of deaths, during house-visit, primary care givers who were with the deceased during the period leading to death, were asked about sequential signs and symptoms exhibited by the deceased prior to his/her death. The causes of deaths were confirmed by medical doctors, then by a gynaecologist and one postgraduating in pediatrics, based on the symptoms recorded by enumerators.

Data entry was done in SPSS 11.5 software program. The SPSS and excel program were used for analysis, whereas Confidence Interval Analysis (CIA) software program was used to calculate the confidence interval of the indicators.

RESULTS

Maternal mortality estimates of the survey

Twelve maternal deaths were found in the district which estimated MMR at 380 per 100,000 live births, but the true estimate was between 196 and 664 at the 95% confidence level, whereas when two other VDCs were also included, there were14 maternal deaths altogether with MMR at 354.

Table 1. Estimates of maternal mortality			
Number of livebirths*	Number of maternal deaths†	Estimated MMR‡	95 percent confidence interval
1579x2=3158	12	380	196-664
1977x2=3954§	14§	354§	194-594§

*The number of live births in the recent study year were found 1579 and 1977 for the representative sample of the district and when two more VDCs were added respectively. So, the total live births for two years' study period were calculated 3158 and 3954, by multiplying 1579 and 1977 by 2.

†Maternal deaths occurred during the two years' study period.

‡Number of maternal deaths per 100000 live births.

§Figures for study area including representative sample of the district and two other VDCs.

Estimates of IMR

The estimates for early neonatal, neonatal and infant mortality rates stood at 32 (26-39 at 95% CI), 39 (32-46 at 95% CI), and 52 (44-61 at 95% CI) per 1,000 live births respectively, similarly, when two more VDCs were also included, the rates were found as 33, 40, and 53 respectively.

Table 2. Estimates of IMR			
Type of death	Number of deaths†	Estimated rates‡	95 percent confidence interval
Early neonatal death	100	32	26-39
	130**	33**	27-39**
Neonatal deaths	123	39	32-46
	159**	40**	34-47**
Infant deaths	164	52	44-61
	208**	53**	46-60**

†Number of deaths occurred during two years' study period

‡Figures for early neonatal, neonatal and infant mortality rates that have been rounded.

**Figures for study area including representative sample of the district and two other VDCs.

Characteristics of maternal deaths

No deaths occurred among Upper castes, whereas the highest MMR was found in Muslims (837 per 100000 live births). With regard to the distance of district level hospital from the home of deceased women in terms of time required, there were no deaths within one hour's and 1 to 2 hours' distance, whereas all 12 deaths (MMR at 570) happened at more than 2 hours' distance.

Table 3. Characteristics of maternal deaths			
Characteristics	Live births	Maternal deaths	MMR*
Caste/Ethnicity groups			
Upper caste	132	0	0
Janajatis	208	1	240
Disadvantaged non-Dalit Terai caste groups	636	4	314
Dalits	364	3	412
Muslims	239	4	837
Total	1579	12	380
Distance to hospital			
Within 1 hour	383	0	0
1 to 2 hours	144	0	0
More than 2 hours	1052	12	570
Total	1579	12	380

*Figures have been rounded

Place of maternal deaths: An equal proportion of maternal deaths occurred at home and hospital.

Characteristics of infant deaths

Males had IMR of 59 per 1000 live births, whereas females experienced only 45 per 1000 live births. Regarding castes, Dalits had the highest IMR at 65 per 1000 live births, and the lowest IMR was among Muslims.

Table 4. Characteristics of infant deaths			
Characteristics of infant deaths	Live births	Infant deaths	IMR*
Sex of infants			
Male	785	92	59
Female	794	72	45
Total	1579	164	52
Caste/ethnicity groups			
Upper caste groups	132	13	49
Janajatis	208	25	60
Disadvantaged non-Dalit Terai caste groups	636	60	47
Dalits	364	47	65
Muslims	239	19	40
Total	1579	164	52

*Figures have been rounded

Causes of maternal death

Postpartum haemorrhage was the leading cause of maternal deaths occupying 42%; and prolonged labour covered 17% of deaths; whereas anaemia, antepartum haemorrhage, eclampsia, heart disease and hypertension in pregnancy resulted to 8.3% of maternal deaths individually.

Table 5. Causes of maternal deaths		
Cause of death	Frequency	Percent*
Anaemia	2	14.0
APH	1	7.0
Eclampsia	2	14.0
Heart disease	1	7.0
Hypertension in pregnancy	1	7.0
PPH	5	36.0
Prolonged labour	2	14.0
Total	14	100.0

*Figures may not add exactly to the total owing to rounding

Causes of infant deaths

As far as the causes of infant deaths are concerned, about a quarter (23%) were due to sepsis, followed

by pneumonia (17%), birth asphyxia (15%), low birth weight (12%), and diarrhoea (5%). Other causes such as accident, hypothermia, measles, neonatal tetanus, hyaline membrane disease, jaundice, respiratory distress syndrome, birth injury, tuberculosis, convulsion, hypovolemic shock, bleeding disorder, cyanotic heart disease, and kalazar contributed to 19.5% of deaths. The remaining 8.5% of infant deaths could not be classified.

Table 6. Causes of infant deaths		
Cause of death	Frequency	Percent
Birth asphyxia	24	15.0
Diarrhoea	8	5.0
Fever	5	3.0
LBW	20	12.0
Pneumonia	27	17.0
Sepsis	37	23.0
Other causes	7	19.5
Unclassified	14	8.5
Total	208	100

DISCUSSION

The estimate for MMR-380 per 100,000 live births in Mahottari district was higher compared to another similar terai district- Bara (329)[4], as well as than the national average (281)[3]. Mahottari's lower socio-economic indicators[5] and 95% births being delivered at home[6], most without the assistance of a skilled birth attendant, could have influenced the status of MMR. The socio-economic indicators such as human development index (HDI), female literacy rate and gender empowerment measure (GEM) of Mahottari district (0.41, 22%, and 0.30 respectively) are at poorer level than the national average (0.47, 42.8%, and 0.39 respectively) and other terai districts: Banke (0.48, 49.2%, and 0.40 respectively), Bara (0.47, 29.10%, and 0.33), and Dhanusa (0.45, 36.30%, and 0.32).[7]

All maternal deaths occurred at a distance of more than 2 hours. Distance of more than 2 hours to reach to hospital for appropriate emergency obstetric care may lead to maternal mortality.[9] An equal proportion of maternal deaths occurred at home and hospital, though only about 5 % deliveries in Mahottari take place at hospital[6], indicating the effect of first delay in deciding to seek care and second delay to reach to hospital for the obstetric care.

However, among infant deaths, home deaths were more than three times of hospital deaths, since about 95% births are taking place at home in the district, and majority of infant deaths happen soon after birth.[8]

Like maternal mortality, neonatal and infant mortality rates in Mahottari-39 and 52 per 1,000 live births respectively, are also higher than the figure for national average (33 and 48)[3], and Bara district (33 and 48).[4] Three quarters of infant deaths were neonatal deaths, of which 81% were early neonatal deaths. Male-to-female ratio for infant deaths was 1:3, and similar ratios-1:3 and 1:35 are mentioned in the WHO report[8] for neonatal and early neonatal mortality respectively.

Regarding castes, MMR was highest among Muslims and lowest among Janajatis, while there were no maternal deaths among Upper castes. IMR was highest among Dalits and lowest among Muslims. With regard to causes of deaths, PPH was the leading cause of maternal deaths, and for infant deaths, it was sepsis that resulted to about a quarter deaths, followed by pneumonia, birth asphyxia, unclassified deaths, etc.

There were some limitations of the study such as the tools to be used by FCHVs did not include pictograms and only deaths collected during census, but not the live births, were confirmed at third time field study, for time and other resources constraints.

CONCLUSIONS

Reduction of early neonatal mortality is vital to reduce infant mortality. Management of birth asphyxia, neonatal sepsis and pneumonia appear to be the major intervention that could save the lives of many newborns. Along with birthing centers, it calls for effective and efficient community based neonatal care. The need for birthing centers in less than one hour of walking distance cannot be overlooked. A study in a larger setting capturing more maternal deaths, that would help to identify more precisely the distribution of the deaths according to the different variables and establish proper causality of maternal mortality, is recommended.

ACKNOWLEDGEMENTS

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