

COMMUNITY BASED ESTIMATION OF PERINATAL MORTALITY THROUGH RECORD LINKAGE

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Objective: To estimate perinatal mortality through record linkage of Health Workers (HW) and Anganwadi Workers (AWW) in rural Haryana. **Design:** Retrospective analysis of records (1991-92) of HW and AWW. Enquiry and home visits were made for tracing the fate of pregnancy in cases with incomplete records. **Setting:** In 1993-95 in 45 villages selected purposively in Raipur Rani block, Ambala. **Main outcome measure:** Enlisting of perinatal deaths as the main outcome measure through scrutiny of records of HW and AWW. **Results:** Perinatal mortality rate (PMR) was 42.25 and 45.78 per thousand births as per the record of HW and AWW, respectively for the 23 villages for which records of both were available. Support by enquiry or home visit yielded a PMR of 59.42 for combined HW and AWW sources and 51.66 per 1000 births for AWW source alone. Concordance between AWW and HW records for fate of pregnancy was moderate ($K=0.46$; 95% CI 0.35-0.57). **Conclusions:** There is a lack of a system of record linkage between and within the records of HW and AWW at primary health care level. AWW data was more accurate and up to date as compared to HW. Reasonably accurate estimates of perinatal mortality rate can be made through record linkage.

Key words: Perinatal mortality, Record linkage, Integrated Child Development Services, Primary health care.

PERINATAL survival is the most reliable index of quality of obstetric and neonatal services in a particular area(1,2). In India, reliable community based data on perinatal mortality is not available. Many of the still births and early neonatal deaths are not reported or recorded because of various reasons including the social stigma attached to such events. Prospective studies can eliminate this element of missed events by following all pregnancies from initial registration, till delivery or termination or early infancy. However, such studies

are costly and time consuming. Retrospective studies on the other hand have the risk of missing many cases because of under-reporting and recall bias of the respondents.

This problem in retrospective enquiries can be eliminated by following pregnant females retrospectively through records maintained by the Health Workers (HW) and Anganwadi Workers (AWW). The present study reports the results of this approach of record linkage for estimation

of perinatal mortality in a rural area of Haryana.

Subjects and Methods

A trained social worker sought information on pregnant women, post-partum cases and on infant's immunization status from HW and AWW in the field practice area of the Department of Community Medicine, PGIMER, Chandigarh. The details were noted on a pretested, pilot tested schedule. The total catchment population of Primary Health Center (37 villages ~30000 population) was purposively selected keeping in view the feasibility of the study and the manpower constraint. In addition to it, 8 other villages, where the field programme of the Department was being run were also included in the study (population ~15000). This included a Primary Health Center (PHC) and a Community Health Center (CHC) headquarter village also.

The reference period for the study was October 1991 to September 1992. Relevant registers (antenatal, immunization, birth and death) were procured from the concerned workers. Prior consent of the Medical Officer and CDPO (Child Development Project Officer) was taken. Starting from the first antenatal case registered in October 1991, an attempt was made to ascertain the fate of all pregnancies recorded during the reference period by HW and AWW by scrutinizing various records. The study was completed during 1994-95. Thus, all cases registered during the reference period would have delivered by the time the study was started.

In case of AWW, first the attendance registers were examined. These contained the month wise list of antenatal cases, postnatal cases and children aged 6 months-1 year, 1-3 years and 3-6 years. Names of the women in the antenatal list

were followed till these were transferred to the postnatal list. The outcome of pregnancy as recorded on the register was also noted. The immunization registers were then screened to locate the names of postnatal cases and to corroborate the details on fate of pregnancy. Birth and death registers were also reviewed. Similarly, in case of HWs antenatal registers were seen first. Information on various columns in these registers were also noted, namely, last menstrual period (LMP), expected date of delivery (EDD), follow up visits and fate of pregnancy. Here also, immunization and birth and death registers were screened.

For each antenatal case, information on items like LMP, EDD, antenatal care (ANC), and post natal care (PNC), outcome and immunization records was obtained from two sources-one from AWW and the other from HW records. Thus, for each item two columns were filled separately from HW and AWW sources. In many cases, either the HW or the AWW information was not available. In such cases the other agency column was left blank. On an average, scrutiny of registers of a village took 1-2 hours.

In cases where the fate of the pregnancy was not recorded, enquiries were made from HW, or other villagers. Home visits were made when even the enquiries did not yield any results.

The perinatal mortality rate (PMR) was calculated as:

$$\text{PMR} = \frac{\text{Number of still births and early neonatal deaths}}{\text{Total births in the study area}} \times 1000$$

Here, still births were taken as recorded in the registers or as told during enquiry or home visit. Death within 7 days of birth was taken as early neonatal death.

Results

Overall, 45 villages were selected for the study. Four remote villages (population ~500) could not be visited and were not included in the analysis. Among the remaining 41 villages (population 45675), HW records were not available for 2 villages. Thus, HW records were available for 39 villages only. There was no Anganwadi in 7 villages. In another 6 villages, AWW data could not be obtained. In 3 other villages, Anganwadi were newly created and the old record of 1991-92 was not available. Thus, out of 41 villages, AWW data was available for 25 villages only. Of these, in 23 villages both HW and AWW data was available (population 34937). Thus, in 16 villages (population 8308, live births 186 and still births 4) only HW data was available and in 2 villages' only AWW data was available (population 2430, live births 105 and early neonatal death 1). Data of these 18 villages is not included in the analysis.

Table I shows the concordance in the fate of 510 pregnancies registered with

HW as well as AWW in 23 villages. There was 84.5% (431 events) agreement between HW and AWW for recorded fate of pregnancies, *i.e.*, 393 live births, 9 still birth, 2 early neonatal deaths and 27 unknown fate (K or Kappa = 0.46 for agreement between HW and AWW data; 95% confidence interval 0.35-0.57, *i.e.*, moderate agreement)(3). Perinatal mortality rate (PMR) was estimated to be 42.25 and 44.78 per 1000 births as per HW and AWW records, respectively ($p > 0.05$).

Table II shows that of the 1954 pregnancies registered by AWW or HW in 23 villages, for only 510 (26%) cases information was available from both the agencies. In rest, the information was available either from Anganwadis (889; 46%) or from HWs (555; 28%) only. PMR when estimated from AW sources alone (51.66/1000 births) or from combined HW and AWW sources (49.18/1000 births) was higher than that derived from HW sources alone which revealed a rather low PMR (10.9/1000 birth). The difference in the rates was, however,

TABLE I—Concordance in Recorded Fate of Pregnancies Registered with HW and AWW for 510 Cases for whom Information was Available from Both Sources in 23 Villages

Source of information and fate of pregnancy	Health workers' data (PMR 42.25/1000 births)				
	Live births	Still births	Early neonatal deaths	Unknown	Total
<i>Anganwadi workers' data (PMR 44.78/1000 births)</i>					
Live births	393	1	2	52	448 (87.8%)
Still births	2	9	—	3	14
Early neonatal deaths	3	—	2	2	7
Unknown	10	4	—	27	41 (8.0%)
Total	408 (80.0%)	14	4	84 (16.5%)	510

K (Kappa) for agreement between Anganwadi and Health Worker data = 0.46; 95% confidence interval = 0.35-0.57.

TABLE II—Source of Information and Fate of Pregnancies Registered with Health Workers and Anganwadi Workers of 23 Villages (population 34937)

Fate of Pregnancy	Source of information		PMR per 1000 birth
	Records	Enquiry/Home visit	
<i>A. For cases registered with AWW as well as HWs (n=510)</i>			
Live births	461	3	
Still births	16	—	
Early neonatal deaths	7	1	49.18
Unknown (4.3%)	22	—	
<i>B. For cases registered with AWW only (n=889)*</i>			
Live births*	737 (95.6%)	34 (4.4%)	
Still births	16 (76.2%)	5 (23.8%)	51.66
Early neonatal deaths	8 (38.1%)	13 (51.9%)	
Unknown (8.55%)	76	—	
<i>C. For cases registered with HW only (n=555)</i>			
Live births	454	1	
Still births	4	1	
Early neonatal deaths	—	—	10.90
Unknown (17.0%)	95	—	

For difference in source of information (records vs. enquiry/home visit) for live births vs. still births/early neonatal deaths:

(a) For overall pregnancies ($\chi^2=143.61$, d.f.=1; $p < 0.001$).

(b) For AWW records ($\chi^2=98.2$, d.f.=1, $p < 0.001$).

statistically not significant ($p > 0.05$).

Fate of the pregnancies registered with HWs could not be ascertained through records or enquiry or home visits in 17% cases as opposed to 8.6% in AWW and 4.3% in cases registered with both HW and AWW. Overall, among the 1761 cases where the fate of the pregnancy was known or ascertained, for 1690 live births it was available in records in 1652 (97.8%) cases and was ascertained through enquiry or home visit in 38 (2.2%) cases. For 71 still births or early neonatal deaths, in 51 (72%) the fate was recorded and in 20 (28%) it was ascertained through enquiry or home

visit ($\chi^2=143.61$, d.f. = 1, $p < 0.001$). Among 813 cases registered only with AWW and whose fate could be ascertained, of the 771 live births, 737 (95.6%) were recorded and 34 (4.4%) were ascertained through enquiry or home visit. For still births and early neonatal deaths, 24 (57%) were recorded and 18 (43%) were ascertained through home visits or enquiry ($\chi^2=98.2$, d.f. =1, $p < 0.001$).

Discussion

HW and AWW maintain a number of registers for every village as a part of their routine activities. However, there is

no organized system of record linkage. Different registers are treated and managed as individual registers thereby losing important information. Our study attempts to provide a methodology through which a functional linkage can be established between various records of paramedical workers at PHC level. Various rates for vital events pertaining to maternal and child health can be easily derived. Pooling of PHC data at CHC level will provide a reasonably adequate sample size in this context.

Computerized health record system also envisages linkages through transfer of the data from one file to the other, *e.g.*, after child birth the name of the woman is transferred from the antenatal list to postnatal list and the name of the child to immunization list(4). In our study also, this approach has been tried, though manually for retrospective analysis. Such an approach will help the health workers and medical officers in realizing that data contained in different registers is interlinked. This will also act as an inbuilt evaluation of various activities undertaken by the health functionaries at the primary health care level. These workers will also be able to calculate various health indices of their service area with the help of these records only.

In our study, the information obtained from the records of Anganwadis proved to be more accurate, complete and up to date. This is evident by the fact that the fate of the pregnancy was not recorded in 8-9% cases in AWW records as compared to 16-17% cases in HW records. Moreover, PMR estimated by AWW data approximated more to the rate obtained through combined sources while PMR through HW data alone was quite low. In another study conducted in our parent institute in the same District during 1980-86, reporting by AWW for perinatal deaths (80%) was better

than that of HW (53%)(5). This difference in updating and accuracy of records is not surprising since the AWW looks after a small population of about 1000 in 150-200 houses. HWs on the other hand have to cater to a larger population (about 5000) scattered over many villages. Much of their time is spent on traveling (6). Hence, there is a need to further strengthen the input from AWW for development of micro-level village based reliable health information system.

It was significant to note that even among the common catchment population of 23 villages where data from both AWW and HW was available, only 26% antenatal cases figured in the records of both the workers. This is mainly because of varying guidelines and criteria used by AWW and HW for registering the pregnant women. Often AWW do not register women who do not belong to their catchment area, whereas HW also register migrant labours, and incoming mothers (daughters of the village married elsewhere but are on a visit to their parent's home often till the delivery). Incomplete registration may also contribute to the discrepancy. Even among the 510 cases registered by both HW and AWW, the agreement for the fate of pregnancies was only moderate.

The PMR estimated in our study (42-52/1000 births) compares well with 41/1000 reported by others(2). CSSM (Child Survival and Safe Motherhood, 1994) module also reported a perinatal mortality of 46.0 for India and 37.9 per thousand births for Haryana(7). Some authors have reported wide variations in PMR (40-147.2/1000 birth) as estimated in various studies in India(8).

Another fact which emerged from the study was that still births and early neonatal deaths were more likely to be

missed if only the records were relied upon. On the other hand, majority of the live births were recorded as such in the registers and enquiries or home visit had to be made for very few of them.

It is concluded that there is a lack of a system of record linkage between and within the records of HW and AWW at PHC level. AWW data was more accurate and up to date as compared to HW. Reasonably accurate estimates of PMR can be made through record linkage.

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