ACTION RESEARCH AND TRIANING FOR HEALTH (ARTH)

ESTABLISHING A SYSTEM FOR CARRYING OUT VERBAL AUTOPSY OF MATERNAL DEATHS IN UDAIPUR, INDIA

A STUDY REPORT

2008

Acknowledgements

This study became possible because of the keen interest on part of Mr Shikhar Agarwal (then) collector, Udaipur district, in investigating maternal deaths and sensitizing the health system about maternal health issues. His continuous encouragement and guidance, and financial support from UNICEF's state office at Jaipur, to the District Health Society, led to our undertaking the venture from Dec 2006 to March 2008. Then Chief Medical & Heath Officer, Dr MS Yadav helped with all clearances, as did Mr Rakesh Thakur, District Statistics Officer, Udaipur.

Anganwadi workers, Sahayikas, ASHA Sahyoginis and Sathins of the district actively reported maternal deaths over telephone and in person. Their contribution helped us to cover all maternal deaths. Child Development Project Officers of the blocks covered by the study gave us access to their field staff through meetings and shared vital data.

Staff members of the health department of Salumbar and Sanvad blocks provided vital information about the study area and reported some of the maternal deaths that occurred in the area. ANMs, male health workers and supervisors, as well as doctors of the two blocks assisted in efforts to identify and investigate each death.

Senior gynaecologists Dr Vinaya Pendse, Dr Nazima and Dr Madhu Bansal reviewed the forms and assigned causes of death.

We are grateful to all these persons and organizations for their support, and most of all, sincerely appreciate the cooperation of families of deceased women at an extremely difficult time in their lives.

We dedicate this report to the women who died an untimely death, and their families.

Authors:
This report is written through combined efforts of several members associated with Action Research and Training for Health. These have included Kirti Iyengar, Sharad Iyengar, Kalpana Dashora, Pallavi Gupta, Virendra Suhalka and Indrani Parker.

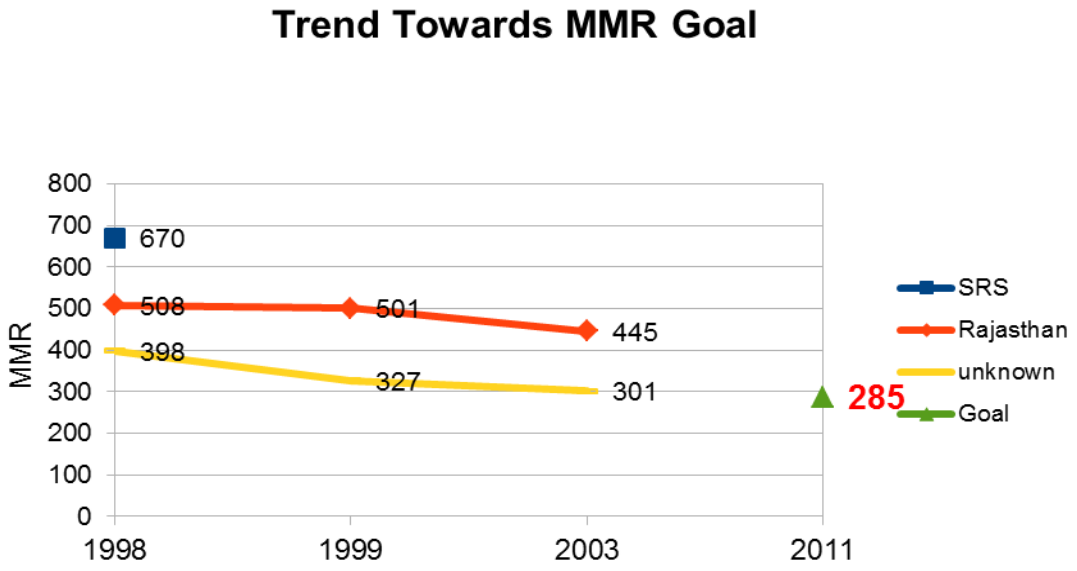
Contents

1. Background

Deaths from pregnancy related causes kill 445 women per 100,000 live births in Rajasthan (SRS, 2001-03). Yet, most maternal deaths are preventable – this is evident from the difference in maternal mortality ratios between developing and developed countries.

The verbal autopsy technique has been used to investigate maternal deaths, including the sequence of events and social circumstances that lead to them. Verbal autopsy can also be used as a tool for maternal death review and for increasing the accountability of the health system to improve maternal health. Its findings could be used to advocate for more resources for safe motherhood programmes at state and national levels.

The District RCH Society of Udaipur in collaboration with ARTH undertook a study to establish a system for the ongoing identification and review of maternal deaths, along the lines of what is being done in the districts of the state of Tamil Nadu. An MoU was signed between District RCH Society of Udaipur and ARTH in January 2007. The key personnel responsible for the implementation of the project from the District RCH Society were additional CMHO (Family Welfare) at the district level, block medical officers at the block level and PHC medical officers at the PHC level. From ARTH a programme coordinator and a research associate had the main responsibility. The study was supported by UNICEF.



Note: This chart demonstrates Rajasthan's progress toward the Maternal Mortality Rate goal set for 2011. While progress is being made, the trend shows we have missed the mark as the decline is not rapid enough.

2. Objectives

- To establish a system for carrying out verbal autopsy of maternal deaths
- To identify what the major causes of maternal deaths among rural women in Udaipur district are
- To identify what the care seeking patterns among those who died of maternal causes are

3. Methodology

One goal of the overall initiative was to strengthen the capacity of the district health system to carry out verbal autopsies of maternal deaths. Hence ARTH, which has considerable experience and expertise in carrying out verbal autopsies of maternal deaths, used this understanding to train the medical department staff in doing the same in this area. This trainings was expected to equip the department with the skills to conduct verbal autopsies on its own.

The Medical, Health and Family Welfare Department conducted verbal autopsies of maternal deaths in two blocks (Sarada and Vallabhnagar) of the district. At the same time ARTH conducted verbal autopsies in two other blocks (Salumbar and Mavli) of the district using a "gold standard" method that picks up all maternal deaths in the study area during a given time period. These two study approaches were adopted in roughly equal populations across the four blocks to develop a system for reviewing maternal deaths. The study was carried out during the period, December 2006 to November 2007.

3.1 Intervention Area

To establish a system for reviewing maternal deaths in Udaipur, the intervention was jointly carried out by the health department and ARTH in four blocks of the district. Present population of Udaipur (adding 12% to the 2001 census data) is 29,49,309 with more than half of

it (nearly 54%) being SC/ST. ARTH covered all the 249 villages in 48 panchayats of Salumbar block and 149 villages in 47 panchayats of Mavli block during the course of this study. The total population of these two blocks is 4,77,443, (adding 12% to census 2001 data) with almost 43% of it being SC/ST population.

The health department conducted verbal autopsies in Sarada and Vallabhnagar blocks of the district. The total population of these two blocks is 5,08,702, of which nearly 46% is

Note: SC and ST refer to Scheduled Caste and Tribal Castes in the Hindu Caste system. People in these castes are often socially and economically deprived with limited formal education.

Table 3.1 Population Data of Intervention Area

Area	Total population 2007 (2001+12%)	Total SC Population 2007 (2001+12%)	% SC Population	Total ST Population 2007 (2001+12%)	% ST Population	Total SC/ST Population 2007 (2001+12%)	% SC/ST Population
Udaipur district	29,49,309	1,77,248	6.0	14,11,684	47.9	15,88,932	53.9
Mavli block	2,39,452	25,131	10.5	44,307	18.5	69,438	29.0
Salumbar block	2,37,991	11,692	4.9	1,24,789	52.4	1,36,481	57.3
ARTH intervention area	477443	36823	7.7	169096	35.4	205919	43.1
Sarada block	2,50,186	10,855	4.3	1,54,778	61.9	1,65,633	66.2
Vallabhnagar block	2,58,516	23,127	8.9	47,347	18.3	70,474	27.3
Health dept. intervention area	5,08,702	33,982	6.7	202125	39.7	236107	46.4

Source: Estimated on the basis of Census 2001

Tribal population in ARTH's intervention area is nearly 35% while the scheduled caste population is almost 8%. Tribal population in health department's intervention area is nearly 5% more than that in ARTH's intervention area.

3.2 Study Tool

The MAPEDI questionnaire (UNICEF's questionnaire for Maternal Death Inquiry) was used to conduct the verbal autopsies. The questionnaire was field tested in the intervention area and finalized after making minor changes, to suit the local context. The questionnaire comprises of a section on general information, social background, cause of death form, and care seeking protocol. There are four types of forms in the questionnaire:

- General information: It records the woman's family and social background and also asks for the stage of pregnancy at which the woman died so that accordingly the detailed form can be filled.
- Death during pregnancy: This form is filled if the woman died while she was pregnant.

- Death during or after delivery: This form is filled if the woman died in the process of delivery or within 42 days of delivery.
- Death during or after abortion: This form is filled for women who died during or within 42 days of spontaneous abortion or MTP.

Investigators themselves conducted the interviews and filled the forms. At the end of the day a debriefing session was held to discuss the problems they faced in the field and sharpen their skills in conducting verbal autopsies.

3.3 Activities Undertaken

3.3.1 Identifying maternal deaths

In this study two strategies were adopted to identify maternal deaths:

- Key Informants- In Salumbar and Mavli blocks where ARTH conducted the study, investigators identified key informants who were oriented to report suspected maternal deaths. Key informants included-
    - Health Department- Auxillary Nurse Midwife (ANM), Lady Health Visitor (LHV), Multi Purpose Worker (MPW), doctors.
    - Women and Child Development Department- Anganwadi workers, Anganwadi sahayikas, Accredited Social Health Activist (ASHA), sahyoginis and sathins
    - Gram panchayat secretaries
    - Teachers and students
    - Village people
- Panchayat's Death Record/ Civil Registration System/ - Health department identified maternal deaths in Sarada and Vallabhnagar using the gram panchayats' death records. Every month the panchayat secretaries gave information about the death of all women in the age group of 15-49 years in their respective panchayats to the concerned medical officers in-charge on a prescribed format (annexure II).

3.3.2 Meetings with key informants

ARTH's investigators attended the monthly meetings of the health department and Women and Child Development staff to inform them about the project, seeking their participation in identifying maternal deaths in their respective areas. The key informants were given general information forms (annexure III) to report suspected maternal deaths. They were given

telephone numbers of the organisation as well as of the investigators. They reported a likely maternal death as soon as possible, by telephone, letter or when contacted personally in the village or at their monthly meetings. A register was maintained in ARTH in which the information provided by the key informants over telephone was recorded.

3.3.3 Incentive to report maternal death

The key informants in Salumbar and Mavli blocks were given a monetary incentive to report maternal deaths. Rs.200 was given as incentive for every correct maternal death reported. Rules were framed regarding this.

3.3.4 Data collection

Data for all the maternal deaths that occurred in the intervention area from December 2006 to November 2007 was collected. In the study conducted by ARTH, the data collection team comprised of a female investigator and a male investigator, supervised by a research manager. In 2 blocks covered by government, the data was collected by medical officers. The teams visited the villages and met the families of deceased women between one and three months after death (or as soon as they got information, if that was later). Efforts were made to meet the family member who was present with the woman at the time of her last illness and around the time of her death. If it was not possible to meet the desirable respondent, the team made a second visit or contacted another respondent who was most familiar with the woman's illness.

3.3.5 Weekly review of the collected data

Data collected each week was peer reviewed in weekly meetings of the organisation for completeness and accuracy. If required, the investigators went again to the concerned households and gathered the necessary information. Sometimes the investigators had to go as many as 3 to 5 times to a family to get complete data. The research manager and coordinator regularly accompanied the investigators to the field to review their work.

3.3.6 Mapping maternal deaths village-wise in the block map

To ensure that no maternal death was missed, the recorded maternal deaths were marked in block maps to indicate the villages from which the deaths were reported. Health services in the block were also marked on the maps. This helped in knowing the villages where lesser number of deaths was being reported. The investigators then went back to such villages and contacted the village people and local shops to find out about any unrecorded maternal deaths.

3.3.7 Writing case studies

On the basis of the information provided by the family members of the deceased women during the verbal autopsy interview, case studies were written. The case studies helped to share maternal death related information with the village panchayats and other villagers so that causes of these deaths could be identified and discussions generated about how to avoid such instances in future.

3.3.8 Formation of maternal death review group

A Maternal Death Review Group was formed with the district collector as its chairperson and RCHO, CMHO, HOD Gynaecology Medical College, DPM (NRHM), ARTH and civil society representatives as its members. The group was supposed to meet every month to review the recorded maternal deaths. However these meetings did not take place due to lack of time.

3.3.9 Enlisting the main causes of maternal death

The completed verbal autopsy forms were given to two gynaecologists (one being a senior gynecologist). The two gynaecologists separately identified medical causes of death in each case. In instances where the medical cause of death was not clear the investigators went back to the families / respective health facilities where medical care was sought to elicit the medical cause of death. One gynaecologist even reviewed the verbal autopsy done by the investigators and took the necessary information from the family members.

3.3.10 Data entry, data cleaning and analysis

The research manager entered the data using epi info and then cleaned and analysed it.

4. Results: Verification of collected data

4.1 Total deaths reported

A total of 135 probable maternal deaths were reported during the period December 2006 and November 2007 in ARTH's intervention area. On cross-checking 57 of these were confirmed to be maternal deaths that occurred during the study period in the study area. The remaining 78 did not fulfill the criteria for the present study and were therefore not included in it.

Table 4.1 Total deaths reported

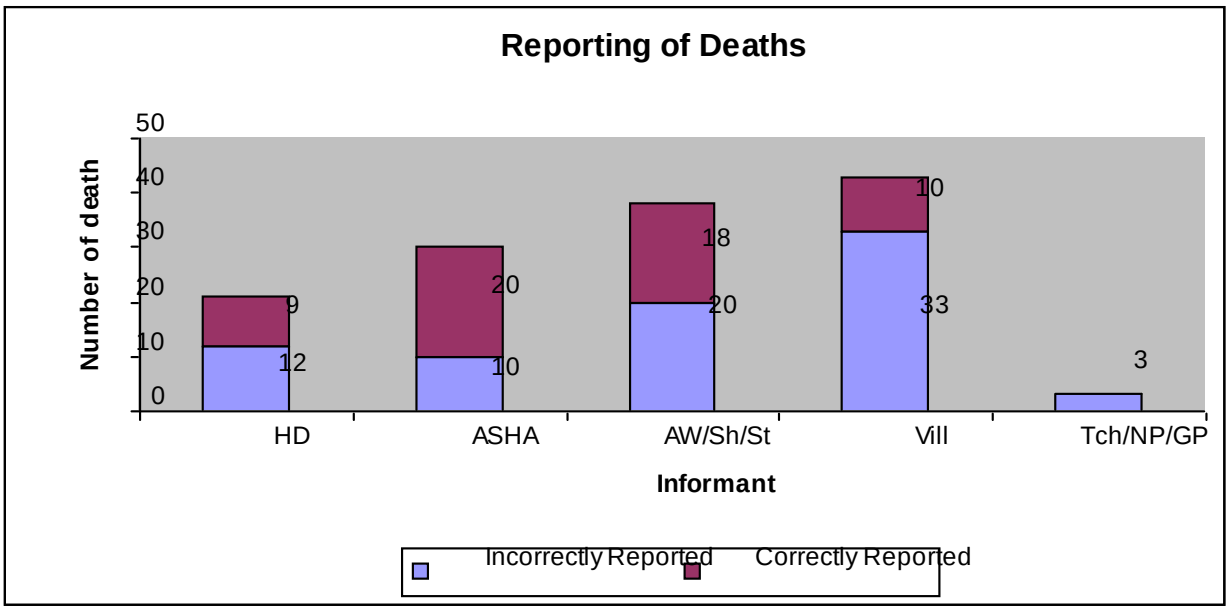
Deaths reported	Salumbar bock	Mavli block	Total
Total deaths reported from different sources	63	72	135
Incorrectly reported deaths	27	51	78
Correctly reported maternal deaths	36	21	57*

**All maternal deaths verified by research manager*

In the health department's intervention area only nine maternal deaths were recorded during the study period of one year.

4.2 Deaths as reported by key informants

Table 4.2 Deaths as reported by key informants



Maximum number of deaths was reported by the village level female workers and villagers. Though a significant proportion of these had to be excluded out of the study as they did not meet the study sample criteria yet the maximum correct data was provided by them. Amongst the health department staff ANM provided the maximum data while LHV and doctor did not prove to be useful sources. A teacher, newspaper and *gram panchayat sachiv* informed about three deaths, all of which were incorrect.

4.3. Death registration at panchayats and sub-centres

Death registration at panchayat	
• Death records that could be examined	30
• Deaths registered	20
• Reason recorded as maternal death	5
• Reason not entered /Other reasons recorded	15
Death registration at sub centre	
• Death records that could be examined	34
• Deaths registered	19
• Reason recorded as maternal death	8
• Reason not entered /Other reasons recorded	11

Death registration records of the panchayats and sub centres in the study area were reviewed. However all records could not be accessed due to unavailability of staff and/or registers at the time of visit.

In the 30 panchayat records that could be examined, one thirds of the deaths had not been registered. Of the two-thirds that had been registered only one-fourth were correctly recorded as maternal deaths while for the remaining, either no reason for death was given or cause other than maternal death was reported.

Similarly the data at sub centres was also found to be incomplete and inaccurate. Nearly 45% of the deaths were not recorded in the total 34 sub centre records that could be examined. Of the deaths that were found to be recorded with the ANM only about 42% were correctly reported to be maternal deaths.

The above data shows that death registration at panchayats and sub centres was not reliable.

4.4 Reasons for excluding deaths from the study

Table 4.3 Reasons for excluding deaths (n=78)

Key Informant	Not a maternal death	Woman died before /after study period	Maternal death out-side study area	Accidental death during maternal period	Wrong Information	Total
Anganwadi Worker	5	8	5	1	0	**19**
ASHA	5	0	3	1	1	**10**
Sathin	1	0	0	0	0	**1**
ANM	1	7	2	0	0	**10**
Doctor	0	0	0	1	0	**1**
Sachiv	1	0	0	0	0	**1**
Villagers	11	14	8	0	0	**33**
LHV	0	0	1	0	0	**1**
Teacher	0	1	0	0	0	**1**
Newspaper	0	0	0	1	0	**1**
TOTAL	**24 (29.3%)**	**30 (36.6%)**	**19 (23.2%)**	**4 (4.9%)**	**1 (1.2%)**	**78**

Almost 60% of the deaths initially reported by the key informants had to be excluded as they either did not fall in the study area or within the study period. About 30% of the reported deaths were such that they did not qualify to be maternal deaths. Another 5% of the deaths were excluded as they happened due to accidents during the maternal period. In the case of doctors, teachers and other medical staff at the teaching hospital, it proved difficult to collect data from them as they often serve many communities, not just those being assessed. Often times, in any documentation that was available, a doctor's name was not recorded in relationship to maternal deaths in the facilities, preventing research staff from being able to follow up with specific individuals for getting details of a case management.

4.4 Accuracy of the collected data

Table 4.4 Effective Maternal Mortality Ratio in the Intervention Areas

Indicator	ARTH Intervention area	Health department Intervention area	Total
Total population 2007 (2001+12%)	477443	508702	986145
Births according to birth rate of 28/1000 population (SRS)	13368	14244	27612
Estimated maternal deaths in intervention area @ MMR of 445/ 100,000 live births (SRS)	59	63	
Maternal deaths recorded in the study (Dec'06 to Nov'07)	57	9	
Effective MMR per 100000 live births)	426	63	

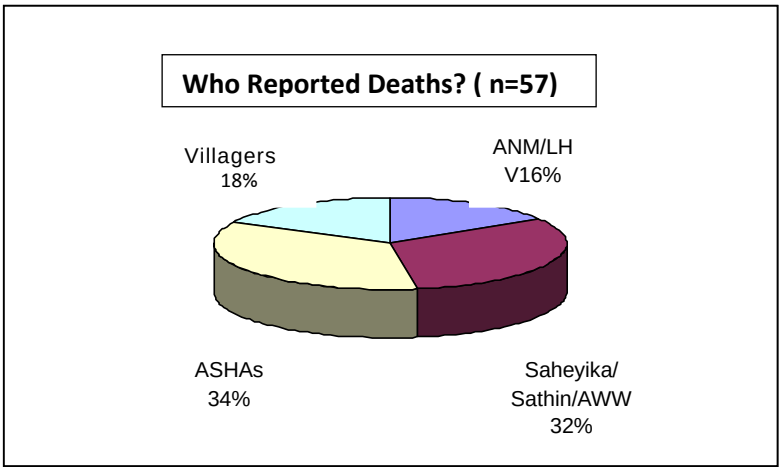
According to census 2001 the total population of the two blocks in which ARTH conducted the study is 4,77,443 and that of health department's intervention area is 5,08,702. At birth rate of 28/1000 population in Rajasthan, total number of live births in ARTH's intervention area in one year is likely to be 13368 and that in health department's intervention area is likely to be 14244. According to State MMR of 445 per one lakh live births, ARTH's intervention area is estimated to have approximately 59 maternal deaths in a year and health department's intervention area is estimated to have 63 maternal deaths in a year. According to the data collected 57 maternal deaths were reported in ARTH's intervention area which is nearly the same as is expected according to above data. This implies that ARTH's investigators covered almost all the maternal deaths in the intervention area and the data can be safely assumed to be nearly complete. Effective MMR in ARTH's area comes out to be 426 which is also quite close to the SRS figure of 445. This once again indicates that ARTH's data is fairly accurate.

On the other hand health department recorded only 9 deaths in the population which is expected to have had nearly 63 maternal deaths in the period. Thus panchayat records do not seem to have complete information about maternal deaths in the villages and may therefore not always be a reliable source of information by themselves. Taking information from multiple local sources, particularly village level female workers has come across as being a better strategy to identify maternal deaths.

5. Results: Key findings

5.1 Key Informants

Figure 5.1 Key Informants



Majority of the accurate maternal deaths were reported by village level female workers-ASHA, anganwadi worker, anganwadi sahayika and sathin (nearly 67%). Amongst these ASHAs were the single largest source for reporting correct maternal deaths. Asking the villagers directly also provided valuable information with almost 17% of the correct maternal deaths being reported by them. From the health department ANM reported about 16% of the deaths but LHV and the doctor did not prove to be good sources.

5.2 Profile of deceased women

Majority of the women who died were married while one had been recently widowed. About one-fifth of the women were in their second marital alliance (locally called *nata*) which is socially not recognized as marriage.

Age of women about whom data was collected ranged from 17 to 42 years. Nearly 44% of the maternal deaths occurred among women in the age group of 20 to 29 years, with mean age at death being 29 years. This age group is expected to be physiologically strong and ideal for motherhood. Yet such a large number of maternal deaths being in this age group implies that there were gaps in the care and treatment received by these women.

Table 5.2 Profile of deceased women (n=57)

Marital status	
• Married	44
• Widowed	1
• Had a second marital alliance (*Nata*)	12 (21.1%)
Age	
• 15-19 years	3 (5.3%)
• 20-29 years	25 (43.9%)
• 30-39 years	26 (45.6%)
• 40+	3 (5.3%)
Median age (range)	30 ()
Caste	
• SC	8 (14%)
• ST	37 (64.9%)
• Other	12 (21.1%)
Below poverty line	36 (63.2%)
Illiterate	45 (78.9%)

According to census 2001 data (refer table 3.1) although only 35.4% of the population in Salumbar and Mavli blocks is tribal yet as many as almost 65% of the recorded maternal deaths were of tribal women. Similarly the percent of scheduled caste women who died (14%) is almost double their population in the two blocks (7.7%). This clearly shows that the SC/ST population is much more vulnerable and in need of special attention.

Nearly two-thirds of the women who died belonged to BPL families, which made their treatment seeking economically difficult.

There is a high level of illiteracy in the study population. According to the census 2001 data, illiteracy among women in Rajasthan is 66.5% while nearly 79% of the deceased women were illiterate. Illiteracy among men in the State is 39.9% whereas husbands of 52.6% of the deceased women were illiterate.

Large proportion of women got married

before the age of 18 years with mean age at marriage being 15.7 years and median age 15.0 years.

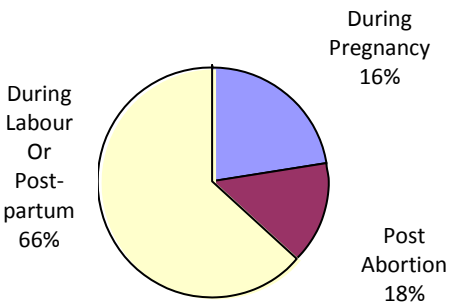
Majority of the women died during their third or later pregnancy which supports the fact that women's health deteriorates with more pregnancies unless given special care. However a significantly high proportion died during their first or second pregnancies as well, which is a serious cause of concern.

Table 5.3 Profile of deceased women (n=57) (contd.)	
Married before the age of 18 years	33 (57.9%)
No. of pregnancies	
• 1	11 (19.3%)
• 2	11 (19.3%)
• 3-4	19 (33.3%)
• 5 and above	16 (28.1%)
Mean	2.5
Median	2.0

5.3 Period of Death

The pie diagram shows that most of the women (38) died during the process of delivery or within 42 days after delivery, highlighting maximum vulnerability during this period. Thus the need for safe delivery and effective post-partum care. Almost one-sixth of the women (9) died during pregnancy and 10 died due to abortion related causes. The fact that a significant proportion of deaths occurred during pregnancy and due to abortion related causes, signifies that care and treatment during these stages also needs to be improved along with services for safe delivery.

Figure 5.3
Period of Death (n=57)



Instances have been recorded of women wanting an abortion and getting it done in a highly unsafe manner due to social unacceptability and lack of availability of safe abortion services.

5.4 Ante natal check-up

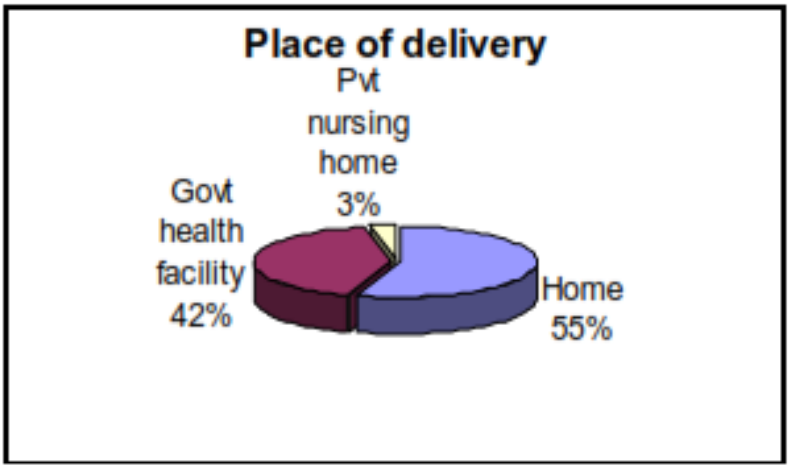
Almost 70% of the women came in contact with a health service provider atleast once during pregnancy, This is similar to NFHS-3 data for rural Rajasthan according to which 71% women reported atleast one ANC. However some of these women were not screened properly during the ANC to identify and prevent any possible complications in the future.

5.5 Data for women who died in the post-partum period (n=38)

5.5.1 Place of delivery

Place of delivery (n=38)	
• Home	21 (55.3%)
• PHC	1 (2.6%)
• CHC	6 (15.8%)
• Medical college teaching hospital	9 (23.7%)
• Private Nursing home	1 (2.6%)
T ype of delivery (n=38)	
• Caesarean Section	2 (5.3%)
• Forceps	1 (2.6%)
• Normal	35 (92%)

The majority of the deliveries happened at home (21), but a fairly high number of women delivered in government health facilities as well (16).



However, nearly 45% of the women died despite institutional deliveries (both government and private institutions). This indicates that merely stressing upon institutional deliveries is not enough unless the health institutions can provide good quality services to ensure safe deliveries.

5.5.2 Place of delivery and place of death

Place of delivery	**Place of death**				
	Home	CHC /PHC	In transit	DH	Total
Home	13	2	2	4	21
CHC /PHC/Private Nursing Home	4	0	3	1	8
Medical college teaching hospital	0	0	0	9	9
Total	17	2	5	14	38

- A significant proportion of women died despite reaching the teaching hospital.
- 5 women died while being taken to the teaching hospital
- Of the 17 institutional deliveries 4 died at home.
- There were 9 women who delivered in the teaching hospital and died there after the delivery.

5.5.3 Time interval between delivery and death (n=38)

Time interval between delivery and death	
• <One hour	5 (13.2%)
• 1 to 3 hours	7 (18.4%)
• 4 to 9 hours	4 (10.5%)
• 10 to 24 hours	3 (7.9%)
• >24 hours to 2 days	5 (13.2%)
• 3 to 7 days	5 (13.2%)
• 8 to 15 days	4 (10.5%)
• 16 to 30 days	5 (13.2%)

50% of the women died within 24 hours of delivery with one-third dying in the first three hours itself.

5.6 Treatment seeking for complication

5.6.1 Place where complication started

Place where complication started (n=57)	
• Home	51 (89.5%)
• CHC	2 (3.5%)
• Medical college teaching hospital	3 (5.3%)
• Others (farm)	1 (1.8%)

Most of the women developed complications at home.

5.6.2 Care seeking pattern

Care seeking pattern (n=57)	
D id not seek any care	17
Visited any medical provider	40
• Sought care only at home	6
• Went to a facility for care	34
Visited only traditional provider/ faith healer	0
Ho spitalized at a formal facility at least once	34

Out of the 40 women who sought medical care for complication 34 went to a facility.

5.6.3 Treatment sought for complication

Women who sought treatment for complication	40 (70.2%)
Place of first treatment (n=40)	
• Home	11(27.5%)
• PHC	2 (5.0%)
• CHC	15 (37.5%)
• Private Clinic	3 (7.5%)
• City private hospital	2 (5.0%)
• Medical college teaching hospital	7 (17.5%)
Place of last treatment (n=40)	
• Home	6 (15.0%)
• PHC	1 (2.5%)
• CHC	10 (25.0%)
• Private Clinic	1 (2.5%)
• City private hospital	2 (5.0%)
• Medical college teaching hospital	20 (50%)

Only 70% of the women sought treatment while the remaining 30% died without even seeking treatment.

Of the women who sought treatment, nearly one-fourth took it at home initially while the majority went to the PHC/CHC first; 18% of the women went straight to the medical college teaching hospital. Almost 72% of the women who sought treatment went first to a health institution and mostly to a government health facility. All of these women died despite reaching a health facility. Ganga was one such woman who first went to the CHC but was turned back and eventually came back home and died (narrative 5).

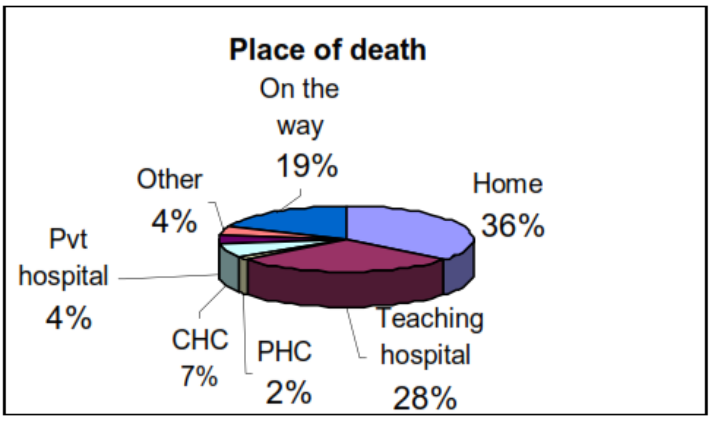
Half of the women who sought treatment went to the medical college teaching hospital in the end while one-fourth approached the CHC as the last resort. 15% sought treatment at home in the end. Treatment seeking behaviour shows that women went to health facilities and mostly to public health facilities, however the providers at the institutions could not save their lives. For instance Roopa went to the medical college teaching hospital after developing complication post abortion but was discharged before she recovered and eventually died at home (narrative 1)

5.6.4 Cost of treatment

Cost of treatment (n=38) (for those who received some treatment)	
Cost of treatment	Women who received medical care
Mean	4976 .9
Median (Range Rs)	2400 (Rs 100-25400)

5.7 Place of Death

Maximum deaths occurred in health institutions, most of them being in public health institutions. Almost one-fifths of the deaths occurred on the way when women were being taken to a health facility/ higher facility.



Place of death by place of treatment (n=57)

Place of Treatment		Place of Death		
		Home	Transport	Hospital
No medical treatment at all	17	13	4	0
Medical treatment only at home	6	5	1	0
Medical treatment outside home	34	5	6	23
Total	57	23	11	23

5.8 Time interval between admission and death

5.8.1 Interval between admission and death in hospital

	(n=23)
< 6 hours	8
7-24 hours	7
25-48 hours	2
> 48 hours	6

Eight women were admitted in the hospital for more than 24 hours before their death, and still could not be saved.

5.8.2 Interval between discharge from hospital and death

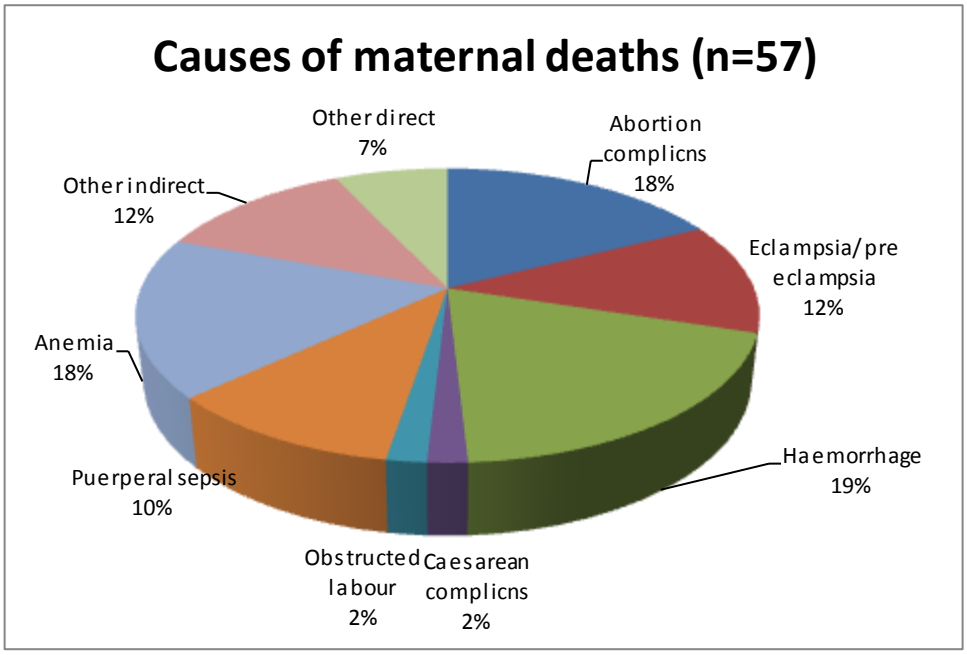
	(n=10)
< 6 hours	3
7-24 hours	2
25-48 hours	0
> 48 hours	5

There were 10 such women who were discharged from a health facility and then died either at home or in transit – 5 of these women died within 24 hours of discharge. This indicates that women were in a serious condition at the time of discharge and their condition was not properly assessed at the time of discharge.

5.9 Causes of maternal deaths

Causes of maternal deaths	Number	%
Abortion complications	10	17.5%
Eclampsia/ pre eclampsia	7	12.3%
Haemorrhage	11	19.3%
Caesarean complications	1	1.8%
Obstructed labour	1	1.8%
Puerperal sepsis	6	10.5%
Anemia	10	17.5%
Other indirect	7	12.3%
Other direct	4	7.0%
Total	57	100.0%

Three most important causes of death were hemorrhage, abortion complications and anemia. Obstructed labour was responsible only for 2% maternal deaths. Additionally, it was found that 2% women died due to complications of caesarean section.



5.10 Cause of death by place of delivery (n=38)

The maximum number of women who delivered at home died due to PPH or anaemia (which are difficult to manage at home and have to be immediately rushed to health facilities that are equipped in emergency obstetric care.)

Causes of death	Home	Institution	Total
Eclampsia/ pre eclampsia	1	4	5
Postpartum haemorrhage	8	2	10
Obstructed labour	0	1	1
Puerperal sepsis	2	4	6
Anemia	8	2	10
Other indirect (Jaundice / TB)	2	2	2
Caesarean complication	0	1	1
Other direct maternal causes, unspecified	0	1	1
Total	21	17	38

Among the women who delivered in institutions PPH, eclampsia and sepsis were the main causes.

5.11 Correlation between phase of pregnancy and cause death

Cause of death	Number of deaths	Phase of death	Subtotal
Malaria	2	During pregnancy	9
Eclampsia/ preeclampsia	2		
Ectopic pregnancy	1		
Other direct maternal causes	2		
Antepartum haemorrhage	1		
Jaundice / Hepatitis	1		
Abortion (including septic abortion)	10	Post-abortion	10
Postpartum haemorrhage	8	Within 24 hours of delivery	19
Anemia	4		
Intrapartum haemorrhage	1		
Jaundice / Hepatitis	2		
Obstructed labour	1		
Caesarean complication	1		
Other direct maternal causes, unspecified	1		
Eclampsia/ preeclampsia	1		
Puerperal sepsis	3	2 to 7 days after delivery	10
Postpartum haemorrhage	1		
Anemia	4		
Eclampsia/ preeclampsia	2		
TB	2	8 to 42 days after delivery	9
Puerperal sepsis	3		
Eclampsia/ preeclampsia	2		
Anemia	2		

The deaths in pregnancy were related to eclampsia/ pre eclampsia, ectopic pregnancy and indirect causes. In the immodate postpartum period (within 24 hours after delivery), the biggest killers were postpartum hemorrhage and anemia, indicating that women need to be closely monitored for PPH after an institutional delivery. During 2-7 days after delivery and 8-42 days after delivery, the biggest cause of maternal death were anemia , sepsis and eclampsia.

6. Key learnings

- A significantly higher number of deaths were identified in the two blocks in which ARTH carried out the study as compared to the two blocks, which the government health system focused upon. According to the number of maternal deaths identified, Maternal mortality ratio in the blocks covered by "ARTH" translates to 426 per 100,000 live births and that in the blocks covered by the government to 63 per 100000 live births.
- Village level women workers (i.e. ASHAs, Anganwadi workers, Sahayikas, and Sathins) provided the greatest number of reports of maternal deaths.
- Most maternal deaths reported occurred post-partum followed by during pregnancy and then post-abortion.
- Among the women who died after delivery, almost half the deliveries occurred at home and half at institutions (PHC, CHC, medical college).
- The most important causes of maternal death in our study were hemorrhage, abortion complications and anemia. Surprisingly, obstructed labour was responsible only for 2% maternal deaths.
- Most of the anemia deaths occurred during 24 hours after delivery, or within 2- 42 days after delivery. While anemia detection and management during pregnancy continues to remain a priority, there is still a need to detect anemia at the time of labour when women come for institutional delivery. Protocols for managed need to be developed and complied with for women who are found to be anemic at the time of labour/ delivery.
- Unsafe abortions was an important cause of maternal death, responsible for 17.5% of all maternal deaths. This indicates a need to improve access to safe affordable abortion services in rural areas.
- All families are not able to go when referred to higher levels of health care. Unless they are provided free transport, someone to accompany them, and an assurance of free care at higher level facility, some of them might come back to their homes to arrange for money (narrative 5).
- Most of the women who suffered maternal deaths were women living below the poverty line and were among ST/SC populations despite the majority of the overall population being other castes.
- Seventy percent of women received some form of treatment when the complication aorse.
- More than one third of the deaths occurred at home, while around one fifth occurred during transport, either in transit to a government health centre, or in transit between government health centres.
- Maternal deaths were often not recorded by panchayats and sub-centres; when deaths were recorded they were most often inaccurate or incomplete.

7. Conclusions

Implications for Programme and Policy/ Recommendations

The government health system needs to improve its ability to find, investigate, and document maternal deaths as the presented data indicates the fact that cases remain underreported and inaccurately recorded in Udaipur district. During this study, district civil registration and health systems were unable to identify the majority of maternal deaths that occurred in the region. On the other hand, key informants, such as ASHAs and AWW staff who are linked to the health system, were very effective and accurate in detecting most of the maternal deaths. Therefore, local village workers such as ASHAs and AWWs should be utilized by future initiatives as reliable informants and active participants in efforts of reporting maternal deaths.

Some women who eventually deliver at home try to seek delivery at an institution. If peripheral level institutions make referral at higher levels, they should make sure that free transport and a person to accompany the woman is arranged. Further, since majority of deaths occur in postpartum period,women should not be discharged before 48 hours after delivery. The community also should be made aware of the benefits of staying at the health facility after delivery in order to monitor any complications.

After concluding the study it was determined that it is feasible for well trained social scientists or PHC doctors to conduct verbal autopsies. Such forms can be reviewed by gynecologists. Additionally, those verbal autopsies of hospital deaths should be supplemented by a facility based maternal death audit in order to more accurately determine the causes of death as well as any socioeconomic circumstances behind them.

There is a need to develop capacity and ownership for reviewing maternal deaths on a district level as well—it cannot be limited only to local offices and organizations in order to improve practices and care overall.

Annexure: Narratives of selected maternal deaths

(All names have been changed in the following narratives)

Narrative 1

Roopa

Phase of death: Post-abortal
Cause of death: Septic abortion
Place of death: Home

Roopa was a 38 year old woman of the tribal community, whose husband was a truck driver. She had four living children after which she twice got abortion done, the last being a year ago.

One and half months into her seventh pregnancy, Roopa got an abortion done at a private hospital in Udaipur. Since she had gone alone for the abortion no one in the family knew how the abortion was done. Soon after the abortion Roopa complained of pain in the abdomen and vaginal bleeding, stopped eating and had slight fever. She had to change her pads twice a day and her clothes gave out a foul odour.

13 days after the abortion Roopa was taken to a charitable maternity clinic in a nearby village, where they were told that she could not be treated there and should be taken to a bigger hospital. The family went back home as they did not have money. They borrowed money and three days later took her to the same private hospital where she had got the abortion done. There too they were told that she could not be treated there. The family brought her home and started arranging money to take her to the teaching hospital at Udaipur. 25 days later the family took her to the teaching hospital 20 km away from their house. During this period Roopa developed swelling in hands and feet.

Over the first two days at hospital, she was given some injections, two bottles of IV fluids and two units of blood. Ultrasound done on the third day revealed a "ruptured wound" in the abdomen. Roopa continued to have swelling in hands and feet. The doctor asked the family to take Roopa back home as there was no improvement in her condition and discharged her in the afternoon around 3 o'clock.

Back home there was no improvement in Roopa's situation – she remained semi conscious and could only take spoonfuls of water. The next morning Roopa died at 8.30 am.

The family spent nearly Rs. 25000 on Roopa's treatment.

Narrative 2

Tulsi

Phase of death: During pregnancy
Cause of death: Jaundice (hepatitis) Place of death: Teaching hospital

Tulsi, a 31-year-old tribal community woman, was educated up to the primary level. She had entered in to a second marital alliance (nata); her husband happened to be blind and unemployed. She worked as a wage labourer for about eight months each year. Her father-in-law was the main earning member of the family.

Tulsi was pregnant for the third time after an interval of five years. The local ANM recalled that Tulsi did not know that she was pregnant until the 4th month, when she came complaining of stomach ache. An ultrasound confirmed pregnancy. She was severely anaemic and the doctor advised her to get a tubectomy after the delivery.

Tulsi had previously got two ante-natal check-ups from a private gynaecologist. In the sixth month, she experienced pain and swelling of her hands and feet, and again visited the gynaecoligist a third time, who diagnosed jaundice and gave her outpatient medication for fifteen days. A week later Tulsi developed extreme body ache and discomfort around 10 at night. The family rushed her to the local PHC, 400 metres away, where the doctor gave some medication (Rs 100) and sent her home. Some hours later at 3 am, her pain increased in intensity and she started crying.

Her family hired a jeep (Rs 300) and reached the teaching hospital at Udaipur (40 km away) by 5.30 am. Tulsi was admitted at 6 am, but, according to her family, treatment started at 9 am after the morning doctor came on rounds. She was given IV fluids and medication over six days. Her father-in-law said that some blood and urine tests were done on the seventh day, after which the doctor told them that Tulsi had jaundice. She died the same evening at around 7 pm, in the hospital. During the week in the teaching hospital, her family had spent around Rs.8000 on treatment.

Narrative 3

Champa

Phase of death: During pregnancy
Cause of death: Hypertensive disorder of pregnancy
Place of death: Home

Champa, a 29 year old woman of tribal community had remarried through a "nata" alliance eight years ago. She had one child from her first marriage, and was pregnant again. According to the husband and mother in law, they had tried to contact the ANM 5-6 times but she had not been available. They had wanted her to get regular check-ups, but the anganwadi was located at a distance and they did not know when the ANM visited the anganwadi. The family finally established contact with the ANM in the eighth month, by when Champa had swelling of hands and feet. The ANM gave her an injection and filled out a card.

At 5 am one morning in the ninth month, Champa complained of abdominal pain. A traditional birth attendant (dai) was called. She examined Champa and opined that there was time for delivery. However when the vaginal passage did not open till 2.30 pm, the dai asked the family to call the ANM. Her husband bicycled 8 km to the sub-district town to call the ANM, and hired a jeep for her to come to the village. The ANM arrived at around 4.15 pm. She gave Champa two injections and informed the family that she had thrown a convulsion, and should be shifted to the teaching hospital at Udaipur . However, before Champa could be moved to the hospital, she had another fit at around 4.50 pm and died soon after. The ANM advised the family not to cremate Champa's body with the baby inside. So a person from a certain community was called. He slit open her abdomen and took out the dead fetus. Champa's family first buried the fetus and then performed her last rites.

Narrative 4
Pyaari

Phase of death: Within 24 hours of delivery
Place of delivery: Teaching hospital
Cause of death: Caesarean complication
Place of death: Teaching hospital

Pyaari, a 28-year-old woman educated up to class 8 taught at a private school. Her husband worked as a cook in Ahmedabad and her parents lived in Udaipur. Pyaari had two children, both from cesarean deliveries, and was pregnant again. She made four visits to the teaching hospital at Udaipur for antenatal check-up during which she was treated for anaemia.

Eight and a half months into the pregnancy, while bathing one Sunday afternoon Pyaari realized that she was having slight bleeding. She called up her parents and her brother arrived at 3 pm in a jeep to take her to Udaipur. They reached by 5 pm. At her parents' place Pyaari had something to eat and was taken to the residence of a consultant at the teaching hospital at 6 pm. The doctor examined and asked for her to be admitted.

Pyaari was admitted at 7.30 pm and given oral medication, injections and IV fluids. Next morning her blood was drawn for tests. Soon thereafter, a doctor came and said that Pyaari had to be taken for a caesarean operation. On being asked, the doctor did not explain why a caesarean was necessary. Pyaari was taken in for surgery at around 9.15 am and came out at midday. She gained consciousness by 1.30 pm and spoke to family members. She was shown her baby an hour later, around 2.30 pm.

At 3 pm she complained of pain in the abdomen and excessive vaginal bleeding. A doctor examined her and said that Pyaari's uterus had ruptured and hence she needed another operation and blood transfusion which the family would have to arrange. Pyaari was immediately taken in for a second operation around 3.30 pm and was brought out at around 5.30 pm. However, the bleeding did not stop even after surgery. The family arranged for replacement donors and Pyaari was given blood and put on oxygen. After 7 pm on Monday, Pyaari received seven units of blood while she continued to bleed. By 8.30 on Tuesday morning, her body had swollen up and her limbs started stiffening. Ultimately around 9 am Pyaari was declared dead.

Narrative 5

Ganga
Phase of death: Within 24 hours of delivery

Place of delivery: Home

Cause of death: Postpartum haemorrhage

Place of death: Home

Ganga, a 33-year-old woman of a tribal community had earlier delivered three children and was pregnant again. Her husband was illiterate and worked as a labourer for six months in a year, besides working on his own farm. During her pregnancy she visited the sub-centre located in her village thrice for ante-natal check-ups.

One day towards the end of pregnancy, Ganga started having labour pains at 4 o'clock in the morning. Her husband borrowed Rs 100 from his relatives to hire a three wheeler tempo to take her to the government Community Health Centre (CHC) located 3 km from their house, where they reached at 7 am. The doctor at the CHC refused to admit Ganga saying that she was very anaemic and had excessive swelling, and the CHC did not have facilities for blood transfusion. The family was instructed to go to the teaching hospital at Udaipur but referral transport was not arranged.

Ganga's husband did not have liquid cash to take her to Udaipur and therefore brought her back to the village by about 9 am.

With labour pains advancing, the family members hurried to call the local ANM but she refused to come saying that she herself was feeling unwell. While her husband was going around the village trying to arrange for money to take her to Udaipur, Ganga delivered at home, at around 9.30 am. When her neighbours came to see her after her delivery, they found her bleeding profusely -- her mattress was soaked in blood and soon she was gasping for breath. Ganga died at around 11 am. At the time of interview (2 weeks after Ganga's death), her husband was taking care of the infant.

Narrative 6

Durga
Phase of death: 2-7 days after delivery
Place of delivery: Community Health Centre

Cause of death: Puerperal sepsis, PPH
Place of death: In transit from CHC to teaching hospital

Durga, a 17-year-old adolescent of the scheduled caste community worked with her husband at a brick kiln near their village. This was Durga's first pregnancy, and she went for two ante-natal check-ups to the sub-centre.

One day in the ninth month, she started having labour pains around 2 in the afternoon. Within half an hour her family took her in a hired jeep to the CHC, 9 km away. Durga delivered at 3.30 pm and was discharged from the hospital after an hour, and came back by 5 pm.

Durga continued to have abdominal pain and copious bleeding. She had not been given any medication from the hospital to help reduce the pain or bleeding. Durga endured the pain for five days. When her condition did not improve, her husband again arranged a jeep and took her back to the CHC, around 8.30 in the morning. The doctor there informed them that Durga had got septic with severe blood loss. She was given a bottle of IV fluid and referred to the teaching hospital at Udaipur, 70 km away.. The family was bringing Durga to the teaching hospital, when on the way at around 9.30 am she breathed her last. At the time of interview 1 week later, her husband was taking care of their child.

Narrative 7
Jhumki

Phase of death: 2-7 days after delivery
Place of delivery: Teaching hospital
Cause of death: Postpartum haemorrhage
Place of death: Teaching hospital

Jhumki (22 years), had studied till class seven and lived in a village of southern Rajasthan. Her husband worked as an ironsmith (lohar) in Udaipur, hence Jhumki would often visit him there. Jhumki had one child and was pregnant again. She moved in with her husband at Udaipur in the fourth month and visited the teaching hospital thrice for antenatal check-ups. Jhumki did not have any problem till the eighth month of pregnancy.

Towards the end of eighth month, one day she became unwell and had body ache, and was taken to the teaching hospital for a check-up. She was admitted there and given two bottles of IV fluid along with some medicines. Five days after admission, Jhumki started bleeding and developed severe backache, at around midnight.

Her mother-in-law immediately informed the nurse on duty and a doctor, who said that the doctor who had admitted her would only treat her. The mother-in-law called up Jhumki's husband who came over to the hospital at 5 am. He again met the doctor on duty and got the same reply. Jhumki was ultimately seen at 9 am when the doctor who had admitted her arrived. After an hour, Jhumki delivered a stillborn baby. The placenta came out soon after, but Jhumki started bleeding profusely. The doctor informed the husband that she would need a blood transfusion and got him to sign some papers.

The family arranged eight units of blood. Jhumki was given blood and IV fluid continuously and was also put on oxygen. The bleeding continued while she was being given blood. Over one and half days, Jhumki was given eight units of blood. She once gained consciousness and again became unconscious. On the second day after delivery her abdomen became swollen. The doctor stopped blood transfusion around 12 pm while oxygen continued. The same night at 9 pm the doctor declared her dead. Jhumki had been admitted in the hospital for seven days during which her family had spent about Rs10,000 on treatment.

Narrative 8
Mohini

Phase of death: 8-42 days after delivery
Place of delivery: Home
Cause of death: Hypertensive disorders of pregnancy
Place of death: Home

Mohini, a 26-year-old woman of a tribal community, had delivered twice before and was pregnant again. She had gone for one ante-natal check-up to the government community health centre where she was given a tetanus injection. During the pregnancy she sometimes had blurred vision and bodyache. One day, in the ninth month when Mohini went into labour,her husband went to call the village dai who however was not at home. So he called another woman to help Mohini deliver. By the time they returned, Mohini had already delivered a baby girl at about 1 pm.

About one hour after the delivery Mohini experienced pain in the abdomen. By 6 pm she started having convulsions. In panic, the family members went to call the local ANM who came around 7.30 pm and gave IV fluids and an injection, and advised the family to take her to the CHC, 14 km away.

It took the family members about an hour to borrow Rs 150 and arrange a jeep. They reached the CHC around 9 pm where Mohini was given emergency treatment but she continued to have fits every hour. After a while her speech became hampered and she was referred to the teaching hospital at Udaipur, about 70 km from the CHC.

The family had spent Rs500 on Mohini's treatment at the CHC, and had to further arrange for transport to Udaipur at their own cost. The family members arranged for more money and then reached the teaching hospital at around 4 o'clock early morning. At the hospital, even after three days of treatment Mohini continued to have fits. During this time she was given two and a half bottles of blood. Her abdomen swelled up and she started passing black stools.

According to the father, seven days leter, the doctor discharged Mohini from the hospital saying that there was nothing else that they could do to treat her. By this time, the family had spent about Rs. 11,000 on her treatment. Mohini died two days after being brought home. At the time of the interview, her child was being cared by her husband and mother-in-law.

Narrative 9

Kanta

Phase of death: 8-42 days after delivery *Place of delivery: Home*

Cause of death: Tuberculosis *Place of death: Home*

Kanta, a 30-year-old tribal community woman had studied till class seven in school.. This was her second marital alliance (*nata*). She had two living children and was pregnant again. She had last delivered three years before.. For the past one and a half years she occasionally had fits and cough with blood for which she had intermittently taken some treatment.

During pregnancy she went for ANC four times at the sub center and was immunized against tetanus. She took iron tablets as recommended. From the fourth month of pregnancy she had pain and swelling in her limbs and found it difficult to see in the dark. However, Kanta had an uneventful normal delivery at home with the assistance of a relative, and appeared to be fine thereafter.

Ten days later one evening around 5 pm, she had another severe bout of cough with blood. The family borrowed money to arrange a jeep to the CHC, 15 km away., at a cost of Rs 470. They reached the CHC by 8 pm. The doctor prescribed some injections and medicines and asked them to take her to the teaching hospital at Udaipur, saying that she was severely anaemic, and the CHC did not have provision for blood transfusion. The family spent Rs 70 on the injections which the doctor gave to Kanta, but according to the ANM, she was unable to swallow the tablets because of swelling in her throat. No referral transport was provided by the CHC.

Since her family did not immediately have the money to take her to the higher facility Kanta was brought back home around, 12 midnight. The family members were in the process of arranging money and a vehicle to take her to the teaching hospital when Kanta breathed her last at 1 am. Kanta's child died in the second week after her death.