



Introduction

The economic boom experienced in India may have eclipsed the problem of high infant mortality for a while, but the statistics are still an evidence for the extent of problem expanding among the poorest in the country. IMR strongly correlates with and is an indicator of a country's level of health or development.

India is faced with an unparalleled child survival and health challenges. As compared to the national average of 47 infant deaths per 1000 live birth Rajasthan records an IMR of 55 per 1000 live births [Sample Registration Survey (SRS), 2011].

The three major causes of high child mortality include infection (Sepsis, Pneumonia, and Diarrhea), premature births and birth asphyxia. Loopholes in the continuum care cycle, leads to many infants dying of preventable causes before the age of 1 year. Eventually the cycle of malnutrition entraps the mother and the new born, ultimately leading to death.

The problem is widespread not only in the uneducated but the well-informed owing to various myths, tradition and culture. Nevertheless, traditions & illiteracy are not alone to be blamed in view of reduced manpower status at the health facilities which in turn leads to diminished patient satisfaction level which restricts the community to use most of the services.

To address the problems of growing and uncontrollable infant deaths various child health interventions have been initiated and implemented at national and state level.

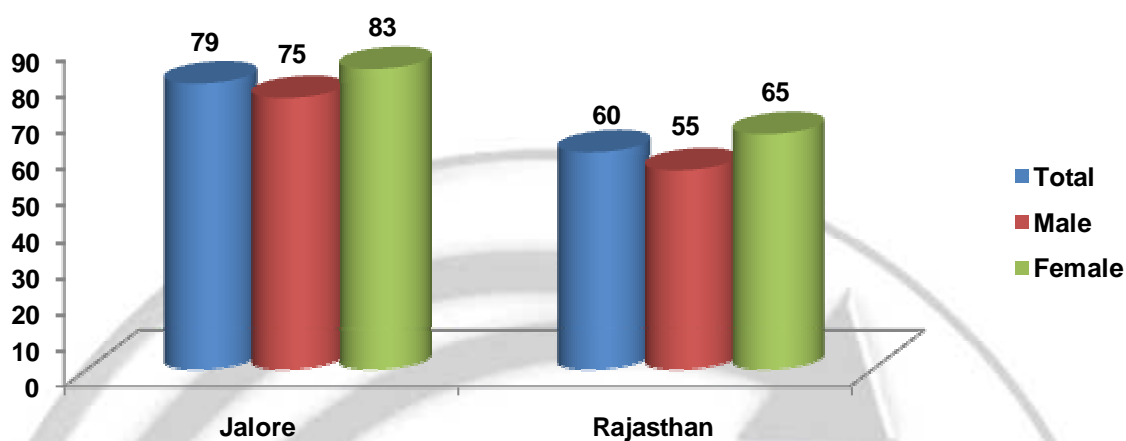
The operational interventions can be categorized into Facility based interventions (New Born Corners, Sick New Born Care Unit (SNCU), Malnutrition Treatment Center (MTC), Yashodas, Navjat Shishu Suraksha Karyakram (NSSK), and Facility – Integrated Management of Neonatal and Childhood Illness (F-IMNCI) and community based interventions like MCHN sessions, Integrated Management of Neonatal and Childhood Illness (IMNCI), Home Based Postnatal Care.

As a result of the above said efforts, the IMR in Rajasthan have been declined from 75 in 2003 to 55 in 2010. However, wide variations amongst and within the states in infant and child mortality have been noted.

AHS was conducted by Census of India in 9 Empowered Action Group (EAG) states in 2010-11. In Rajasthan the survey was conducted in 32 districts and highest IMR was found in Jalore district which was 79 as compared to state IMR of 55 infant deaths per 1000 live births which pose a major cause of concern.



**Fig 1. IMR Rajasthan V/s Jalore district
AHS- 2010**



To top it all, the weak reporting mechanism for infant deaths across the district, lead to failure in identification of the prone areas and the situations prevalent therein.

In view of the above said, the DM&HS asked SIHFW, Jaipur to conduct a research study to find out the main reasons for high infant deaths in the district.



The study

A. Scope of the work

Objective

The main objective of the study was to understand the major determinants of high infant deaths in Jalore district. The study also focused on assessment of gaps in knowledge and practices of families, communities, service providers and existing health services for infants.

The specific objectives of the study were:

- To find out the major determinants of Infant Deaths in Jalore district and compare across.
 - Age specific death
 - Sex specific deaths
 - Socioeconomic aspects
 - Parity
 - Nature and place of delivery
- Assessment of accessibility and availability, utilization of child health services (in terms of clinical and public health services)
- Assessment of existing referral mechanism

Approach

To achieve the above said objectives, following approach was adopted.

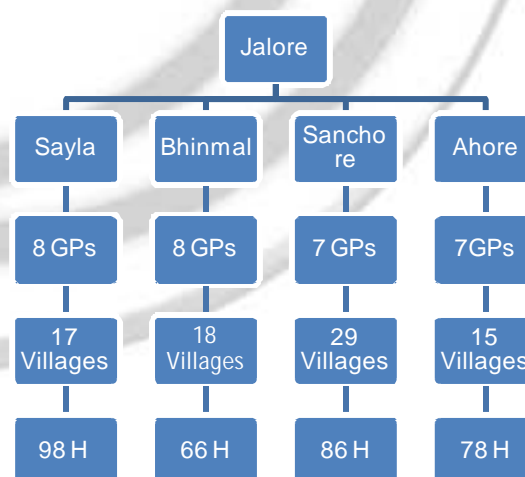
Methodology

1. Sampling technique:

30 Cluster sampling technique was used to identify the sample size in Jalore district.

2. Sample size

Gram Panchayats (GP) were taken as clusters. A total of 30 GPs with highest population were selected from four blocks namely Ahore, Sayla, Bhinmal and Sancho re (highest population) at Jalore district. 30 GPs were equally divided in these 4 blocks. All the villages in the selected GPs (with infant deaths) were covered making a total of 79 villages. As proposed, in each village the estimated number of infant deaths was calculated and 50 % of those households were supposed to be covered (owing to time and budgetary constraints).





Likewise an equal number of households' with healthy and live infants born between 1st April 2010 and 31st March 2011 were to be covered.

Study Tool:

Four types of structured questionnaires were used to get the desired information

- a. Questionnaire for Pediatrician/ Medical Officer(MO) in charge (Facility survey)
- b. Questionnaire for ANM/ASHA/Anganwadi workers(AWW)/Key informants(KI)(Village level survey)
- c. Questionnaire for mother / caretaker for live infant (Household survey)
- d. Questionnaire for mother / caretaker for dead infant (Household survey)

Personal interview through structured questionnaires were held for households and health facility officials.

Household/ village level:

1. Interview of mother / caretaker
2. ASHA/AWW, KI

Facility:

1. **District:** SNCU in charge: Pediatrician / MO
2. **Community Health Center (CHC):** MO In charge in (CHC)
3. **Primary Health Center (PHC):** MO In charge
4. **Sub center :** ANM

Selection and orientation of team

Briefing of the supervisors (SIHFW staff) was done on objective, design and approach of the study, questionnaires used and flow of field study.

Investigators were selected on basis of experience in field studies with graduation as the minimum qualification. Further, orientation of investigators was done on April 26, 2012. Each questionnaire to be filled by the investigators was discussed in detail and every query and doubt was addressed. Accordingly, the 4 Study Team had 16 members (Supervisors: 6 & Investigators: 10). Together they contributed 96 man days of field work. Each team comprised of one/ two supervisors (from SIHFW) and 2-3 investigators.



Data Collection:

Field visit was done from April 27 – May 02, 2011 and data were collected on pre-decided attributes and variables using structured protocols.

A total of 4 CHCs, 9 PHCs, 21 Sub centers and 79 villages and 328 households were covered for the study. The details of the health workers and KI interviewed are as follows:

Table 1: Number of respondents Proposed and actually covered

Blocks	MO		ANM		ASHA/AWW		KI*	
	Proposed	Actual covered	Proposed	Actual covered	Proposed	Actual covered	Proposed	Actual covered
Sayla	5	2	16	17	17	15	34	33
Bhinmal	4	3	16	13	18	17	36	32
Sanchoe	2	2	16	15	29	17	58	57
Ahore	3	3	14	10	15	12	30	30
Total	13	10	62	55	79	61	164	152

* Panchayati Raj Institution (PRI) member / Self Help Group (SHG) members/ Mother in law/ Non Government Organization (NGO) representative/ Youth members/Traditional Birth Attendant (TBA)

Table 2: Total households covered

S No.	Blocks	No. of Households with history of Infant death	No. of Households with live infants
1	Sayla	49	49
2	Bhinmal	33	33
3	Sanchoe	43	43
4	Ahore	39	39
	Total	164	164

Software development, data entry, analysis and Report Writing

Software development and preparing dummy tables for tabulation was done simultaneously to avoid time loss and to facilitate the data entry and data analysis.

To ensure consistency and accuracy, the data entry was done, by the supervisors of the respective teams from May 3- 6, 2012. After the completion of data entry tables were generated for analysis using MS Access and SPSS 16.0. This was followed by report writing.



Observations

There were separate questionnaires for the different groups of respondents which mainly focused on assessing the determinants of infant mortality, the knowledge and practices of the respondents related to mother and child care and referral mechanism for sick child in the selected research areas.

Of the total 79 villages surveyed, with a total population of 2,39,043, the estimated live births were calculated to be around 6672 (as per the birth rate of 27.9 for Jalore). Birth records were available only for 55 villages. Even for these great disparities were seen in the records with only 3080 live births compared to the estimated. As per AHS, 2010, the IMR for Jalore was stated as 79 per 1000 live births. Accordingly the estimated infant deaths were expected to be 531 in the surveyed area. But only 164 deaths were found including 138 reported and 26 unreported cases. Since the observation is based on house to house visit in the study area we do not find any reason to disbelieve the number and there could be something grossly wrong with the AHS data for the meager representation of Jalore in AHS.

Based on the number of infants deaths found during house to house visits in the sampled population, the IMR for the District works out just 24.5 per thousand live births using estimated live births based on Birth Rate for Jalore as compared to 79 reported from AHS data. A sanguine estimate taking reported live births (3080) as denominator also does not substantiate the AHS data as the IMR still shall be 54.5 per thousand live births

According to the estimated live births almost half of the numbers was obtained from the records which puts question to much hyped (Pregnancy and Child Tracking System (PCTS), handholding and supportive supervision. Also, for those whose birth record is maintained the follow up in terms of immunization and child care is lacking, due to which the deaths too remain unreported. Some of the reasons are universally known: distance, transport and staff shortage.

To ascertain the underlying facts behind high infant deaths in Jalore district of Rajasthan, a total of 328 households were interviewed. 164 households with infant deaths and equal households with live healthy infants formed the basic respondent group in the surveyed areas.

Thirty GPs included in the study had 14 health facilities (CHC, PHC) besides the District Hospital (DH) of Jalore and all these were covered. Likewise, 15 MO in- charges were planned to be interviewed from these facilities but only 10 MOs present at the time of study, could be contacted.

In the surveyed area, from a total of 62 sub centers and PHCs, 55 ANMs were interviewed. Subsequently, it was found that at 79 villages visited, ASHA was posted only at 37 villages and some of them were recently appointed.

Accessibility of the health services to the community

Closer to community a functional Health facility shall be better utilized is a well known fact. As both the groups were taken from similar villages, the responses for nearness of health facilities were almost same. The nearest health facility was Sub Center for the majority (approx. 62%). The PHCs were next and CHC was the farthest of all, and obviously the nearest would be the one to be approached first.

Fig 2: Nearest Govt. Health facility (%)

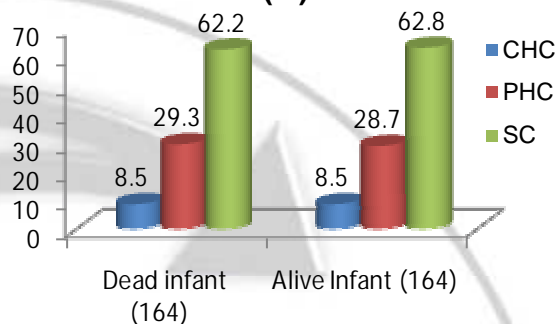
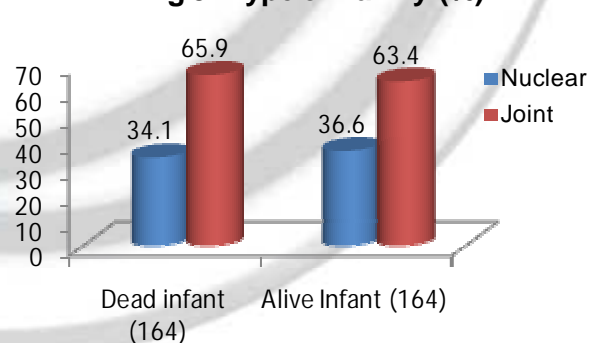


Table 3: Distance of the nearest government health facility

	Distance			
	0-2 km	2-5 km	5-10 km	10-15 km
Dead infant (164)	103(62.8)	39(23.8)	22(13.4)	0 (0.0)
Live Infant (164)	121(73.8)	38(23.2)	2(1.2)	3(1.8)

When asked about the distance of the nearest government health facility from the home of the respondents, it was reported by 62.8% of respondent's households with an infant death history and 73.8% of those with live infants that the distance was less than 2 kms from their residence. Approximately equal number (23%) stated that the health facility was within 2-5 kms. vicinity. However, for 13.4% of families with h/o infant death the nearest health facility was 5-10 kms away.

Fig 3 : Type of Family (%)



Responses of the h/o deceased and live infants

The IMR besides direct medical causes has so many other socio-economic attributes (family type, family income, religion, social class and mother's education). It was in this context that the information collected was analyzed and some striking observation surfaced up.

Family Profile

The Dead infant households were **mainly Hindus** living in joint families and belonged to **APL category**. The prominent caste category was OBC followed by SC.

Most of the households, which had live infants, were Hindus belonging to similar family type, socioeconomic status and social category as households where infant death had occurred.

Greater number of dead infant's households belonged to Scheduled tribe (ST) category as compared to live infants. However, compared with in itself, more dead infants were seen in OBC (35.4%) followed by SC category (32.3%).

Fig 4 : Economic status of household (%)

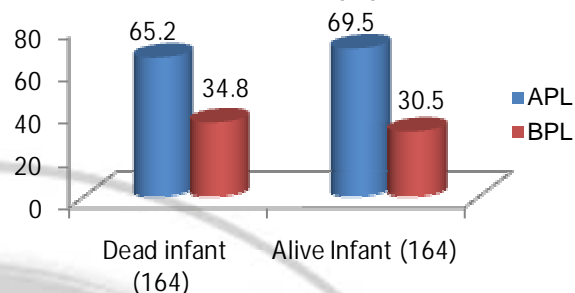


Fig 5 : Religion of household (%)

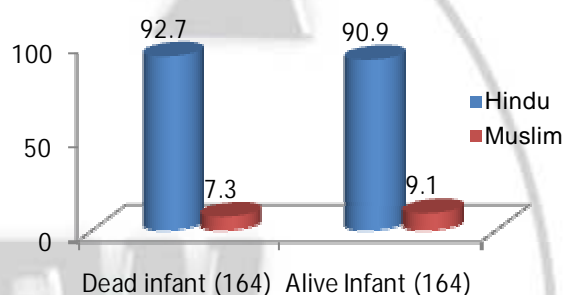


Fig 6: Social category : Dead Infant (%)

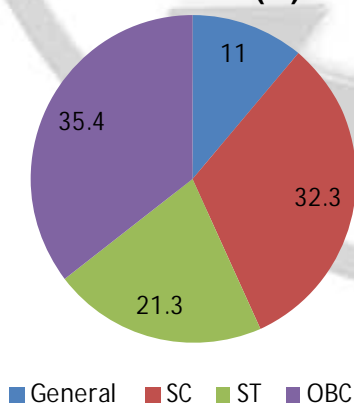


Fig 7: Social category : Alive Infant (%)

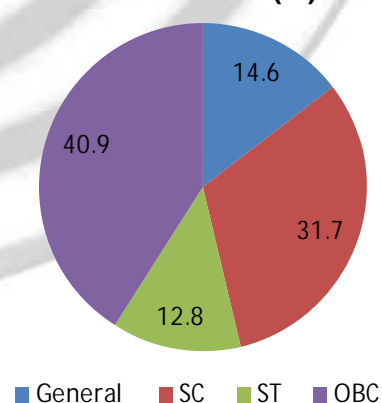




Table 4: Education of the mother

	Education						
	Illiterate	Literate	Primary	Middle	Sec.	Sen. Sec.	Graduation
Dead infant (164)	108(65.9)	25(15.2)	19(11.6)	10(6.1)	2(1.2)	0(0.0)	0(0.0)
Live Infant (164)	104(63.4)	19(11.6)	20(12.2)	12(7.3)	3(1.8)	4(2.4)	2(1.2)

Education level of mothers hardly had any bearing on survival of child as is evident from the table above.

Table 5: Age of mother at the time of concerned infant's birth

	Age			
	Below 21	21-25	26-30	More than 30
Dead infant (164)	17(10.4)	58(35.4)	63(38.4)	26(15.9)
Live Infant (164)	23(14.0)	63(38.4)	57(34.8)	21(12.8)

Maximum number of births was in the peak fertile period (21-30 yrs.) irrespective of whether the child survived or died after birth, Mothers with h/o infant death were in the age group of 18-20 yrs (53.7%) at the time first pregnancy, compared to those with live infants who were between 21-25 yrs (43.3%).

Table 6: Symptoms at the time of birth

Symptoms at the time of birth *	Dead infant (164)
Failed to cry	17 (10.4)
Neonatal jaundice	7 (4.3)
Inability to breastfeed	20 (12.2)
Low Temperature	30 (18.3)
Fits	6 (3.7)
Rapid breathing	44 (26.8)
Chest in-drawing	11 (6.7)
LBW	48 (29.3)
Inactiveness/ lethargy	24 (14.6)
Problem in passing urine / stool	4 (2.4)
Congenital defect	22 (13.4)

*Multiple responses



The respondents from the household of dead infants were asked to recall about the visible symptoms present in the infant at the time of birth. It was reported that Low birth weight (29.3%) and rapid breathing (26.8%) were the prominent symptoms. Low temperature, inactiveness and congenital defects were second in line. Neonatal jaundice fits and problem in passing urine / stool were reported by a few.

Table 7: Probable cause of death as told by family

	Probable cause of death								
	Jaundice	Diarrhea	Pneumonia	Infection	Fever	Birth asphyxia	LBW	Unknown reasons	Congenital Abnormality
Dead infant (164)	7 (4.3)	3 (1.8)	25 (15.2)	30 (18.3)	17 (10.4)	21 (12.8)	44 (26.8)	12 (7.3)	5 (3.0)

The respondents were asked about the probable cause of death of the infant. The major reason stated was LBW (26.8%) which also corresponds to the premature births. Infection and fever caused the death of 28.7% of infants while birth asphyxia (12.8%) and pneumonia (15.2%) were other reasons. The number of deaths due to jaundice, diarrhea and congenital abnormality lead to death of 9.1% of total deaths.

Table 8: Probable cause of death and economic status of infant's family

Probable cause of death	Economic status	
	APL (107)	BPL (57)
Birth asphyxia	13 (12.1)	8 (14.0)
LBW	30 (28.0)	14 (24.6)
Infection	17 (15.9)	13 (22.8)
Pneumonia	18 (16.8)	7 (12.3)
Fever	11 (10.3)	6 (10.5)
Diarrhea	2 (1.9)	1 (1.8)
Congenital birth defects	3 (2.8)	2 (3.5)
Jaundice	4 (3.7)	3 (5.3)
Unknown reason	9 (8.4)	3 (5.3)

Apart from LBW, majority of infants from BPL family died of infections (22.8%) as compared to 15.9 % infants belonging to APL families. On the other hand, pneumonia (16.8%) was the next major probable cause of death in APL families whereas only 12.3% of the infants from BPL families died of pneumonia.



Table 9: Probable cause of death and caste category of infant's family

Probable cause of death	Caste category			
	General (18)	SC (53)	ST (35)	OBC (58)
Birth asphyxia	2 (11.1)	6 (11.3)	5(14.3)	8(13.8)
LBW	4 (22.2)	18 (34.0)	8(22.9)	14(24.1)
Infection	2 (11.1)	6 (11.3)	8(22.9)	14(24.1)
Pneumonia	4 (22.2)	10 (18.9)	3 (8.6)	8(13.8)
Fever	3 (16.7)	3 (5.7)	5(14.3)	6(10.3)
Diarrhea	0 (0.0)	2 (3.8)	1 (2.9)	0(0.0)
Congenital birth defects	0 (0.0)	3 (5.7)	0(0.0)	2(3.4)
Jaundice	1 (5.6))	4 (7.5)	1 (2.9)	1 (1.7)
Unknown reason	2 (11.1)	1 (1.9)	4(11.4)	5(8.6)

When probable cause of death is seen across caste categories, an equal number of infants died of pneumonia and LBW amongst general category; **LBW was the most prominent cause in SC category. In ST and OBC category LBW and Infection were the prime reasons** of infant deaths.

Table 10: Sex of the new born

	Sex of new born	
	Male	Female
Dead infant (164)	90(54.9)	74(45.1)
Live Infant (164)	98(59.8)	66(40.2)

In the live and dead infant families which were contacted, more male children were born in the reference period and accordingly more male infant deaths were found, reemphasizing that females are biologically stronger.

An equal number of premature deliveries were found in case of dead and live infants (26.8%). More of male infants were born prematurely (dead infants: 26, live infants: 30) than female (dead infants: 18; live infants: 14). When compared across time of death it was noticed that except for deaths between 1-24 hrs of birth, more male infant deaths occurred in other time categories.



Table 11: Probable cause of death and sex of infant

Probable cause of death	Sex of infant	
	Male (90)	Female (74)
Birth asphyxia	7 (7.8)	14 (18.9)
LBW	25 (27.8)	19 (25.7)
Infection	15 (16.7)	15 (20.3)
Pneumonia	14 (15.6)	11 (14.9)
Fever	9 (10.0)	8 (10.8)
Diarrhea	2 (2.2)	1 (1.4)
Congenital birth defects	4 (4.4)	1 (1.4)
Jaundice	5 (5.6)	2 (2.7)
Unknown reason	9 (10.0)	3 (4.1)

Apart for the primary cause of death i.e. LBW, maximum number of female children died due to infection (20.3%) and birth asphyxia (18.9 %) while male children died of Infection (16.7%) and pneumonia (15.6%). As compared to males, more females died of birth asphyxia and infections. Congenital birth defects caused death of more males than females.

Table 12: Time of death of infant

Sex of the dead infant (164)	Time of death of infant				
	Within 1 hr of birth	Within 1-24 hrs	Within 2-7 days	Within 8-30 days	Within 1 -12 months
Male	13	9	23	16	29
Female	11	15	18	7	23
Total	24 (14.6)	24 (14.6)	41 (25.0)	23 (14.0)	52 (31.7)

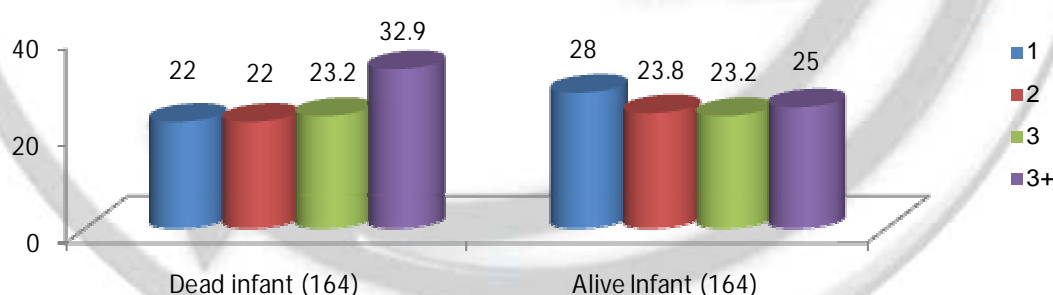
When asked about the time of death of the infant, it was found that 68.3% infants (comprising of 61 males and 51 females) died before completing 1 month of their life. Of these 68.3% (112), 42.8% died within 24 hrs and 36.6% died within 2-7 days of birth.

Table 13: Probable cause and time of death of infant

Probable cause of death	Time of death of infant				
	Within 1 hour (24)	1-24 hours (24)	2-7 days (41)	8-30 days (23)	1 month - 1 year (52)
Birth asphyxia	12 (50.0)	9 (37.5)	0 (0.0)	0 (0.0)	0 (0.0)
LBW	6 (25.0)	10 (41.7)	11 (26.8)	9 (39.1)	8 (15.4)
Infection	2 (8.3)	3 (12.5)	10 (24.4)	3 (13.0)	12 (23.1)
Pneumonia	0 (0.0)	0 (0.0)	7 (17.1)	5 (21.7)	13 (25.0)
Fever	0 (0.0)	0 (0.0)	3 (7.3)	2 (8.7)	12 (23.1)
Diarrhea	0 (0.0)	0 (0.0)	2 (4.9)	0 (0.0)	1 (1.9)
Congenital birth defects	1 (4.2)	1 (4.2)	1 (2.4)	1 (4.3)	1 (1.9)
Jaundice	1 (4.2)	0 (0.0)	4 (9.8)	0 (0.0)	2 (3.8)
Unknown reason	2 (8.3)	1 (4.2)	3 (7.3)	3 (13.0)	3 (5.8)

The most probable cause of death of those infants, which died within an hour of birth (24 infants), was birth asphyxia (50%) followed by LBW (25%) whereas for infant dying between 1 hour to 1 month, the primary cause of death was observed to be LBW.

Fig 8: Birth order of infants (%)



Maximum infants, who died between 1 month to 1 year, succumbed to pneumonia, infection and fever which are well known causes underlying IMR.

Maximum deaths were recorded for infants whose birth order was more than 3 and 16 out of 54 deaths were premature deliveries. While for those infants who were the first child (36), 15 were born to mothers aged 18-20 years and three out of these were born premature.



Table 14: Probable cause of death and birth order of infant

Probable cause of death	Birth order of infant			
	1 (36)	2 (36)	3 (38)	More than 3 (54)
Birth asphyxia	2 (5.6)	6 (16.7)	3 (7.9)	10 (18.5)
LBW	13 (36.1)	8 (22.2)	11 (28.9)	12 (22.2)
Infection	6 (16.7)	6 (16.7)	6 (15.8)	12 (22.2)
Pneumonia	7 (19.4)	4 (11.1)	7 (18.4)	7 (13.0)
Fever	4 (11.1)	4 (11.1)	3 (7.9)	6 (11.1)
Diarrhea	1 (2.8)	0 (0.0)	2 (5.3)	0 (0.0)
Congenital birth defects	0 (0.0)	2 (5.6)	1 (2.6)	2 (3.7)
Jaundice	0 (0.0)	3 (8.3)	1 (2.6)	3 (5.6)
Unknown reason	3 (8.3)	3 (8.3)	4 (10.5)	2 (3.7)

Of the children whose **birth order was more than three, maximum infants died of LBW** and infections. Another large group of infants succumbed to birth asphyxia, pneumonia and fever. LBW has been the primary reason of infant death across parity, which directly indicates poor maternal health and nutrition.

Table 15: Birth weight of infant

	Birth weight		
	Less than 2.5 kg	More than 2.5 kg	Don't Know
Dead infant (107)	53(49.5)	40(37.4)	14(13.1)
Live Infant (122)	50(41.0)	65(53.3)	7(5.7)

For the total number of deaths, a maximum number had weight less than 2.5 kg but not taking into account the rough estimate for the infants, weight comparison is done only for infants born at institution. 53.3% of the live infants were born with weight more than 2.5 kg as against 37.4 % of dead infants. Of these 34.6% in case of dead infants were prematurely born.

Nature and place of delivery

Equal numbers of premature deliveries (26.8%) were found in dead and live infant categories.

In case of dead infants, 34.8% deliveries were conducted at home as compared to only 25.6% home deliveries in case of live infants.

Fig 9: Place of delivery (%)

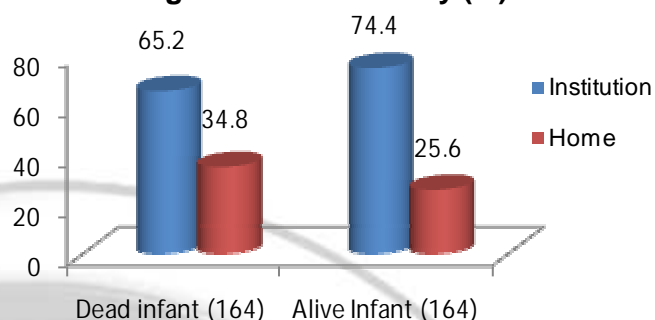


Table 16: Reason for ID

	Reasons for ID*					
	Free Medicine	JSY benefit	Specialist services	Due to complication	Safe delivery	Motivation by ASHA
Dead infant (107)	34(31.8)	73(68.2)	13(12.1)	22(20.6)	55(51.4)	23(21.5)
Live infant (122)	55(45.1)	81(65.4)	21(17.2)	24 (19.7)	75(61.5)	26(21.3)

***Multiple responses**

ID was favored, due to benefits like JSY, free medicines and safe delivery. Very few responded for other benefits like Specialist services or were admitted due to complications. Only 21 % respondents in both cases were motivated by ASHA/ Health service providers for Institutional deliveries.

No difference was found between dead infant and live infant as far as type of delivery is concerned. But, in case of normal ID where the child died within 24 hours of birth, the major causes were LBW, Birth asphyxia and Infections followed by Pneumonia.

Fig 10: Type of delivery (%)

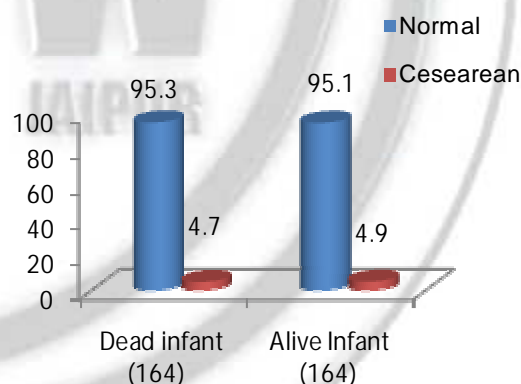




Table 17: Duration of stay at the facility

	Duration		
	Less than 24 hrs	24-48 hrs	More than 48 hrs
Dead infant (107)	50(46.7)	34(31.7)	23(21.5)
Live infant (122)	55(45.1)	38(31.1)	29(23.8)

Institutions are expected to be equipped for offering services to mother and child during the critical period of first 24 hrs.

When analyzing the probable cause of death with ID and its time of discharge, it was noticed that 16 infants of all those who were discharged within 24 hours had died before 24 hours of birth and the probable causes of death included Birth asphyxia(6), LBW(6), infection(3) and congenital defect (1).

Whereas for those whose discharge time was between 24-48 hours, 8 infants died before 24 hours due to Birth asphyxia (5), LBW (2) and congenital defect (1).

But in case of home deliveries it was noticed that 21 died before 24 hours and the major causes (leaving apart the unknown causes) were birth asphyxia (8), LBW (8), infection (2) and Jaundice (1).

Table 18: Reasons for home delivery

	Reasons*				
	Labour pain	Unavailability of conveyance	Distance	Tradition	Less expensive
Dead infant (57)	26(45.6)	4(7.0)	11(19.3)	32(56.1)	4(7.0)
Live infant (42)	21(50.0)	2(4.8)	5(11.9)	17(40.5)	3(7.1)

*Multiple responses

The prime reason for home delivery amongst dead infant household was tradition while for the live infant's families it was sudden labour pains leaving no time to go to the health facility.

Table 19: Person conducting home deliveries

	Person conducting home deliveries		
	Family members	Dai	Health worker
Dead infant (57)	31(54.4)	13(22.8)	13(22.8)
Live infant (42)	21(50.0)	13(31.0)	8(19.0)

There were more home deliveries in case of dead infant and more than 50 % were conducted by family members out of which 38.7% died within 24 hours. While in case of those where home deliveries (13), were assisted by health workers, only 3 (23.1 %) died.

Practice and Knowledge

The respondents in both types of households were interviewed to assess their knowledge of the care of newborn and PW. On the other hand, the practices followed by the mother in both types of households (dead and live infant) with reference to the infant born between reference periods were observed and compared.

Practice regarding taking health services by mother and her child through ANM/ ASHA.

The practices followed by the households / mother were assessed to identify the causes of death of infants and the same were compared across the practices followed in households where the infants survived. The survey results indicate that there was poor utilization of health services the households where the infant died, and a few practices were common in both types of families.

Fig 11: Mothers registered (%)

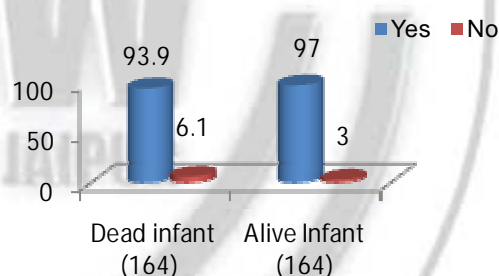


Table 20: Time of registration

	Time of registration			
	First Trimester	Second Trimester	Third Trimester	Don't know
Dead infant (154)	39(25.3)	95(61.7)	12(7.8)	8(5.2)
Live infant (159)	60(36.6)	79(48.2)	15(9.1)	5(3.1)

In households with live infants slightly more percentage of the women in concerned pregnancy were registered in the health facility as compared to households with infant deaths. Time of registration was



an important concern, in households with infant deaths only 25% females were registered in first trimester as compared to 36 % who have live infants.

Table 21: Number of ANC check-ups of mother

	Number of ANC check ups				
	1	2	3	4	Don't Know
Dead infant (154)	15(9.7)	66(42.9)	53(34.4)	11(7.1)	9(5.8)
Live Infant (159)	11(6.9)	51(32.0)	65(40.9)	20(12.6)	12(7.5)

About 53.5% pregnant females in the live infant households got 3 or more ANCs done in the concerned pregnancy as compared to only 41.5% in the dead infant households.

Table 22: Number of TT injections received by mother

	Number of TT injections			
	1	2	Can't recall	None
Dead infant (154)	19(12.3)	124(80.5)	9(5.8)	2(1.3)
Live infant (159)	13 (8.2)	130(81.8)	12(7.5)	4(2.5)

Of the total 154 (93.9 %) registered mothers of dead infant, 80.5% received 2 TT injections. This percentage was marginally higher in case of mothers of live infants.

Table 23: Reasons behind not receiving or receiving less than two TT injections

	Reasons*					
	Lack of information	Distance	Lack of support	Myths	Fear	Superstition
Dead Infant (21)	3(14.3)	5(23.8)	1(4.8)	1(4.8)	11(52.4)	3(14.3)
Live infant (17)	13(76.5)	2(11.8)	0 (0.0)	1(5.9)	3(17.6)	0 (0.0)

*Multiple responses

TT₂ coverage was > 80%. The major reasons noticed for getting less or no TT among households with dead infants was distance of the facility from their home (27%) and fear of injections (50%) while lack of information (76.5%) was the major reason amongst live infant households.

Table 24: IFA tablets consumed by mother

	IFA consumed	
	Yes	No/ consumed few tablets
Dead infant (134)	94(70.1)	40(29.9)
Live infant (146)	109 (74.7)	37(25.3)

Contrary to the normal perception in the system close to **90% had received IFA** tablets during pregnancy and **more than 70% consumed it too**.

Of all the mothers who received IFA tablets, 29.9 % of whose child died within reference period did not either consume or if consumed, only took few tablets.

87 % of the women who lost their child received IFA tablets during last pregnancy as compared to 91 % from other group, not a significant difference and same is true for consumption pattern, 70% and 75% respectively. The major reason for non consumption was aired as nausea and constipation after consumption.

Only 57 % of the dead infants received colostrums as compared to a majority 88 % of the live infants. Of the total dead infants who were born at an institution and survived from 2 day – 1 year, only 16.2 % were not given colostrums as compared to home delivered infants who survived the same time period, 44.4% were not fed on colostrums.

Apparently, the data shows that pre-lacteal feed was given to more number of live infants. 24 of the 164 dead infants who died within 1 hour of birth had no chance to be given a pre-lacteal feed. It was observed that, giving pre lacteal feed in form of “ghutti” (water with sugar/ honey, or ghee with jaggery) was customarily practiced in the study area.

Fig 12: Colostrum given (%)

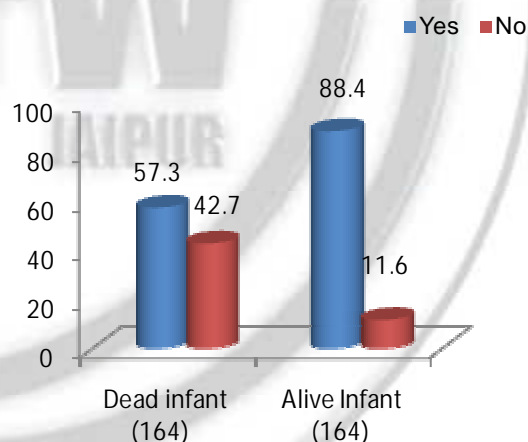




Table 25: Time of initiating breastfeed

	Time of initiating breast feed				
	Within 1 hr of birth	1-6 hrs	6 hrs – 2 days	After 2-3 days	Not able to feed/ Medical complications
Dead infant (164)	69(42.1)	31(18.9)	11(6.7)	4(2.4)	49(29.9)
Live infant (164)	112(68.3)	33(20.1)	7(4.3)	12(7.3)	0(0.0)

Only **42 % babies who died before 1 year received breastfeed within an hour of birth** while 29.9 % did not receive breast milk owing to some medical complications with the mother / child. In comparison **breastfeeding was started for 68 % of the surviving infants within an hour of birth.**

Majority (42.7%) of the women who were fortunate to have their children surviving did opt for exclusive breastfeeding; whereas in case of mothers with history of infant deaths, exclusively breastfeeding was reported by 21.6%. However, in case of mothers where the child could not survive beyond 2 days (48) this question lost its relevance.

Of the total 164 dead infants, the question on immunization of infant was asked from those respondents whose infant had survived beyond 24 hours and those surviving up till 24 hours in case of institutional delivery (127). Only 48 % were immunized as compared to 92.7% live infants. 2 out of 11 dead infants born at institution and who survived between 1- 24 hours were immunized against BCG. While in the live infant category 92.7% infants were immunized.

Table 26: Vaccine doses taken by dead infants prior to death

Vaccine doses	Total infants who survived the period of immunization	Vaccine doses taken: dead	Total live infants	Vaccines doses taken : Live
BCG/ Zero dose	61(100.0)	61(100.0)	164(100.0)	148(97.4)
DPT & OPV I	30(100.0)	17(56.6)	164(100.0)	148(97.4)
DPT & OPV II	24(100.0)	12(50.0)	164(100.0)	141(92.8)
DPT & OPV III	22(100.0)	8(36.7)	164(100.0)	137(90.1)
Measles & Vitamin	8(100.0)	3(37.5)	164(100.0)	129(84.9)

Except for BCG/ OPV zero dose, the live infants were better immunized than their dead counterparts. Approximately only 36 % of the dead infants were immunized for DPT III - OPV III and Measles – Vitamin A against 90.1% and 84.9% live infants. The percentage difference between two categories is simply on account of “opportunity” the surviving children had as compared to infants who died before one year of age at different times.



Table 27: Reasons behind not getting the infant immunized

	Reasons*				
	Lack of knowledge	Nobody informed	Nobody came	Infant was sick	Others
Dead infant (66)	17(25.8)	2(3.0)	4(6.1)	45(68.2)	5(7.5)
Live infant (12)	6(50.0)	1(8.3)	1(8.3)	2(16.7)	3(24.3)

*Multiple responses

Majority households where infant death has occurred (68.2%) replied that the infant was sick before death hence could not be immunized and 25.8% did not have knowledge of the same. In case of families with surviving infants, 50 % families of unimmunized did not have knowledge while others did not get their child immunized owing to some myths, fear of injections, family pressure and superstitions.

Table 28: Infant regularly taken to Anganwadi Centre (AWC) for weighing

	Child taken for weight monitoring	
	Yes	No
Dead infant (44)	10(22.7)	34(77.3)
Live Infant (164)	102(62.2)	62(37.8)

Only 22.7% of the dead infants were taken to AWC for regular weighing till the time of death in comparison to 62.2% live infants who are regularly weighed.

Table 29: Type of food given as weaning food

	Food*		
	Meals taken by family	Mashed food	Liquids
Dead infant (14)	6(42.9)	8(57.1)	7(50.0)
Live infant (164)	59(36.0)	129(78.6)	75(45.7)

*Multiple responses

A total of 14 infants survived more than 6 months in case of dead infants, and when asked about the time of weaning it was found that for most of them weaning started after 6 months of birth. 57.1 % households said that mashed foods were given to the infant at the time of weaning as compared to 78.6% of families with surviving child.



Table 30: Supplementary Nutrition (SN) taken by mother from AWC during pregnancy

	Mother taking SN from AWC during pregnancy	
	Yes	No
Dead infant (164)	58(35.4)	106(64.6)
Live infant (164)	101(61.6)	63(38.4)

Only 35.4% of the PW whose infants died used to take SN from AWC during the concerned pregnancy as compared to 61.6 % of the mothers of live infants.

Table 31: SN taken by infant from AWC

	Infant taking SN from AWC	
	Yes	No
Dead infant (14)	1(7.1)	13(92.9)
Live infant (164)	96(58.5)	68(41.5)

Only 7.1 % of the infants who died, were above the age of 6 months, had SN from AWC as compared to 58.5 % surviving infants.

Table 32: Initiatives by the families in case of surviving children

Steps	Live infants (164)
Care of PW	97 (59.1)
ANC /Post Natal Care (PNC) checkups	53 (32.3)
ID	32 (19.5)
Care of newborn	107 (65.2)
Early initiation of breastfeeding	55 (33.5)
Exclusive breastfeeding	47 (28.6)
Complete immunization of PW	87 (53.0)
Complete immunization of infant	95 (57.9)
Care of newborn and mother during sickness	55 (33.5)
SN for mother and child	35 (21.3)
Care through specialists at the facility	19 (11.6)
SN for child after 6 months	32 (19.5)
Regular growth monitoring	19 (11.6)
Use Birth spacing methods	6 (3.6)

*Multiple responses



The respondents from household of live infant were asked about the good practices followed to keep the mother and child healthy. The major steps as reported by them included proper care of mother and child and their complete immunization. Early initiation of breastfeeding and exclusive breastfeeding with care of newborn and mother during sickness and SN for them was also reported.

Table 33: Type of service provider where sick child is taken

	Type of service provider		
	Private practitioner	Local practitioner	Health worker
Live Infant (164)	50(30.5)	45(27.4)	69(42.1)

The respondents from households with live infants were asked where they take their child when he/she falls sick. The respondents stated that they usually approach the health worker (42.1%) and 30.5% reported that they take their child to private practitioners. 27.4% take the child to local practitioners (quacks & local healers).

Services provided by ASHA

ASHA is the community worker who is responsible for making ANC and PNC visits to the expectant and lactating mother and providing counseling to pregnant, infant and lactating mothers besides accompanying the PW for ID

In the 79 villages included in the study, ASHAs were posted at only 37 villages and some were recently appointed and so at many places ASHAs were not available at the time of the concerned pregnancy and birth of the infants. Accordingly, 64.6% of respondents from live infant's family and 61.6% from dead infant's family responded in affirmation to the presence of ASHA while 5.5% of dead infant's family stated that they were unaware about the availability.

Table 34: Visit made by ASHA during and post pregnancy

	Visits by ASHA	
	ANC	PNC
Dead infant (101)	71(70.3)	66(65.3)
Live Infant (106)	86(81.1)	80(75.5)

Of those who stated that ASHA was available in their village, a higher number (81.1%) of caretakers of live infants said that ASHA had made visits at the time when the mother was pregnant while more families of dead infant (29.7%) reported that ASHA did not visit them during mother's pregnancy.



ASHA makes visit after the delivery not only for infant's care but also for mother's care. But 34.7% of dead infant's family reported that ASHA did not visit them after delivery, and the family was never counseled on infant / mother care. More PNC visits were made in the live infant household.

Table 35: Number of ANC visits made by ASHA

	Number of ANC visits		
	1	2	3 and more
Dead infant (71)	12(16.4)	21(29.6)	38(52.5)
Live Infant (86)	4(4.7)	33(38.4)	49(57.0)

Over 50% of the respondents from both categories stated that three or more visits were made by ASHA while more families of dead infants (16.4%) reported that only one visit was made compared to those of live infants (4.7%).

While counseling, ASHAs had mainly focused on immunization of the mother (dead infant- 90.3%; live infant – 95.5%) and child (dead infant- 76.4%; live infant – 85.2%) during the visits besides nutrition and breastfeeding. It is to be noted that Kangaroo mother care(KMC) and danger signs of mother and child were not discussed by ASHA with the family of the deceased.

Knowledge of the services by service providers for mother and child

Malpractices prevailed in both types of households attributable to family pressures, myths prevailing in the community or unavailability of services. A vast difference was noticed in practice and knowledge aspects, when queries were made related to care of PW, lactating mothers and their new born.

Table 36: Knowledge about registration of PW

	Registration of PW		
	Yes	No	Don't know
Dead infant (164)	144(87.8)	9(5.5)	11(6.7)
Live infant (164)	154(93.9)	4(2.4)	6(3.7)

It was observed that the households with infant death history were unaware of the care/ services to be taken for mother and child pre and post pregnancy as compared to live. This is in conformation with the fact that lesser number of PW in case of dead infants was registered at the health facility.



Table 37: Knowledge about time of registration

	Time of getting Registered			
	As soon as menstruation stops	First trimester	After 3 months of pregnancy	Don't know
Dead infant (144)	18(12.5)	38(26.4)	71(49.3)	17(11.8)
Live infant (154)	27(17.5)	47(30.5)	65(42.2)	15(9.7)

The awareness level in case of registration of PW at the facility and time of registration was found to be better in case of households where the child is alive and healthy. The majority respondents in both the category believed that the registration should be done after 3 months of pregnancy. This is in concurrence with the practice followed by the surveyed group.

Table 38: Knowledge about number of ANC checkups to be taken by PW

	Number of ANC check ups				
	1	2	3	4	Don't know
Dead infant (164)	3(1.8)	45(27.4)	54(32.9)	15(9.1)	47(28.7)
Live infant (164)	5(3.0)	38(23.2)	65(39.6)	26(15.9)	30(18.3)

55.6% of the respondents from the live infant group knew that the PW should get 3 or more ANC checkups as compared to only 42 % respondents from the dead infant's households. Similarly, unawareness was more in the dead infant households (28.7%). The results correspond to the practices.

Table 39: Knowledge about number of TT injections to be taken by PW

	Number of TT injections			
	1	2	More than 2	Don't know
Dead infant (164)	7(4.3)	101(61.6)	9(5.5)	47(28.7)
Live infant (164)	5(3.0)	122(74.4)	8(4.9)	29(17.7)

The families where the infant survived, 74.4% households knew that 2 TT injections should be given during pregnancy as compared to only 61.6% from the other group. Although more number got 2 TT injections during pregnancy, but the awareness about the number of TT injections to be taken by PW was low.



Table 40: Knowledge about number of IFA tablets to be taken by PW

	Number of IFA tablets				
	Less than 30	30-60	60-90	100	Don't know
Dead infant (164)	24(14.6)	24(14.6)	44(26.8)	14(8.5)	58(35.4)
Live infant (164)	30(18.3)	29(17.9)	45(27.4)	27(16.4)	33(20.1)

Only 8.5 % respondents from the families of dead infants were aware that 100 IFA tablets should be taken by the PW as compared to 16.4% of the respondents from families of live infants. Whereas, the number who have consumed IFA tablets, were much higher in both the categories.

Table 41: Knowledge about immunization of infant

	Immunization	
	Yes	No
Dead infant (164)	152(92.7)	12(7.3)
Live infant (164)	155(94.5)	9(5.5)

Knowledge level regarding the child immunization was almost equal among the households with infant deaths and live infants. As far as the practice is concerned only 48% of infants were actually immunized before death. The knowledge might have improved after the death of the concerned infant.

70.1 % of the families were aware that more number of children die during infancy.

Knowledge of the existing referral health services

Table 42: Knowledge about 108 ambulance services

	Knowledge about 108 services	
	Yes	No
Dead infant (164)	113(68.9)	51(31.1)
Live infant (164)	117(71.3)	47(28.7)

71.3% respondents from families of live infants knew about the 108 ambulance services, though only 15.4 % of them ever used it. On the other hand, awareness about the service was poorer among respondents from families with infant deaths and still poor was the usage (14.2%).



Table 43: Reasons for using 108 ambulance services

	Reasons*		
	Transport of pregnant woman	Transport of sick child	Transport of sick medical emergency
Dead infant (16)	10(62.5)	5(31.3)	8(50.0)
Live infant (18)	15(83.3)	4(22.2)	10 (55.5)

*Multiple responses

The services in case of both types of households were mainly used for transport of PW and sick to the health facility while very few ever used to transport sick child.

Table 44: Knowledge about MCHN days organized in the village

	MCHN days organized		
	Yes	No	Don't know
Dead infant (164)	111(67.7)	35(21.3)	18(11.0)
Live infant (164)	119 (72.6)	34(20.7)	11(6.7)

67.7% families of dead infants said that MCHN day is organized in their village as compared to 72.6% families of live infants as the health worker was providing the services at the doorsteps. Around 30% families of both types either refused or were not aware of the MCHN day being organized at AWC.

Majority respondents from both the groups pointed out only few services like, immunization, distribution of IFA tablets, weighing of PW and infants as the services offered on a MCHN day. A few responses were received for counseling sessions and ANC/ PNC checkups.

Table 45: Knowledge about benefits under JSY

	Benefits*		
	Monetary help	Free Medication	Free transport
Dead infant (155)	154(99.4)	60(38.7)	50(32.3)
Live infants (155)	151(97.4)	68(43.9)	53(34.2)

*Multiple responses

An equal number in both the groups were aware about the JSY services (94.5%). Majority of the respondents in both the categories knew about the monetary benefits.



Table 46: Knowledge about services provided at AWCs

	Services at AWC*				
	SN	Immunization	ANC check up	Growth monitoring	Adolescent health counseling
Dead infant (164)	116(70.7)	136(82.9)	31(18.9)	28(17.1)	3(1.8)
Live Infants (164)	136(82.9)	143(87.2)	47(28.7)	44(26.8)	3(1.8)

***Multiple responses**

When the respondents were asked to recall about the services provided at AWCs, most of them stated SN and immunization while only a few stated ANC checkups, growth monitoring and even adolescent health counseling. But in comparison to dead infant families, awareness about the services was more in families of live infants.

Referral

Timely referral of sick new born or infant can curb the mortality, but for the punctuations that defy the spirit of referral.

Referral of dead infant before death:

The families were asked if at any point of time before death, the infant was referred to health facility. Only 28% respondents stated that the referral was done.

Once the referral was done 91.3% respondents took the infant to the higher health facility. The reasons for not taking the referred child were mainly: transportation cost, treatment cost and gender. In case of home delivery conducted by health worker (13), only one infant was referred but was not taken to the health facility.

Table 47: Time lag between referral and reaching the health facility (more than 6 hours)

	Time lag	
	Yes	No
Dead infant (42)	10(23.8)	32(76.2)

Time lag between referral and actually reaching the facility has a critical role in avoiding possible deaths 23.8% respondents stated that it took them time to reach the health facility . Of these 80% could reach the facility within 6 hrs while 20% took more than 6 hrs. When the respondents were



further probed about the reasons for getting delayed, three reasons were stated – unavailability of transport, indecisiveness on part of family on where to take the infant and faith in local healers.

Table 48: Place of death of the infant

	Place of death			
	Home	Health institution	On way to Health Facility	Private hospital
Dead infant (164)	106(64.6)	32(19.5)	8(4.9)	18(11.0)

Irrespective of the place of birth and time of death, 64.6% of the infants had succumbed to death at home while 30% died at one or the other health institution. Another 4.9% died on their way to the health facility.

44.5% respondents reported that the infant was attended by doctor prior to death which suggests that medical help was sought for the sick infant. 35.4% infants, however, died without any medical aid. Most of these were delivered at home (36 out of 58) and died within 24 hrs of birth (17 of 36).

Referral for the live infant in case of sickness

In case of live infants, the families were asked about the place of referral and the referral mechanism used to transfer the sick infant to health facility, based on the recall memory related to preceding three months

22.6% of the respondents of live infants reported that the child had the sickness episode in the last three months.

Table 49: Nature of illness

	Nature of illness				
	Diarrhea	Acute Respiratory Infection(ARI)	Pneumonia	Infection	Fever
Live Infants (37)	7(18.9)	4(10.8)	2(5.4)	3(8.1)	21(56.8)

The main illness that had affected the children according to the families included fever (56.8%) followed by diarrhea (18.9%) ARI, infection and pneumonia as the main reason. Of the 37 children who had fallen sick in the past three months, 94.6% were taken to a health facility to seek medical advice while 5.4% opted not to take the child there.

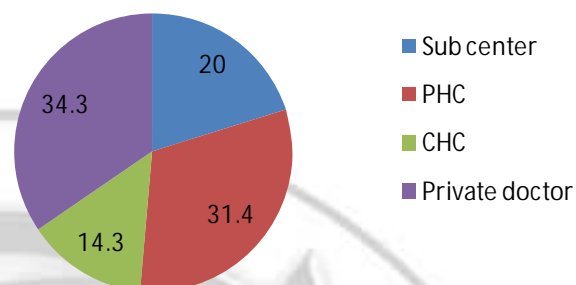
91.4% respondents reported that the symptoms were noticed and sick children were taken to the health facility (self referral) while 8.6% were asked by the ANM to take the child to a health facility.

Most of the children were taken to government health facilities be it a Sub-center, PHC or CHC. About 34.3% of all took their children to private doctors as the CHCs were not manned by pediatrician.

Those who did not take the child to government health facility were further probed as to why not. The main reason stated was that they always consulted private practitioners (58.3%) while some said that staff was not cooperative (25.0%) at the government facilities. Distance (16.7%) and inconvenient time (8.3%) were other reasons.

On being asked if the child was referred to any higher health facility, only 5.7% responded that further referral was done while other 94.3% probably did not need higher referral.

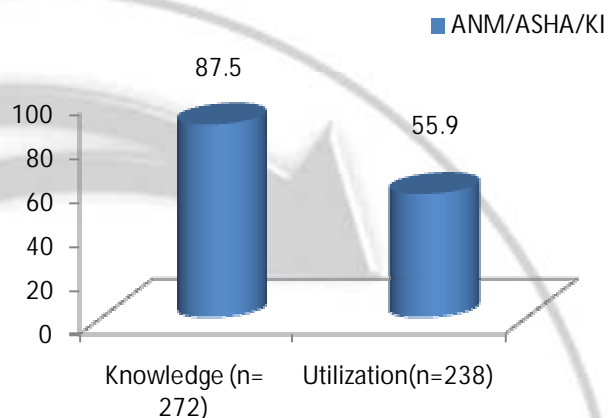
Fig 13: Type of health facility where the child (%) was taken to in case of sickness



Responses of ANM/ ASHA/ KI

ANM, ASHA and the KI which included influential persons from the community as PRI member, teachers, dais and others who interacted with the community on regular basis were queried to assess their knowledge about the government health services.

Fig 14: Knowledge and utilization of 108 Ambulance service (%)



For ANM/ ASHA records of birth and death of infants in years 2010-2011 were also asked and checked. 55 ANM/ (Male Nurse – II (MN-II)/ (Multi Purpose Health Workers (MPHW) were interviewed and of them 50 were able to show the record of births of infants while only 48 of them had records of infant deaths of their area. Some of the records checked were not maintained properly or were incomplete.

108 ambulance services have been made available across the state and have proved to be vital in saving lives. All the respondents were asked if they were aware of the existence of 108 ambulance services. Out of 272 respondents, 87.5% were aware about the service and 37.8% of these were health providers. But a few (6) service providers expressed unawareness also.

Of those who were aware about the services were further probed whether the services had been utilized in the village. 55.9% KI affirmed that the 108 ambulance services were utilized at their village while 44.1% were aware of the services but these were never utilized at the time of emergency. The 108 ambulance services were utilized in 49 villages for the reasons as tabulated below

Table 50: Reasons for using 108 ambulance services

	Reasons for using 108 ambulance*		
	Transporting PW to facility	Transporting Sick child to facility	Transport for medical emergency in the family
KI (133)	113(85.0)	55(41.4)	89(66.9)

*Multiple responses

“108” ambulance services were basically used for transporting the PW to health facility (85%) followed by transportation in case of any other medical emergency (66.9%).



Table 51: Awareness about MCHN days

	Awareness about MCHN days	
	Yes	No
KI (272)	256(94.1)	16(5.8)

MCHN days are organized at the AWCs in villages once a month. 94.1% KI were aware that MCHN days were organized in their village while 5.8% refused.

Table 52: Services given on MCHN days

	Services*						
	IFA	Weighing of PW and children	Immunization of mother and child	Nutrition counseling	Breast - feeding counseling	Counseling adolescent girls	ANC PNC check up
KI (272)	218 (80.1)	212 (77.9)	246 (90.4)	170 (62.5)	118 (43.4)	42 (15.4)	96 (35.3)

*Multiple responses

When further asked about the services provided by the health providers at the AWCs on Thursday or Monday the respondents prominently stated two services – immunization of mother and child (90.4%) and distribution of IFA to the PW (80.1%). Second in line came the weighing of PW and children (77.9%) and counseling on nutrition (62.5%). Others included counseling on breastfeeding and ANC/PNC check-ups.

JSY has been in existence since 2005 and still 5.1% respondents were unaware about the scheme while a vast majority was aware (94.9%).

Table 53: Benefits under JSY

	Benefits		
	Monetary help	Free Medication	Free Transport
KI (258)	257(99.6)	164(63.6)	167(64.7)

Of those who were aware about the benefits under JSY, monetary help was known to 99.6% respondents, 63.6% said that free medication was also provided and 64.7% considered that free transport was also a benefit under the scheme.



Table 54: Services at AWCs

	Services*				
	SN	Immunization	ANC/PNC check up	Growth monitoring	Adolescent health counseling
KI (272)	245(90.1)	254(93.4)	160(58.8)	84(30.9)	49(18.0)

***Multiple responses**

When asked about the regular services provided at AWCs, the respondents mainly stated SN and immunization. ANC/PNC checkups were reported by 58.8%. Some of the respondents even said that counseling to adolescent girls was also given.

It was observed that referral through ANM/ ASHA has been very poor which suggest that timely identification of danger signs in mother and child was not done by them.



Responses from MO in- charge

Out of total of 15 facilities(DH, CHC, PHC), 10 MO in charges of their respective facilities were interviewed regarding performance of the facility and the opinion related to infant mortality rates in their specified areas.

Manpower (Pediatrician, Gynecologists and Anesthetist) position, as always, is the big constraints, Jalore being no exception with just 3 pediatricians posted in the entire district (1 at CHC, Ahore and 2 others at DH). One of them has been recently posted at DH, Jalore. Accordingly in 2010-11, only 2 pediatricians were available in the Govt. health facilities for the entire infants of Jalore. As for Gynecologist and anesthetist the status is even poor with 1 each in the entire district. Infant deaths have occurred in the health facilities, but as for referrals no records of referral to or from health institutes were available.

Irrespective of the availability of SNCUs and FBNC units at the DH and CHCs covered, just for a pediatrician availability of pediatricians things could have been different. As in case of DH and CHC Ahore. Six 6 out of 10 facilities trained staff for NSSK and IMNCI but no Yashodas were posted at any of them.

Of the 10 facilities, at 6 institutions following facilities were available as stated by the MO interviewed

- DH-MTC, Blood Transfusion, Life saving Anesthetic skills (LSAS)
- CHC Sanchor-MTC
- CHC Bhinmal-Blood transfusion
- CHC Ahore-MTC,LSAS
- PHC Umedabad,- Neonatal corner
- PHC Mandawala- Neonatal corner

50 % of the MO's interviewed were aware that Jalore has the highest IMR in the state. The major reasons stated included

1. Lack of trained manpower
2. Lack of facilities to handle complications
3. Late and complicated referrals
4. Poor referrals by health workers
5. Less number of IDs
6. Poor ANC coverage
7. Others which include distance, poor roads, lack of transportation, illiteracy and unawareness in the community



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Incidentally 6 of these 7 reasons are within the control of system. The main reason (LBW, Birth asphyxia, pneumonia and infections) perceived by service providers and the understanding on the same of the households is compatible.

The in-charges faced difficulties in handling infant cases due to lack of human resource, drugs, investigative facilities & unavailability of equipments.

The respondents opined that primarily the human resource should be increased with placement of 1 pediatrician at each CHC besides improving referral system, making infrastructure and equipments available, health awareness programme, proper spacing between child birth

Regular orientation trainings on program & managerial issues and skill based trainings emerged as important steps that can be taken up immediately





Discussion

The causes for IMR are well known, constraints common and possible solutions have been time tested still infants die and that is a dilemma as the interventions lack dogged determination and a little lucidity based on actual priority.

Accessibility of health facility

The accessibility and availability of the services at health facility determines utilization. Distance as a constant factor is often taken an excuse though it is a fact that people do not mind travelling an extra mile if they are sure that the facility will have services available (Manpower and logistics). **Even if the sub center is accessible within a kilometer or two (62.8 % h/o dead infants)**, it hardly makes a difference if it does not offer services when the community needs it (some of the sub centers even in the village were not conducting deliveries).

Family profile

The basic family profiling was observed to have no major effect on infant deaths. But, economic status and education seems to have an effect on choice of place of delivery made by the family as ID was preferred more by families belonging to APL category (66.3%) who had more number of educated mothers (35.5%)

Majority of the mothers with h/o dead infants during reference period had their first pregnancy before the age of 20 years. Most of the dead infants had the birth order of more than 3. Taxing the reproductive potential at an early age and repeated pregnancies have emerged to be the prime reason for LBW (49.5%) and weaker infants ultimately find it difficult to negotiate through other common causes like fever, infections and pneumonia.

More male children were born and accordingly (54.9%) died in the reference period. Overall survival in time categories other than 1-24 hours was visibly better in female which supports the popular notion that survival rate of females are better than males. Of those infants who died of infection, females were in majority (20.3%) which might be due to lesser care owing to gender disparity, lower education status of the mother (supported by the fact that 73.3% of them were illiterate) and higher birth order.

Major determinants of infant death

68.3% of infants as observed died within 1 month of birth. While 31.7 % lived beyond a month but succumbed to death within a year. Myriad factors contributed to this reality, but one of the prime reasons was LBW of the infant at birth (30.7%) which directly corresponds to poor ANC (55.6% of PW either did not undergo any ANC or had less than 3 checkups), poor maternal health status, multi



parity (58.9% with birth order of 3 or more) and low educational status of mothers (64.2% women were illiterate).

Birth asphyxia and LBW were noted as the prime causes of death of the infant. Of the total infants who died of the aforementioned reasons, 73.8% died within 7 days of birth. Of these 43.8% were delivered at home which suggest that they did not receive any medical assistance at the time of birth which could have saved their life.

Contrary to this fact, it was also observed that of the total infants dying of birth asphyxia, even though 69% were delivered at institutions and received the care of health personnel could not be saved. In spite of the fact, that the ANMs in the surveyed area were Skilled Birth Attendant (SBA) and IMNCI trained, yet the skill of using an Ambu Bag was not put to use to save the infant.

Evidence suggests that the survival of infant is also influenced by the external environment in which the infant lives. Poverty and household income are important upstream determinants of infant mortality. Improved income triggers a cascade of structural and behavioral factors such as better housing and living conditions, food security, access to clean water, proper sanitation, access to health care, infant care and feeding practices that influence the proximal risk factors of infant mortality – malnutrition, diarrhea and infections. This could be seen in relation to the observations made for the probable cause of death against the economic status, stating that the number of children dying out of one or more infection was more in BPL families as compared to APL. Hence it can be said that improper care of newborn and unhygienic condition may be the probable cause in the BPL families.

Nature and place of delivery

Place of delivery is also an important determinant for infant survival. Many children die owing to the lack of safe delivery facilities, a practice that presents risk to both the mother and the new born. As evident from the results that in live infants the percentage of IDs was higher and so was the survival. Likewise in the dead infant category, a higher percentage (52.4%) of infants who were delivered at an institution, survived up to first 7 days compared to those who were delivered at home and died within 7 days of birth (66.6%).

Also, it was noticeable that people are well aware of the benefits of IDs, yet those who go for home delivery basically practice the same by reason of traditional practices. This is evident from the observations made which suggest a higher percentage preferring IDs (62.2%) but the reasons stated mainly corresponded to monetary benefits only.

Although IDs were preferred, yet a meager percentage stayed at the facility for 48 hours after delivery. If this norm had been followed the life of more number of newborns could have been saved by providing timely medical assistance.



Practices and knowledge

A comparison between the practices and knowledge of the care of PW and infants imply that in this regard practices overpowered knowledge. The field level health workers were giving door to door services to the community but the knowledge about the need and benefits of the various maternal and child health services was lacking.

Comparison was made between numbers of ANC done in both categories; it was found to be low in mothers of dead infants as most of the pregnant females from this category got registered only in their 2nd trimester or later.

Also, a fairly good number of mothers in both the categories were found to receive IFA tablets but merely receiving them through service providers do not ensure that it would be consumed as evident from the finding that **90% had received IFA** tablets during pregnancy but only **70% (approx.) consumed it**.

Feeding colostrums and giving bath to the infant within 24 hours of birth to the newborn was seen to be practiced in the community. However, in case of infants who died within 24 hours of birth due to some complications, it was not possible to give colostrums.

Sickness was acknowledged as the reason of poor immunization in case of dead infants, which consequently affected the health, entrapping the infant in the vicious cycle of series of illnesses. This is evident from the findings that only 48 % were immunized as compared to 92.7% live infants

Health of the mother has a direct impact on the proper growth and development of the fetus. This fact can be supported by the responses of the families with live infant who practiced proper care of the PW through timely registration & ANC checkups besides opting for ID, complete immunization for infants' and exclusive breastfeeding

27 mothers who had history of infant death prior to the reference period were a little wiser to opt for ID (70.4%) this time.

Services by ASHA

ASHA being an important link between the community and health system, shares the responsibility of generating awareness among the masses through home visits pre and post delivery; informing about the availability of maternal health services besides counseling on important health aspects like ANC/PNC, nutrition, immunization of the new born and assessment of danger signs in the infant and the mother. Lesser ANC visits were observed in households with infant death. This corresponds to the fact that at many places ASHA were not available and at places where more than one ASHA was posted, the confusion due to overlapping of area led to certain households being left unattended.



Similarly in the case of PNC visits at households of dead infants, less number of visits were made corresponding to the time of death of the infant.

Referral

Timely referral of the sick being an important factor affecting child survival was assessed in case of live and dead infants. As observed, that in 2010-11, only 2 pediatricians were available in the entire Jalore district. Hence, in view of the situation, community preferred to take their children to Gujrat or Barmer which ever was nearer.

Referral was found to be poor in case of dead infant. Considering the fact that only 1/4th of the households where infant deaths occurred, had taken their infant to the health facility. Informal probing in dead infant households brought out the fact that high expenses involved in treatment and transport were the deciding factors for not taking the infant for further treatments.

Still other reasons like poor emphases on assessment of danger signs during home visits/ MCHN days by the health workers; delay in decision making at the household level; lack of specialist facilities in the district; poor transport facility; shortage of manpower at the PHC/CHC; more faith on local healers by the community; poor follow-up of sick infants by the health workers and poor counseling on health issues leading to poor knowledge in the community about the services could not be overlooked.

In contrast to the above, the households in case of live infants were proactive and took the child timely to the health facility in case of sickness.

Interaction with KI

The reported data on death of infants was obtained from the health workers. But in view of poor maintenance and unavailability of records at some places, information was sought from KI in each village regarding infant deaths and knowledge of existing health services.

Questions regarding services provided at MCHN days, AWCs & 108 ambulance services were asked to the KI and health workers. The responses correspond to higher awareness but limited utilization of 108 ambulances with increasing distance from the CHC, where it is stationed. Poor roads and distances were other reasons limiting the reach of 108 services as most of the households where infant deaths have occurred were found mostly in the interior areas of the villages where the roads and transport facilities were poor. Even for those who were referred or proactively wanted to take the infant to health facility could not be benefitted by the services.

Immunization and distribution of IFA tablets were commonly known services provided at MCHN days. JSY was associated with monetary benefits by almost 100 % respondents. While in case of services at AWCs, immunization and SN was more popular and known. The probable cause behind the



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awareness regarding only these services might be that the community received something to take home, while in case of counseling the memory recall was affected by time.

Interaction with MO In- charges

The MO in- charges were probed about the performance of their facility and their opinion regarding infant deaths in their work areas. The unavailability of the specialist services has emerged as the most prominent cause of infant mortality in Jalore district leading to less referral on part of service providers and reluctance on part of families to spent a huge amount on transport and treatment in private hospitals and nearby state or district.

All other possible reasons stated by them revolve around poor services by the service providers at the community level.





Summary

IMR is a measure of number of infants dying per 1000 live births before completing one year of age. It is a strong indicator of poor maternal health as well as lacunas of the health system to deal with one or more complications related to mother and child health.

AHS report 2010 showed that Jalore district of Rajasthan has the highest IMR (79 /1000 live births) in the state. To understand the determinants and the primary causes of death of infants besides identifying the gaps between knowledge and practices followed in the community, a study was conducted in the selected 30 GPs in 4 blocks of Jalore district.

Discrepancy was observed in the estimated figures for live births and infant deaths and the actual obtained. Also the IMR obtained through calculation from the data received vary with the IMR given by AHS, 2010. The variation may be attributed to the area covered, sample selected, methodology adopted for data collection in both the surveys.

In the selected areas, all the available households with infant deaths between 2010 -11 and an equal number of households with healthy and live infants born in the same period were interviewed to determine the probable cause of death and assess the gaps in practices of community and service providers.

Family profile suggested that illiteracy of mothers somehow had an impact on health of the infant. More deaths occurred for infants whose birth order was more than 3 which signifies deterioration of maternal health with increasing age and birth order. This corresponds to high proportion of low birth weight infants. As for gender, more males were born and subsequently the death was also more amongst male infants.

Birth asphyxia, LBW and infections were the main medical reasons of infant deaths. These reasons are such where prevention and intervention are both possible, if the respective health worker focuses on early identifications of complication in PW and danger signs of mother and child. Also nutrition counseling to improve maternal health status and timely referral could have saved the lives.

More than $2/3^{\text{rd}}$ infants died before completing one year of life. Half of the deaths which occurred in the first hour of birth were due to Birth asphyxia, of which $3/4^{\text{th}}$ were IDs. This implies that the manpower at the facility was incompetent in handling such cases despite of being trained.

One third deliveries in case of dead infants were conducted at home and half of these were due to traditional practice of home delivery. While $1/5^{\text{th}}$ of the mothers went for ID only due to complications.

Even in spite of complications in many cases the option of caesarian was not open because there was only 1 gynecologist available in the entire district. Further in case of ID it was seen that half of the



mothers got discharged from the facility in less than 24 hrs adversely affecting the health of the infant which could have been saved if kept in medical observation.

In death infants, the immunization coverage as well as weight monitoring was also found to be poor as compared to the live infant.

Only a few service providers had well maintained records. When compared with the secondary data received from the district (through 9 A forms), the total reported infant deaths were far below the figures obtained from the study.

The referral through ASHA/ ANM was very poor owing to low ANC/PNC visits by ASHA and lack of identification of danger signs in mother and child by the service providers which was also affected by lack of specialist care at the health facilities. The counseling during home visits and MCHN days was found to be minimally reported. The distances, poor roads and lack of transportation can be said to be the reasons for poor coverage.

The 108 emergency ambulance services were located only at the CHC level and thus its utilization was limited to the nearby areas.

The reasons given by MO in-charges for infant deaths at Jalore matched the observation made in the field. The main problems encountered by the in-charges were related to trained manpower and infrastructure, lack of pro-activity on part of service provider at field level, besides factors as distance, roads, transport, illiteracy and unawareness in the community.

Though the number of infant deaths as expected (as per AHS 2010) does not match the observed number of deaths, yet it can be concluded that the medical as well as social determinants of infant mortality are predictable and preventable. Activeness on behalf of service providers at community level and awareness amongst community besides availability of trained manpower and specialist can lower the existing IMR.