A Cohort Study of Pregnancy Outcomes in Rural Area of Gandhinagar, Gujarat

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Abstract :

Introduction: In India, infant and maternal deaths go unreported with disparities in reporting systems between Health system & Civil Registration System (CRS). This study was undertaken to find out pregnancy outcomes, gaps in the reporting and understand medical and social causes of infant and maternal deaths. **Method:** A total of 874 antenatal women from a PHC area were interviewed. They were contacted after one month of expected date of delivery (EDD) to get the details of pregnancy outcome. For all the live babies, follow up was done six monthly up to age of completed one year to report any infant or maternal death. In case of mortality, Maternal or Infant death review was conducted using standardized formats of GOI to find out probable cause of death and associated factors. Such deaths were cross checked with data of PHC and gram panchayat. **Results:** There were 830 (6 twin births) live births, 2 still births and 48 abortions. Among the live births, 19 infant deaths (14 male, 4 female and 1 ambigous genitalis) were found, of which, 12 were neonatal deaths. 12 infant deaths were reported at PHC and no deaths were reported at Panchayat. Various causes for infant deaths were infection, congenital anomaly, preterm birth, birth asphyxia, Rh incompatibility etc. One late maternal death was observed and the cause was SLE with lupus nephritis. **Conclusion:** There is a opportunity for improvement in the reporting of pregnancy outcomes as well as reporting of pregnancy intrinsically. The deaths can be further reduced by addressing the first delay and correcting the delays/faults at the health facility level.

Key Words : Cohort, Infant death, Maternal Death, Pregnancy outcome

Introduction :

In India, Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR) have been declined considerably from 80[1] (1991) to 33[2] (2017) per 1000 live births and 556[3] (1991) to 131[4] per 100000 live births (2014-16) respectively. Gujarat has an IMR of 30 per 1000 live births (36 & 22 for rural and urban areas respectively) and MMR of 122 per 1000 live births,[2, 4] lower than the national average but is considerably high when compared with the developed countries. In India, maternal and child deaths are reported in namely 3 systems: (i) Health system, (ii) Integrated Child Development Services (ICDS) scheme and (iii) Civil Registration System (CRS). There have been no linkages among these systems and also, there are gaps among these systems. Many a times, infant and maternal deaths go unreported. It is important to find out such gaps locally to have maximally reliable reporting system which can pr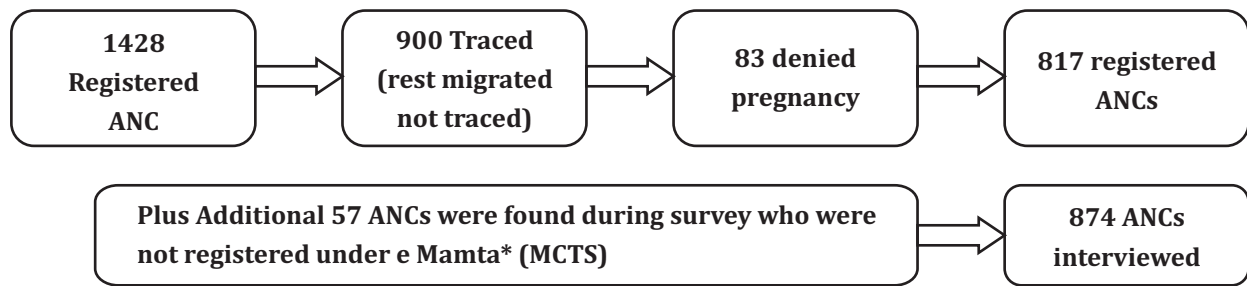ovide the accurate action oriented information[5]. As the antenatal services are considered to be good and the gaps are usually in intranatal & postnatal services, the study was proposed to follow the registered antenatal women to study pregnancy outcome. Again it is also important to know about medical and social causes of infant and maternal deaths. Hence, this study was planned with following objectives:

1. To find out pregnancy outcome among registered Antenatal women in the form of live birth, abortions, still births, infant deaths & maternal deaths in the study area.

2. To know about medical and social causes of infant and maternal deaths.

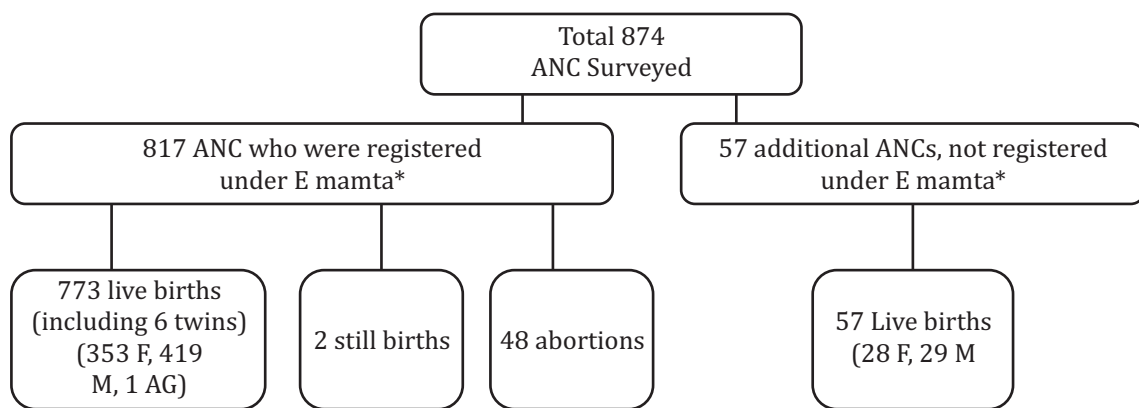3. To study gap in different maternal & infant death reporting systems.

Method:

The study was carried out in all 19 villages of a PHC of Gandhinagar, which happens to be the Rural

Figure 1: ANCs covered in the study

| 1428 Registered ANC | → | 900 Traced (rest migrated not traced) | → | 83 denied pregnancy | → | 817 registered ANCs |

| Plus Additional 57 ANCs were found during survey who were not registered under e Mamta* (MCTS) | → | 874 ANCs interviewed |

*E mamta- Mother child tracking system (MCTS) of Gujarat

Figure 2: Outcomes of pregnancy

Total 874 ANC Surveyed

817 ANC who were registered under E mamta*

57 additional ANCs, not registered under E mamta*

773 live births (including 6 twins) (353 F, 419 M, 1 AG)

2 still births

48 abortions

57 Live births (28 F, 29 M

*E mamta- Mother child tracking system (MCTS) of Gujarat

Health Training Centre (RHTC) of the college. All ANC females registered during financial year 2014-2015 at that PHC were included in the study. A total of 1428 ANCs were registered during this period. (Figure 1)

During first visit, their expected date of delivery (EDD) was noted and ANC women were contacted after 1 month of EDD to get the details of pregnancy outcome (maternal & foetal both). In case, pregnant mothers had already delivered during first visit, detail of pregnancy outcome was noted in the first visit itself.

For all the live babies, date of birth was noted and follow up was done 6 monthly up to the age of completed 1 year to report any infant or maternal deaths. In case of mortality (maternal / infant), Maternal or Infant death review using standard GOI formats[6, 7] was carried out to find out probable cause of death and associated factors. Any maternal or infant death found during study were cross checked with data of PHC and gram panchayat (talati).

Data was collected by trained paramedical staff of department and death reviews were conducted by lady medical officers and/or assistant professors of the department. Data thus collected was entered in MS Excel for descriptive analysis. For the identification of the causes/delays/contributing factors for infant/maternal deaths, case based analysis was done.

Results:

Out of 874 (817+ 57) ANCs surveyed, 830 live births were found giving birth rate of 20.0 per 1000 population. There were 381 female births, 448 male births and 1 birth with ambiguous genitalis which makes sex ratio at birth of 850 females per 1000 males. (figure 2)

At the age of 1 year, total of 19 infant deaths were found with 12 (63%) in neonatal period. There were more male deaths (73.7%) than female.IMR comes out to be 22.9 per 1000 live births (Table 1). Of 19 infant deaths, 12 (63%) deaths were reported at PHC and zero deaths were reported at Gram Panchayats.

Table 1: Outcomes among the live births at the age of 1 year

Outcomes among registered ANCs				
Outcome	Male	Female	Others	Total
Infant deaths	12	4	1 (Ambiguous genitalis)	17
a. Early Neonatal deaths	5	3	-	8
b. Late neonatal deaths	3	0	1	4
c. Post neonatal deaths	4	1	-	5
Alive	407	349	0	756
Outcome among additional pregnancies				
Infant deaths	2	0		2
a. Post neonatal deaths	2	0		2
Alive	27	28		55

Table 2: Causes and contributing factors for each Infant death

Infant deaths	Causes	Case Specific Any delay/contributing factors/social determinants
Early Neonatal (8, 42%) M-5,F- 3	a. Congenital anomaly (Tracheooeso-phageal Fistula)	a. Detection of anomaly by early antenatal USG and corrective surgery can be planned on day of birth.
	b. Congenital anomaly (Anhydramnios, Lung hypoplasia, both kidney & bladder not seen in 19wks USG)	b. Detection of anomaly by early antenatal USG and termination of pregnancy can be done.
	c. Congenital Anomaly- GI tract anomaly (jejunoileal /Deodenal /colon atresia)	c. Detection of anomaly by early antenatal USG for termination of pregnancy or planning of surgery on day of birth
	d. Birth Asphyxia	d. Prolonged labour. Delay in referring from PHC. Partograph can be of help in such cases.
	e. Birth asphyxia leading to hypoxic ischemic encephalopathy	e. From the history, No amenable intervention
	f. Hydrops foetalis	f. This was 4th pregnancy and Anti D was not given following one of the pregnancies.
	g. Hypovolemic shock due to delayed feeding with probable hypoglycemia	g. Delay in seeking treatment. (Initiation of breastfeeding on 4th day. On 5th day, baby stopped feeding, & developed drowsiness. Child was taken to hospital on 6th day.)
	h. Pre term delivery (28 weeks)	h. VLBW (1.7 kg)

Late neonatal (4, 21%) M- 3, F-0, AG-1	a.	Possible serious bacterial Infection	a.	Delay in seeking care as mother was unaware of danger signs. LBW, no EBF, Teenage pregnancy
	b.	Preterm (7 months)	b.	ELBW (900 gms), Baby was given powdered milk after 1 day. Teenage pregnancy.
	c.	Pre term (26 weeks), Congenital Anomaly-Ambiguous genitalis with Ascites	c.	Detection of anomaly by early antenatal USG for termination of pregnancy or for preparation of proper management from the day of birth.
	d.	Acute diarrheal disease	d.	No EBF. No other contributing factors found.
Post neonatal (7, 37%) M-4,F- 1	a.	Not taking feed/ persistent vomiting /prerenal failure	a.	Delay in seeking care and refusal for hospital admission by parents.
	b	Acute Diarrhoeal disease	b.	Child was never breastfed as mother had active tuberculosis. Child stopped taking feed but private hospital didn't admit the patient as per the respondent and child died at home.
	c.	Fever with diarrhea	c.	No delay / contributing factors found.
	d.	Fever with seizures	d.	–do-
	e.	Typhoid fever	e.	–do-
	f.	Congenital heart disease/ pneumonia	f.	Delay in seeking care. Baby was having excessive cry since 10 days, parents decided to seek care when he developed breathing difficulty and chest in drawing.
	g.	Failure to thrive and abdominal distension	g.	Child was never breastfed as mother had SLE. Infant had vomiting since birth. No vaccine was given. Mother died at 6 weeks after delivery. H/o alcoholism and smoking in family (father).

Table 3: Detail of Maternal death

Age of mother	Time of death	Cause of death	Remarks
22	43rd day (late maternal death)	SLE + Lupus nephritis	Pre-existing SLE which got worsened following delivery.

From the death reviews, various causes for infant deaths found in descending order were infections, preterm birth, congenital anomaly, birth asphyxia, Rh incompatibility etc. Each of the deaths was assessed for the presence of contributing factors and/or delay and are mentioned in table 2.

One maternal death was found on 43rd day of delivery, which is considered as late maternal death,[8] detail of which is mentioned in table 3. This death was also not reported at PHC or Gram Panchayat.

Discussion:

The study was conducted among 874 ANCs of a PHC catchment area. Among these 6.5% ANCs were not registered under Government MCTS and found during the survey. 830 live births, 2 still births and 48 abortions were outcome of these 874 ANCs. Birth rate in the study was 20.0 which is lower than the national estimate of rural area [9] (22.1). Sex Ratio at birth in our study is quite low (850) than the national average [9] of 898 (2014- 2016). Lower sex ratio suggest male child preference in the community which is indirectly reflected in abortion rate (5.2 per 1000 females of reproductive age group) and furthermore 83 registered ANCs who denied being pregnant (figure 1), might have terminated their pregnancy and probably concealed their abortion. There could be a likelihood of unsafe abortion in these cases and probably they might not want to disclose their pregnancy. 19 infant deaths (830 live births) were detected, among which 63% of deaths were in neonatal period, out of which, 66.7% deaths were in first week of life. In contrast analysis of DLHS 4 [10] showed 39.4% of deaths in neonatal period, of which 73% were in the first week of life. IMR in our study was 22.9 and NMR was 14.5 per 1000 live births. Both are lower as compared to SRS estimate of rural area in 2016[9]. Both the rates are comparable to SRS estimates of urban area[9], which is probably due close proximity of PHC to Ahmedabad city. As per SDGs [11], the goal is to reduce NMR to 12 by 2030, which is achievable, provided the preventable causes get addressed. Various studies[12, 13] have shown higher mortality in females during infancy, while in our study, 74% of infant deaths were male child, reflecting adequate care of girl child in desired families.

As per WHO, deaths of children within the first 28 days of birth are associated with lack of quality care at birth or skilled care and treatment immediately after birth and during the first few days of life[14]. Causes for neonatal deaths in our study in descending order were preterm birth (25%), congenital anomaly (25%), infection (17%)(diarrhoea and possible serious bacterial infection), birth asphyxia (17%)

followed by Rh incompatibility (8%) and hypovolemic shock/hypoglycemia (8%). All these births took place at health care facility (10 in private hospital, 2 in government hospital). Causes for post neonatal deaths were infections in 57% of cases (fever, diarrhoea, typhoid etc) and others were prerenal failure, congenital heart disease and failure to thrive. During 2008-12 in study of North India13, birth asphyxia (31.5%) followed by low birth weight (LBW)/prematurity (26.5%) were the most common causes of neonatal death, while infection (57.8%) was the most common cause of post-neonatal death. As per DLHS 410, Birth injuries, low birth weight and neonatal infections were the leading causes of neonatal deaths. Acute respiratory infection was the most common cause of post-neonatal deaths.

No delay was found in 42.1% (8) deaths among which 4 cases were of congenital anomaly, where early antenatal USG can help in detection and planning for either termination of pregnancy or surgery on day of birth. Other cases were of birth asphyxia, fever and diarrhoea. Similar result was there in study of North India[13], where delay was not observed at any level in 47% (24) deaths and among which, the most common cause of death was congenital malformation and birth asphyxia.

Delay in seeking care (1st delay) was found in 21% (4) of deaths (in 16.6% of neonatal deaths & in 28.5% of post neonatal deaths), delay in reaching the health care facility (2nd delay) was, not associated with any deaths. However, there were 5 deaths which happened on the way to health care facility in which either there was presence of first delay also or it happened during the way from one health facility to the next. Delay at health care facility (3rd delay) in receiving care was not directly linked. However, some lacunas were identified in 3 cases: i) anti D was not given to Rh negative mother in previous delivery leading to hydrops foetalis in current baby, ii) a child having diarrhoea with poor feeding and fluid intake was not admitted at the health facility, iii) staff at the facility failed to identify prolonged labour leading to foetal distress. Study of North India [13] showed delay at level 1 as most common and occurred in 32.4% of neonatal deaths and 29.4% of post-neonatal deaths. Delay levels 1, 2 and 3 were reported among 14 (27.5%), 4 (7.8%) and 4 (7.8%) deaths, respectively.

In our study one late maternal death [8] was found

on 43rd day of delivery in which cause of death was systemic lupus erythematosus (SLE) with lupus nephritis. SLE is mentioned under common indirect causes of maternal death in ICD MM. [8] Pregnancy constitutes a major challenge for women with SLE when compared with other women, resulting in some life threatening complications i.e. severe kidney, lung or heart disease. [15] A study on pregnancy outcomes of lupus showed a significantly greater proportion of preterm births, growth restriction and infants in the very low birth weight category among lupus affected pregnancies compared with the control group. [16] In our study, the infant of this patient died at the age of 4 months.

Conclusion & recommendations:

1. IMR and NMR in the study area were comparable to the estimates of urban area. 63% of deaths were in neonatal period.

2. Out of total 19 infant deaths, at least 7 deaths were evidently preventable. These were either because of delay in seeking care (because of unawareness regarding danger signs) or delay/ faulty practice at health care facility i.e. lack of administration of Anti D after each delivery in case of Rh negative mother, no use of partograph at health care facility to detect prolonged labour and timely referral. Strengthening of home based newborn care (HBNC) is essential for early detection of danger signs in the infants once discharged from facility.

3. For congenital anomaly, early detection can help to reduce mortality either by termination of pregnancy or by planning of appropriate surgery after birth based on the type of anomaly.

4. Reporting of deaths need to be strengthened as 63% of deaths were reported at PHC and no infant deaths were reported at Panchayat.

5. One late maternal death was found and the cause being SLE is an indirect cause of maternal death.

6. Study could find 57 additional pregnancies which were not registered under E mamta (MCTS). So reporting of missed pregnancies requires cross validation of reported data by supervisor or medical officer to fill up the gap.

Acknowledgements:

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