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Research Article

Morbidities, Rate and Time Trends of Neonatal Mortality in Dilchora Referral Hospital, Dire Dawa, Ethiopia, 2012-2017

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Corresponding author:** Roba AA, Department of Pediatrics and Neonatal Nurses, School of Nursing and Midwifery, College of Health and Medical Sciences, Haramaya University, Ethiopia**Received:** September 28, 2017; **Accepted:** October 27, 2017; **Published:** November 03, 2017**Abstract*Introduction:** The study assessed causes of admission, the rate and time trends of neonatal mortality in Dilchora referral hospital, Dire Dawa, Ethiopia, 2013-2017.**Methods:** A hospital based 5 years retrospective study was conducted among neonates admitted to NICU from January 1/2013 to September 10/2017 in Dilchora hospital, Dire Dawa, Ethiopia. Data was abstracted from Neonatal Intensive Care Unit Registration logbook by four data collectors. It was coded, and entered in to Epi Data version 3.02 and exported to SPSS version 20 for analysis. Descriptive statistics was used to describe the frequency, mean and standard deviations.**Results:** A total of 3418 neonates were admitted to NICU from January 1/2013 to September 10/2017 and 391 neonatal deaths were registered. This indicated that the overall neonatal mortality rate was 11.44%. Suspected sepsis (35.31%), prematurity (19.05%), respiratory distress (15.27%) and perinatal asphyxia (12.73) were the leading causes of admission (more than 82%) to Neonatal Intensive Care Unit (NICU). The major causes of neonatal mortality were complications of prematurity 97 (24.8%), infection 125 (31.97%) and birth asphyxia (22.25%). Neonatal mortality rate in NICU had sharp decline from 2013 to 2015, but the after it was almost constant and slightly increasing.**Conclusion:** Suspected sepsis, prematurity, respiratory distress and perinatal asphyxia were the leading causes of admission to NICU while sepsis, prematurity and birth asphyxia were the major causes of neonatal deaths. There was steady little declining in neonatal mortality between 2013 and 2015, but then after, it was slightly increasing up to 2017. Future studies are required to investigate the factors contributing to the neonatal mortality and trends in Dire Dawa, Eastern Ethiopia.**Keywords:** Cause of admission; Rate and trends of neonatal mortality; Neonatal morbidity; Dire Dawa; Ethiopia**Introduction**

Every year 1.16 million African babies die in the first month of life. Half of these newborn deaths occur in just five countries: Nigeria, Democratic Republic of Congo, Ethiopia, Tanzania, and Uganda. Neonatal deaths account for 45% of all deaths among children fewer than 5. The majority of all neonatal deaths (75%) occur during the first week of life, and 25% to 45% occurs within the first 24 hours. 80% of causes of death were due to prematurity, infections, asphyxia and birth trauma [1,2].

In Ethiopia, Rates of neonatal mortality were highest in sub-Saharan Africa and Asia. The gaps between rich and poor countries were widening: neonatal mortality is now 6.5 times lower in the high-income countries than in low income Countries. The life time risk for a woman to lose a newborn baby was 1 in 5 in Africa, compared with 1 in 125 in more developed countries [3]. Most newborn deaths occur during the first week of life as a result of sepsis, birth asphyxia, birth injuries, complications of prematurity and low birth weight, and

birth defects [4].

Neonatal mortality has been declining worldwide. The number of deaths among babies 0-28 days of life decreased from 4.4 million in 1990 to 3 million in 2010. There was also 28% reduction in neonatal mortality rates over the same period of time. Although both, numbers and rates, have been lessening over the last 20 years, neonatal mortality account for an increasingly proportion of under five deaths [5].

Evidences indicated that the second half of the twentieth century witnessed a remarkable reduction in child mortality, with a halving of the risk of death before the age of 5 years. The majority of this reduction, however, has been due to lives saved after the first four weeks of life, with relatively little reduction in the risk of death in the neonatal period [6-8]. In Ethiopia also, even if MDG 4 was achieved 2 years ahead of deadline, new-born mortality was very high and stagnant over the past decade (42% of under-five death was due to NMR) [9].

Table 1: Causes of neonatal admissions to NICU from 2013-2017, DilChora referral hospital, Dire Dawa.

Cause of admission	2017 (n=687)		2016 (n=875)		2015 (n=945)		2014 (n=511)		2013 (n=400)		Total (n=3,418)	
	Mag*	%	Mag	%	Mag	%	Mag	%	Mag	%	Mag	%
Prematurity	125	18.2	174	19.89	151	15.98	93	18.2	108	25	651	19.05
Suspected sepsis	231	33.62	311	35.54	382	40.42	163	31.90	120	30	1207	35.31
Respiratory distress	96	13.97	88	10.06	149	15.77	78	15.26	111	27.75	522	15.27
Perinatal Asphyxia	58	8.44	96	10.97	126	13.33	88	17.22	67	16.75	435	12.73
Congenital Malformation	28	4.08	29	3.31	34	3.60	14	2.74	18	4.5	123	3.60
Meconium aspiration	78	11.35	90	10.29	104	11.01	63	12.33	41	10.25	376	11
Anemia	6	0.87	5	0.57	8	0.85	4	0.78	3	0.75	26	0.76
Others	65	9.46	82	9.37	142	15.03	135	26.42	70	17.5	494	14.45

Mag* Magnitude of the problem

Table 2: Admission and death rate in NICU, DilChora referral hospital, Dire Dawa.

Year	Admission	Death	Neonatal Mortality rate
2013	400	75	18.75
2014	511	81	15.85
2015	945	76	8.04
2016	875	87	9.94
2017	687	72	10.48
Total	3,418	391	11.44%

Many neonatal deaths are preventable with existing low-cost, low-tech interventions but to make effective use of limited resources, planners and policymakers require reliable cause-of-death information. Information regarding causes of neonatal morbidities and mortality, particularly in the first week of life when three-quarters of neonatal deaths occur, is fundamental for developing and tracking public health strategies. There is very limited information regarding cause of admission, death, rate and trends in neonatal death to NICU admitted neonates in Ethiopia, particularly to eastern Ethiopia. So, the aim of this study is to find-out the cause-of admission and death, rate and trends of neonatal mortality in DilChora referral hospital, Dire Dawa, eastern Ethiopia.

Methods and Materials

Study area and period

Hospital based retrospective descriptive study covering a period of five years from January 1/2013-September 10/2017 were conducted in Dire Dawa town, DilChora Hospital, eastern Ethiopia. Dire Dawa was founded in 1902 when the railroad from Djibouti reached the area. It is center of Dire Dawa city administration and the second largest city in Ethiopia. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Dire Dawa has a population of 341,834, of whom 171,461 are men and 170,461 women; 233,224 or 68.23% of the population are urban inhabitants. DilChora Referral Hospital (DCRH), the only governmental hospital in the region, which was established in 1952 and since then, has been serving the ever increasing population of the Dire Dawa City and its adjacent regions, Oromiya and Somalia.

Study population: All neonates who were admitted to NICU and died in DilChora hospital from January 1/2013-September 10/2017 and that fulfill inclusion criteria.

Inclusion criteria: The admission files of all new born babies who were admitted to NICU and died in the unit during the study period were investigated. In-patient neonatal mortality rate/Neonatal death rate/ was defined as the ratio of total number of newborn deaths occurring among admitted sick neonates to total number of newborn discharged (including death) for a period multiplied by 100%.

Exclusion criteria: Patient cards with incomplete data/missing variable and unknown diagnosis were excluded.

Data collection

Secondary data was abstracted from Neonatal ICU treatment registers by using a structured questionnaire. These include socio-demographic data (age, sex, residence), Mode of delivery, para, gravida, maternal HIV status, ANC follow-up, multiple birth, birth weight, infant temperature, extra uterine adaptation (crying, need of resuscitation), problems identified at birth/cause of admission, treatments given, treatment outcome, and duration of hospital stay.

Data quality control

Training was given to four data collectors who were BSc nurses on how to gather information from registration cards. Registrations with incomplete data/missing variables were discarded. Close supervision was undertaken during data collection by principal investigator.

Data processing and analysis

Epi Data version 3.02 was used for data entry while SPSS version 20 and Microsoft Excel were used for data analysis. Descriptive statistics was used to describe the frequency, mean and standard deviations. Tables and graphs were used to summarize and present the data.

Ethical considerations

Ethical clearance was obtained from Haramaya University, College of Health and Medical Sciences Institutional Health Research and Ethics Review Committee (IHRERC) and submitted to DilChora hospital. The hospital managements were informed about the objectives of the study, risks, benefits and confidentiality. Written and signed consent was obtained from hospital administrator after reading the information sheet.

Result

Five years newborn registration logbook reviews were conducted. A total of 3418 neonates were admitted to NICU from January 1/2013

to September 10/2017 and 391 neonatal deaths were registered. This indicated that the overall neonatal mortality rate was 11.44%.

Neonatal morbidities

Suspected sepsis, prematurity, respiratory distress and perinatal asphyxia were the leading problems of neonates in which they constituted more than 82% of admission to Neonatal Intensive Care Unit (NICU). Sepsis was the top leading and anemia was the least for admission (Table 1). Regarding the congenital anomalies, defects in central nervous system and gastro-intestinal tract were the leading identified problems. In the “others” category, the leading problems for admission were unable to suck, jaundice, skin infection, cord bleeding, vomiting, infants of diabetic mother with hypoglycemia and macrosomia and birth trauma. More than one admission criteria’s were observed for some neonates and it was counted as it is.

Trends of neonatal morbidities

Although the patterns of many of the neonatal problems were declining over the last five years as depicted in (Figure 1), the rate of reduction for some intrapartum related problems were sluggish. Perinatal asphyxia was sharply reducing during the study period while respiratory distress and prematurity declining slowly. Problems of meconium aspiration, congenital anomalies and anemia were relatively constant over the study period. Admission due to neonatal sepsis was sharply increasing from 2013 to 2015 but then after showing slow decline (Figure 1).

Neonatal mortality

A total of 391 neonatal deaths were registered during the five years study period (Table 2). Among the deceased neonates, 247 (63.17%) were delivered by Spontaneous Vaginal Delivery (SVD), 87 (22.25%) were by Cesarean Section (C/S) and the remaining 57 (14.58%) were by assisted vaginal delivery. More than half, 206 (52.69%) were didn’t breastfeed after birth, 101 (25.83%) breast fed, the remaining 84 (21.48%) were not registered. Out of those who initiated breast feeding, more than three fourth i.e. 78 (77.23%) were initiated after the recommended one hour of delivery. 272 (69.57%) of mothers had at least one Antenatal care follow-up. On the other hand, 263 (67.26%) of neonates from HIV negative mothers, 29 (7.42%) were from positive and 99 (25.32%) were from HIV status unknown mothers. Of these neonates, 242 (61.89%) were referred from maternity ward of the same hospital, 87 (22.5%) from other health institutions and 62 (15.6%) were came from home. Regarding birth weight among deceased neonates, only 184 (47.06%) were birth weights 2.5-4kg; 164 (41.94%) were below 2.5 kg and 43 (11%) were above 4kg. Mean weight at admission was 2.27 kg with SD=0.872 (Table 2).

*Neonatal Mortality rate [10] =Total number of newborn death for a period x 100

Total number of newborn discharge (including death) for a period

Hospital stay before death of a neonate indicated that the first week was critical especially the first 72 hour. The mean, mode and median hospital stay before death were 3.78, 3 and 2 days (SD±4.261). More than 70% of neonatal mortality occurred in the first 3 days of life, which indicated the early neonatal mortality rate had paramount importance (Figure 2). The causes of neonatal mortality were

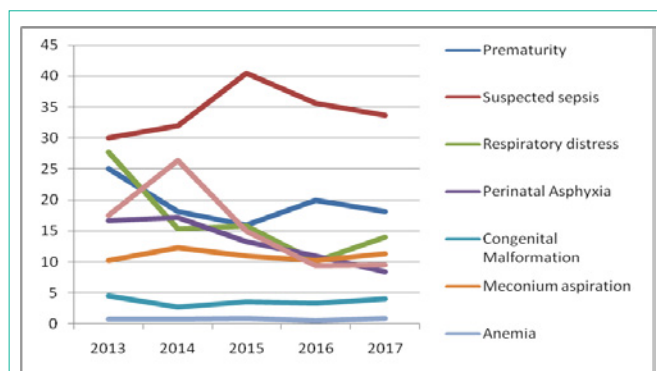


Figure 1: Trends of Neonatal morbidities in DiIChora referral hospital, Dire Dawa Ethiopia.

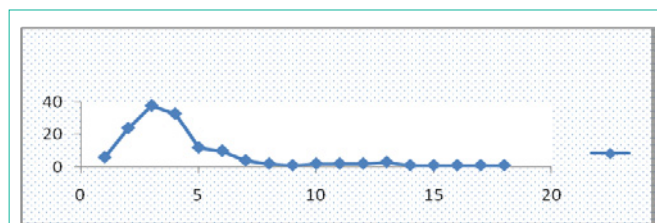


Figure 2: Hospital stay and Neonatal mortality in DiIChora hospital, Dire Dawa.

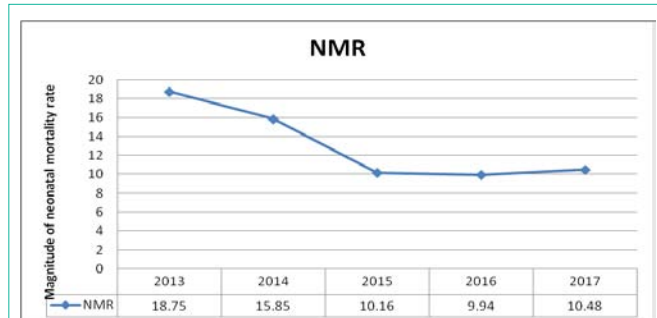


Figure 3: Trends of neonatal mortality rate in DiIChorareferal hospital, Dire Dawa.

complications of prematurity 97 (24.8%), infection 125 (31.97%), birth asphyxia (22.25%), congenital malformations 5 (1.28%) and others 77 (19.7%) (Figure 2). Of the deceased neonates, 114 (29.15%) were not cried after birth. Of them, 85 (74.56%) were resuscitated at delivery room and referred to NICU for admission and follow-up 29 (25.44%) were direct referral cases without getting the golden minute help to breath.

Trends in NMR

Neonatal mortality rate in NICU had sharp decline from 2013 to 2015, but the after it was almost constant and slightly increasing (Figure 3).

Discussion

Suspected sepsis, prematurity, respiratory distress and perinatal asphyxia were the leading problems of neonates in which they constituted more than 82% of admission to Neonatal Intensive Care Unit (NICU). Infection was the leading cause of neonatal admission

to NICU. This finding was compatible with other similar studies [11].

Around 80% of neonatal deaths in NICU were caused by birth asphyxia, infection and complications of prematurity. These were consistent with various previous studies [12-16]. The vast majority of deaths were due to preventable complications of prematurity, birth asphyxia and early onset neonatal sepsis. This may be due to inadequate birth preparedness and limited skill like essential newborn care and neonatal resuscitation to manage adaptation problems of newborn to extra uterine life. High prevalence of early onset neonatal sepsis may be associated with breaches in six cleans (clean delivery surface, hand, perineum, cord tying, cutting, cord care) [17].

The first week of life was the time in which the highest numbers of deaths were occurred. More than 70% of neonatal mortality occurred in the first 3 days of admission. This was in line with findings elsewhere like 85.9% Zimbabwe [18], 62.7% in Ghana [19], 74.2% in Cameroon [2], 73% in Pakistan [20], 79% in Jordan [21], 76.4% in Bangladesh [22] and 80% in China [23]. These studies indicated that the first three days and the first week of life were very critical for newborn survival and smooth extra uterine transition. These studies also indicated that the leading causes of mortality in this period were preventable by their nature such as complications of prematurity, perinatal asphyxia, early onset neonatal sepsis and respiratory distress if standard newborn care were applied.

Overall, neonatal mortality was 11.44% which was declined from 18.75% in 2013 to 10.48% in 2017. The trend of neonatal mortality reduction in this study was comparable with other findings [2]. In this study, there was improvement in neonatal mortality rate. This may be due to improvement in infrastructure (New building of NICU), socio-economic improvements of the people and short and long term NICU management training of NICU staffs by stakeholders. This may be in contrast with other studies in which socioeconomic improvements had no association with reduction of NMR [24,25].

Conclusion

Suspected sepsis, prematurity, respiratory distress and perinatal asphyxia were the leading causes of admission to NICU while sepsis, prematurity and birth asphyxia were the major causes of neonatal deaths. There was steady little declining in neonatal mortality between 2013 and 2015, but then after, it was slightly increasing up to 2017. Future studies are required to investigate the factors contributing to the neonatal mortality and trends in Dire Dawa, Eastern Ethiopia.

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