

**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF NURSING AND MIDWIFERY
DEPARTMENT OF NURSING**

**MAGNITUDE AND PREDICTORS OF EARLY NEONATAL MORTALITY
IN SELECTED GOVERNMENTAL HOSPITALS IN ADDIS ABABA
ETHIOPIA, 2020. RETROSPECTIVE CROS-SECTIONAL STUDY**

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Declaration

I, the undersigned, declare that this M.Sc. thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the proposal have been duly acknowledged.

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ABBREVIATION AND ACRONYMS

AIDS	Auto Immunodeficiency Syndrome
ANC	Anti Natal Care
AOR	Adjusted Odds Ratio
APGAR	Appearance, Pulse, Grimace, Activity, Respiration
CI	Confidence Interval
COR	Crude Odds Ratio
DM	Diabetes Mellitus
EDHS	Ethiopian Demographic Health Survey
ENMR	Early Neonatal Mortality Rate
FMOH	Federal Ministry of Health
GA	Gestational Age
HIV	Human Immunodeficiency Virus
HTN	Hypertension
LBW	Low Birth weight
MAS	Meconium Aspiration Syndrome
MDG	Millennium Development Goals
NICU	Neonatal Intensive Care Unit
NMR	Neonatal Mortality Rate
PPROM	Prolonged Premature Rupture of Membrane
PROM	Premature Rupture Of Membrane

RH	Rhesus
RDS	Respiratory Distress Syndrome
ROM	Rupture of Membrane
SPSS	Statistical Package for Social Science
SSA	Sub-Saharan Africa
WHO	World Health Organizations

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ABSTRACT

Background: The first month of life is the riskiest time for child survival. Worldwide, an estimated 2.5 million newborns deceased in the first month of life in 2018 with estimate of 7,000 death per day and a third of all neonatal deaths tend to occur on the day of birth and close to three quarters die in the first week of life. Ethiopia is one of the ten countries which account to two-third of global neonatal death. **Objective:** This study aims to assess magnitude and predictors of early neonatal mortality among early neonates admitted in neonatal intensive care unit of selected governmental hospitals in Addis Ababa, Ethiopia, 2020. **Methods and materials:** Institutional based retrospective cross-sectional study design was conducted at Tikur Anbessa specialized hospital, Gandhi memorial hospital, Zewuditu hospital and Yekatit 12 hospital at Addis Ababa and data was collected from February 15 to June 5, 2020 from medical record sheets of early neonates who were admitted in NICU from January 1, 2018 to December 30, 2019 by using a check list with a total sample size of 303. Simple random sampling method was used to select hospitals and systematic sampling method to select study units. Descriptive statistics were used to compute individual variables and regression analysis for associated variables by considering 95% CI, p value of 0.05 to show strength of association by using SPSS version 24 software. **Result:** The study report revealed that 18.2% of neonates died in their early neonatal period. Being pre-term [AOR: 0.088; 95% CI (0.015-0.515)], having birth defect [AOR: 2.759; 95% CI (1.072-7.1), oxygen treatment in early neonatal period [AOR: 11.629; 95% CI (4.950-27.317) and initiation of breast feeding within one hour [AOR: 0.061; 95% CI (0.014-0.272)] are significantly associated with early neonatal outcome. **Conclusion and recommendations:** According to this study early neonatal mortality was decreased from the study done previously at Addis Ababa. Initiating breast feeding within one hour of birth, birth defect and Oxygen treatment which was found to be a significant predictor of early neonatal mortality by affecting neonatal outcome positively or negatively. So, it is better to give a special attention for neonates admitted in NICU especially early neonates with important predictors of mortality. **Key words:** neonate, neonatal outcome

1. INTRODUCTION

1.1. Background

Neonates are the future generations and upkeep their healthy growth, progress and all the activities concerning them must be the anxiety of all individuals. Neonatal period which is defined as period beginning at birth and ending at 28 completed days of life are the most vulnerable time for a child's, especially that of first seven days of life are the riskiest time for child survival. World health organization has also demarcated neonatal death as "deaths among live births during the first 28 completed days of life, neonatal death more sub-divided into early neonatal death (deaths between 0 and 7 completed days of birth) and late neonatal deaths (deaths after 7 days to 28 completed days of birth) is a principal indicator for neonatal health and wellbeing and is becoming a noticeable component of overall under-five mortality. Kids face greater risk of dying in their first month of lifetime, at a global rate of 18 deaths per 1,000 live births(1,2).

Compared to adults, children specifically those under the age of five are mostly vulnerable to death and they are more likely to sick, lost, incapable to access help or health care, or unprotected to greater. Crosswise the human lifespan, an individual face the greatest risk of death during birth and the first 28 days of life(neonatal period) and decline in neonatal mortality over the last decades have been slower than that of postnatal and early childhood mortality .Globally more than 86% of neonatal deaths are due to three reasons which are infections, prematurity and birth complications and many of these deaths might be prevented with health care before, during and after delivery(3).

Center of disease prevention and control global health maternal and child health Strategy has a decade's long history of pleasing in activities to advance maternal and child health internationally, structuring on its domestic expertise, and making important helps to decrease child mortality and morbidity around the world. According to Center of disease prevention and control, to reduce Under-5 perinatal as well as maternal indisposition and death, the goals should be headed on strengthening actions during facility based well child visits, advance care of sick infants and children,improve population and communal based disease prevention and control,strengthen antenatal care to improve perinatal and maternal consequences,expand emergency obstetric care coverage and improve access to family planning and preconception health(4).

Neonatal mortality is still overall municipal problem with the immense majority of death occur in low- and middle-income countries. Worldwide, an estimated 2.5 million newborns deceased in the first month of life in 2018 with an estimate of 7,000 death per day with substantial disparity of mortality rate, a third of all neonatal deaths tend to happen on the day of delivery and near to three quarters die in the first week of life. These findings propose that focusing on the life-threatening periods before and immediately following birth is crucial for saving more newborn lives. Advancement in reducing neonatal mortality is sluggish than mortality in grown ages and the share of neonatal deaths relative to all under five deaths has increased(1).

The well-being of mothers and newborns is straightforwardly related, there for to reduce neonatal morbidity and mortality or upholding health averting deaths requires, in many cases, applying the same interventions. These include such vital measures as antenatal care, skilled attendance at birth, admittance to emergency obstetric care when necessary, adequate nourishment, post-partum care, newborn care and education to advance health, infant serving and care, and sanitation behaviors(5).

A Meta-Analysis of Demographic and Health Surveys in Sub-Saharan Africa listed that, the approximation for perinatal mortality within Sub-Saharan Africa was 34.7 per 1000 births. The joint sub-regional estimates for Eastern, Western, Southern and Central Africa were 34.5, 35.7, 30.3 and 30.7 per 1000 births, respectively(6).

1.2. Statement of the Problem

Kids continue to face prevalent regional disparities in their likelihood of survival and child mortality is an incomplete agenda of the Millennium Development Goals global number of neonatal deaths decayed from 5.0 million in 1990 to 2.5 million in 2018. Neonatal mortality accounted for 47 per cent of all under- five mortality in 2018, increasing from 40 per cent in 1990 due to a quicker global decline in mortality among kids aged 1–59 months than for children in their first month of life. These conclusions suggest that focusing on the critical periods before and immediately subsequent to birth is essential to saving further newborn lives (1).

Regardless of a progressive decrement under-five child mortality in global level low-income countries, facing an upturn in the percentage of newborn morbidity and mortality every day in Africa, 3,100 newborns die within 28 days of birth. Findings report that in most countries in sub-Saharan Africa (SSA), the prominent reason of newborn deaths were infections such as tetanus, sepsis and pneumonia, preterm birth complications and birth asphyxia (7).

A study finding in the Neonatal Intensive Care Unit in Iran indicated that, about 10.23% neonates deceased with a neonatal mortality rate of 6.44 per 1000 live births in the course of seven-year period and early neonatal death was about 2.16 per 1000 live births. Early neonatal mortality rates were suggestively different based on gender, birth weight, gestational age, different reasons of death and different years of death (2006 -2013) and, the very early mortality rate ([of neonatal deaths in the first 24 h after birth/ total of live birth] x 1000) was 3.33, and the late mortality rate ([of neonatal deaths 8-27 days/ total of live birth] x 1000) was 0.96(8).

In a study done at Indonesia on risk factors linked with neonatal deaths, 74% of neonatal deaths happened in the first week of life (early neonatal death). In the first subdivision analysis of early neonatal death category, the leading risk factors were neonatal complications during birth, low Apgar score, and the neonate having a health problem(9).

Decreasing neonatal mortality has been sluggish than that for maternal and child (1–59 months) mortality, slowest in the peak burden countries, particularly in Africa, and decline is even slower for stillbirth rates(10).

A meta-analysis of demographic and health surveys on perinatal death in sub-saharan africa disclosed a pooled guesstimate of perinatal death rate for Eastern Africa 34.5, Tanzania 39.5, Burundi 38.2 and Mozambique 37.8. On the other hand, the rate reported was not significant because their confidence interval overlapped with the pooled sub-regional estimate. Whereas Kenya 28.7 indicated the lowest perinatal death rate in the sub-region(6).

Ethiopian demographic health survey done in 2016 described that Neonatal mortality dropped from 49 deaths per 1,000 live births in 2000 to 29 deaths per 1,000 births in 2016, a decrement of 41% over the previous 16 years. MDG (millennium development goal) with respect to neonatal death is less accomplished as equated to infant (declined by 50%) and childhood (decreased by 60%) death(11).

The study in southern Ethiopia displayed that total, neonatal mortality incidence was 27 per 1000 neonates-days. Predictors of neonatal death were: multiple birth, mothers who did not attend antenatal care visits, neonates delivered by cesarean section, not started breast feeding within 1 hour of delivery, those neonates lifesaving support, those having hyaline membrane disease and perinatal asphyxia(12).

This high magnitude of early neonatal mortality may be due to poor identification of contributing factors and lack of effective interventions on those factors. So, identification of those factors will have significant effect on the decrement of neonatal morbidity and mortality. This study aims to assess the magnitude of early neonatal mortality and identify factors which contributes for morbidity and mortality of neonates in NICU and fills the gap that's seen in poor decrement of neonatal mortality.

1.3. Significance of the study

Primarily this study determines the magnitude of early neonatal mortality and contributing factors for early neonatal mortality in NICU of selected hospitals. Determining contributing factors also help policy maker to formulate effective neonatal care policy through focusing on the contributing factors, developing guidelines and regulations for the management and prevention of neonatal morbidity and mortality.

Health care professionals also can use the policy, guideline and as well as this research result as a guide to manage neonates in NICU. In cumulative the result of this study could have its own effect in decreasing and combating early neonatal mortality and also helps in identification of those factors that have significant effect on the decrement of neonatal morbidity and mortality. Finally, this study can be used as an information for further researches.

2. LITERATURE REVIEW

2.1. Magnitude of early neonatal mortality

Underprivileged maternal, newborn and child well-being continues to be a significant problem and symbolize two of the most challenges to achieve targets among the millennium development goals predominantly in low- and middle-income countries. Majority of infant mortality is highest in the first 28 days of life. Sub-Saharan Africa leftovers the region with the maximum under five mortality rates in the globe. In 2018, the region had an average under-five mortality rate of 78 deaths per 1,000 live borne. This decodes to 1 in 13 children dying earlier to his or her fifth birthday 16 times greater than the average ratio of 1 in 199 in high-income countries. It is serious to further speed up progress in preventing child deaths(1,13,14).

In the face of progress over the earlier quarter-century, millions of newborns, children and young adolescents die every year, commonly of avoidable or curable causes such as infectious illnesses and harms. These deaths mirror the incomplete access of kids and communities to elementary health interferences such as vaccination, therapeutic management of infectious diseases, adequate nourishment and clean water and sanitation. Therefore, death rates among children and young adolescents are not only key pointers for child and young adolescent well-being, but, more broadly, for sustainable social and economic development(15).

Recent trends forecast that near to 10 million 5- to 14-year-olds and 52 million children aged under 5 years will die between 2019 and 2030. Just about half of these under-five mortality will be newborns whose deaths can be prevented by reaching high coverage of excellence antenatal care, skilled care at delivery, postpartum care for mother and baby, and care of small and sick newborns(1).

Sub-Saharan Africa has one of the highest levels of perinatal death worldwide, conversely, there are sub-regional and country-specific disparities in its distribution. The joint estimate for perinatal mortality rate per 1000 births crosswise 21 countries in the four sub-regions of SSA was 34.7. Eastern Africa reported 34.5 with the highest rate observed in Tanzania 39.5, Western Africa reported 35.7 with the highest rate observed in Nigeria 40.9, Southern Africa reported 30.3 with the highest rate observed in Lesotho 49.6 Central Africa reported 30.7 with the highest rate observed in Equatorial Guinea 37.3(6).

Ethiopia is one of the ten countries which account to two-third of global neonatal death and also among the six countries accounting half of global under five deaths. The 2016 Ethiopian Demographic Health Survey (EDHS) results show that the neonatal, infant, and under-5 mortality rates for the 5 years before the survey were 29, 48, and 67 deaths per 1,000 live births, respectively. In other words, in Ethiopia 1 in every 35 children dies within the first month, 1 in every 21 children dies before celebrating the first birthday, and 1 of every 15 children dies before reaching the fifth birthday (11).

The study in Ethiopia at Addis Ababa showed an early NMR of 23.3% (233 per 1000 live births); 96.6% of the deaths occurred during the first three days of life(16).And in a study done in northern Ethiopia showed a NMR of 63 per 1000 live births(17).

2.2. Predictors of early neonatal mortality

2.2.1 Socio demographic factors

On a study done in Afghanistan, parental education levels had a significant association with early neonatal mortality and in this study most of the infants were from a community with 'low' education level (87.9%), which in chance had a greater proportion of neonatal deaths than the communities with higher education level, 0.4% and 1.4%, respectively. And also, rural infants were nearly two times more likely to die than urban infants (1.1–3.2). Odds of deaths were significantly lower in north-western (0.2–0.6) and central- western (0.4–0.9) regions than the north-eastern part (18).

Study in Jimma showed neonates who came from rural place had a 1.89 times higher increased risk of mortality (1.4–2.5) compared to their counter parts resident in the city (19).

2.2.2. Early Neonatal factors

The study done in Afghanistan displayed, male children had a higher likelihood of dying than their female counterparts. Mutually smaller and larger babies had higher odds of mortality than average sized babies(18).

The study in Indonesia shows neonatal complications during birth, low Apgar score and neonatal complication at delivery; neonatal health problem noted by mother and low Apgar score to be significantly related with early neonatal death(9).

In Africa, there was considerable heterogeneity in absolute intensities of under-5 and neonatal mortality in 2015, as well as the annualized rates of decline reached from 2000 to 2015. Subnational areas in countries such as Botswana, Rwanda, and Ethiopia documented some of the largest decline in child mortality rates since 2000, placing them well to achieve SDG targets by 2030 or earlier(20).

The study in Egypt shows mortality rate declined with the increase in birth weight as well as gestational age. None of the neonates below 27 weeks gestational age survived, and 96.1% of those weighing less than 1000g died. Common causes of death in LBW neonates (<2500g) were respiratory distress and prematurity, and both of them decreased as the birth weight increased. Among those with normal birth weight, common causes of mortality were respiratory distress (90.4%), prematurity (27.7%), congenital malformations (26.5%), hypoglycemia (14.5%), infections (8.4%) and brain insult due to hypoxia (8.4%)(21).

A study done at Eretria total of 1502 infants were admitted to the Sembel neonatal care unit with an average preterm gestational age of 35.9 weeks, 87 died (mortality 8.2%). In bivariate analysis, the highest mortality rate (10.3%) was seen in patient's admitted <1 h after birth. Patients with hypothermia or pneumonia exhibited higher mortality rates (13.6% and 13.4%, respectively). In multivariate analysis, birth weight <2kg (p<0.01), birth weight between 2.1 and 2.5 kg (p<0.01), Apgar score at 1 min (p<0.01), small for gestational age (p<0.01), hypothermia (p<0.04) and pneumonia (p<0.01) were associated with mortality(22).

In a study done in Ethiopia first born, preterm and low-birth weight infants accounted for 20.5%, 52.5% and 59.3% of neonatal deaths, respectively(16).

A study from Northern part of Ethiopia pinpoints leading causes of death to be prematurity [23 (34%)], and asphyxia [21 (31%)] which accounted for 2 of every 3 deaths. The remaining deaths were triggered by infections 8 (12%), congenital abnormalities 5 (7%), and other causes 11 (16%). Three-fourths (51) of the total deaths took place during the early neonatal period, primarily due to prematurity and asphyxia(17).

A study conducted at Arba Minch General Hospital on Magnitude of Neonatal Mortality and associated factors among Neonates indicated that, neonates who have the 5th minute APGAR score less than five were 4.4 times more likely to die as compared to those who have greater or equal to five. Neonates initiate early breast feeding (within one hour) were about 62.7%. (23).

The study in Somali region reports the leading causes of death were prematurity, suspected sepsis, meconium aspiration syndrome and respiratory distress/perinatal asphyxia which accounted for 31.1%, 24.4%, 24.4% and 20% respectively(24).

A study done at north Gondar zone on neonatal mortality was 43.8 per 1000 live births. Neonatal illness (AOR = 3.68; 95% CI, 2.41-5.62) were strongly associated with neonatal mortality. Small size neonates at birth were 2 times more likely to die compared with medium sized ones(25).

A study done at black lion hospital on magnitude and predictors of early neonatal mortality oxygen treatment has positive association to early neonatal mortality AOR 4.69 (0.000,)(16).

2.2.3. Maternal factors

Maternal factors were : maternal knowledge or educational status (mother's knowledge of risk and danger signs in pregnancy, childbirth, and newborns); maternal health (mother's report of illness during pregnancy and complications noted in medical records); and maternal characteristics (age, previous pregnancies, and antenatal care)(9).

The study done in Afghanistan displays maternal age had a significant association with the neonatal mortality. Children delivered by mothers who received antenatal care (COR: 0.5; 95% CI: 0.4–0.7)(18).

And baby delivered by skilled health personnel (COR: 0.6; 95% CI: 0.4–0.8) and delivered at health facilities (COR: 0.6; 95% CI: 0.4–0.8) were less likely to die than the children delivered by mothers who did not utilize these services(18).

A study conducted at Arba Minch General Hospital showed that, those neonates born from mother with duration of labor greater than or equal to 18 hours have 2.6 times more likely to die than those of the counter parts less than or equal to 12 hours. The likelihood of the neonatal mortality for those born from mothers with the time of rupture of membrane greater than or equal to 12 hours have 3.9 time more likely than those of less than 12 hours. Neonates born as greater than or equal to fifth birth order have 19.5 times more likely to die than those of first birth orders and the odd of Neonatal mortality for those whose mothers labor induced have 2.7 times more likely as compared with those of spontaneous labor(23).

A hospital based retrospective cohort study in Somali region of Ethiopia on trends of admission and predictors of neonatal mortality showed that, maternal factors, the majority (71%) were Primi-paras who had ANC (89%) during their pregnancy and 91% of them delivered spontaneously while their pregnancy was at term(24).

As described above predictors of early neonatal mortality are grouped in to three:

Socio demographic factors of neonate and mother; these are maternal age, residence, maternal education, maternal occupation, household income, newborn age, newborn sex and neonatal age at admission.

Early neonatal factors: These are gestational age, birth weight, Apgar score, multiple gestation, neonatal medical problems, congenital abnormalities and initiation of breast feeding.

Maternal factors: These factors are Gravidity, parity, ANC follow up, time of Rom, induction or augmentation, duration of labor, mode of delivery, maternal problems, place of delivery and birth attendant.

2.3. Conceptual framework

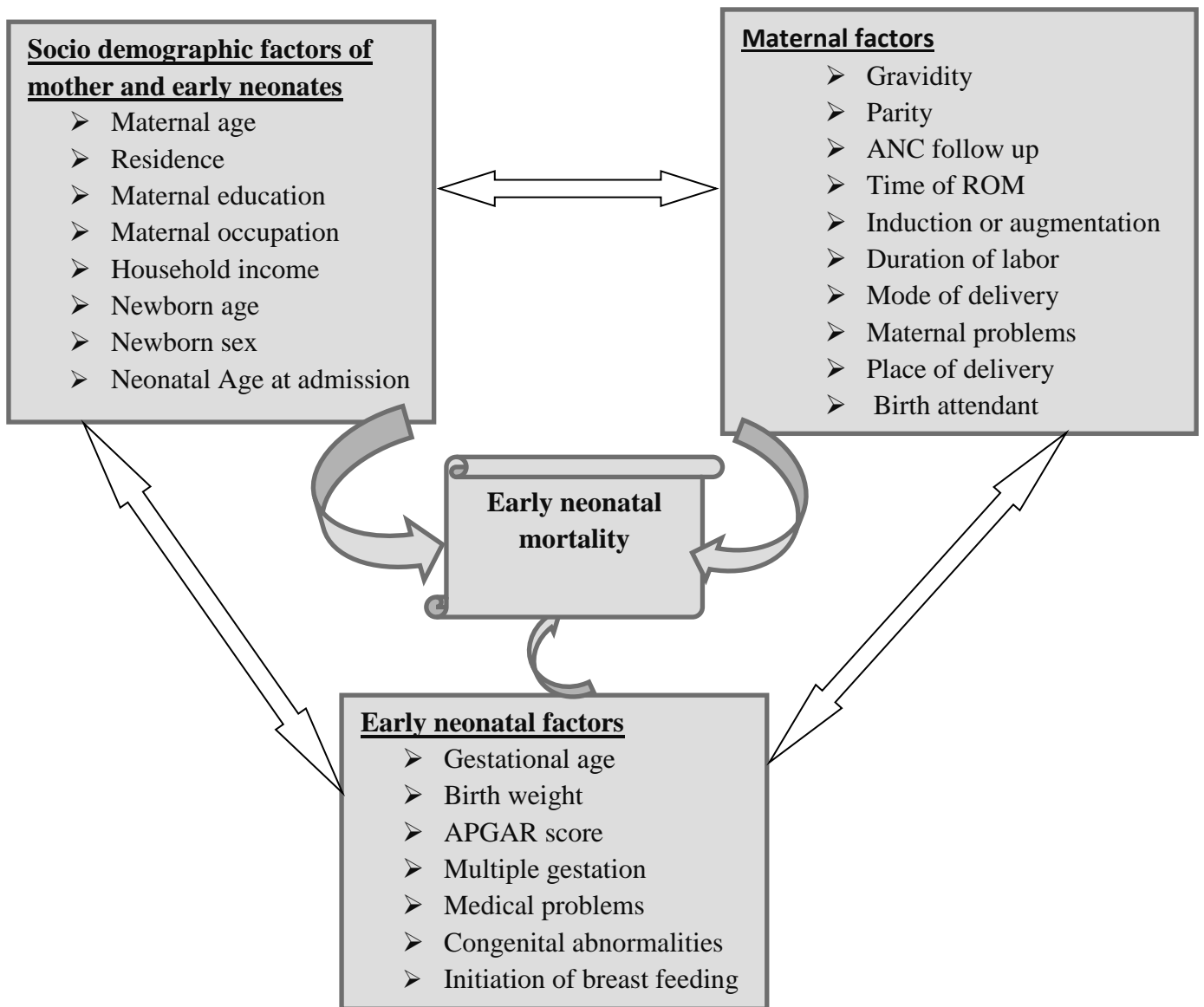


Figure 1. Conceptual framework adapted from different literatures (16,17,21,23)

3. OBJECTIVES

3.1 General Objective

- To assess magnitude and predictors of early neonatal mortality among early neonates admitted in neonatal intensive care unit of selected governmental hospitals in Addis Ababa, Ethiopia, 2020.

3.2. Specific objectives

- To determine the magnitude of early neonatal mortality in NICU of selected governmental hospitals in Addis Ababa, Ethiopia, 2020.
- To identify predictors of early neonatal mortality in NICU of selected governmental hospitals in Addis Ababa, Ethiopia, 2020.

4. METHODS AND MATERIALS

4.1. Study setting

The study was conducted among early neonates who were admitted in neonatal intensive care unit of randomly selected governmental hospitals in Addis Ababa, Ethiopia. Addis Ababa is the capital city of Ethiopia having ten sub cities and 116 woredas at which the city lies at an altitude of 7546 ft (2300 meters). According to the population projection value for 2014 the city has an estimated total population of 3,195,000. The proportion of male counts 1,515,000 and female accounts 1,680,000. The city has 12 governmental hospitals. Five hospitals owned by Addis Ababa health bureau, four by federal ministry of health (FMOH), one is under ministry of education (Addis Ababa university), two by defense force according to Addis Ababa health office. The study was conducted in Tikur Anbessa specialized hospital, Gandhi memorial hospital, Zewuditu hospital and Yekatit12 hospital.

4.2. Study period

The study was conducted from February 15 to June 5, 2020.

4.3. Study design

An institutional based retrospective cross-sectional study design was conducted in Addis Ababa from January 1 2018 to December 30 2019.

4.4. Source and study populations`

4.4.1. Source population

- ✓ All early neonates admitted in neonatal intensive care unit of governmental hospitals in Addis Ababa.

4.4.2. Study population

- ✓ Early Neonates admitted in neonatal intensive care unit of selected hospitals from January 1, 2018 to December 30, 2019.

4.4.3. Study unit

- ✓ Each selected early neonate cards from January 1, 2018 to December 30, 2019 based on inclusive criteria.

4.5. Eligibility criteria

4.5.1. Inclusion criteria

- ✓ All early neonates who were admitted in NICU from January 1, 2018 to December 30, 2019 and their card had fulfilled at least age of neonate, neonatal medical diagnosis during admission and neonatal outcome.

4.5.2. Exclusion criteria

- ✓ Early neonates who were against medical advice for hospital.
- ✓ Early neonates who were referred from one to another of four selected hospitals.

4.6. Sample size determination

A single population proportion formula was used to calculate the sample size by considering the following assumption: - p (proportion in the previous study in similar topic) as prevalence of early neonatal mortality done on Predictors of early neonatal mortality at a neonatal intensive care unit of a specialized referral teaching hospital in, Addis Ababa Ethiopia was 23.3% and by considering 95% confidence interval (CI) with level of precision $z@/2 = 1.96$, p value 0.05, margin of error 0.05.

$$n = \frac{(z@/2)^2 pq}{d^2}$$

$$n = \frac{(1.96)^2 (0.233) (0.767)}{(0.05)^2}$$

$$\mathbf{n = 275}$$

by adding 10 % as a non-respondent (by considering lost or incomplete sheets) giving a total sample size of = 303

$$\mathbf{n = 303}$$

Where, n= sample size, d = marginal error, p = prevalence.

4.7. Sampling methods

Simple random sampling method was used to select four hospitals from 12 governmental hospitals and early neonatal cards systematically selected proportionally according to their total early neonatal admission at NICU.

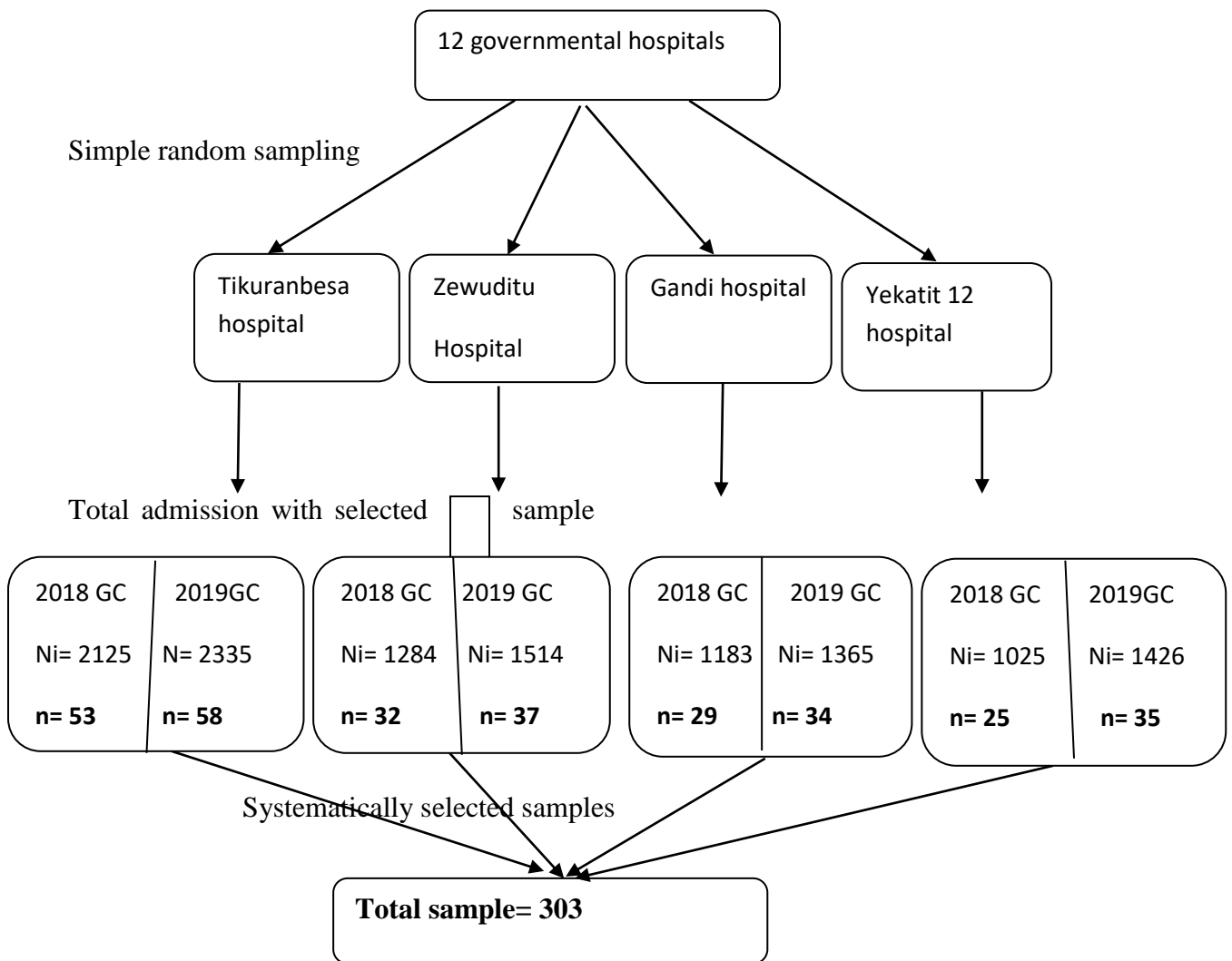


Figure 2: Sampling procedure

Table 1. The total early neonatal admission and selected samples from January 1 2018 to December 30, 2019 at selected hospitals.

S.no	Hospital name	Period	Total no of early neonates admitted	No of samples that were selected
1	Tikur Anbessa	2018	2,125	53
		2019	2,335	58
2	Zewuditu	2018	1,284	32
		2019	1,514	37
3	Gandhi	2018	1,183	29
		2019	1,365	34
4	Yekatit 12	2018	1,025	25
		2019	1,426	35
5	Total samples selected			303

4.8. Study variables

4.8.1. Dependent variable

- Early neonatal mortality

4.8.2. Independent variables

- **Socio demographic characteristics of the neonate and the mother** (Maternal age, Residence, Maternal education, maternal occupation, Household income, Newborn sex and Neonatal Age at admission)
- **Early neonatal factors** (Gestational age, Birth weight, APGAR score, Multiple gestation, neonatal Medical problems, Congenital abnormalities and Initiation of breast feeding).
- **Maternal factors** (Gravidity, Parity, ANC follow up, Time of ROM, Induction or augmentation, Duration of labor, Mode of delivery, Maternal problems, Place of delivery and Birth attendant).

4.9. Operational definitions

ANC follow up: -A scheduled clinical visits a mother ever had during her pregnancy during this study.

Gravidity: - A no of pregnancy a mother ever had during this study.

Parity: - A total no of birth a mother ever had after 28 complete weeks of her pregnancy.

Early neonate: - Refers to newborn from first day of his or her birth to 7 days of life.

Early neonatal mortality: - Death of newborn baby from first day of his or her birth to 7 days of life during this study.

Incomplete sheet: -a card that had not fulfilled at least age of neonate, medical diagnosis of neonate and early neonatal outcome.

4.10. Data collection tools and procedures

The data was collected by four trained health professionals working in the NICU of the hospitals by using checklist by assessing the available information on the patient chart. The check list has been adapted from different related literatures. The check list consists of three parts. Part 1:Socio demographic characteristics of early neonate and mother such as maternal age, residence, maternal education, maternal occupation, household income, newborn age, newborn sex and neonatal Age at admission. Part 2:Maternal factors such as gravidity, parity, ANC follow up, Time of ROM, Induction or augmentation, duration of labor, mode of delivery, maternal problems, place of delivery and birth attendant. Part 3: Early neonatal factors such as gestational age, birth weight, APGAR score, multiple gestation, medical problems, congenital abnormalities and initiation of breast feeding.

A data collector used the check list to collect the information from the patient's charts in the NICU. Charts was retrieved using the patient's registration number which found in data base in the electronic system and one data clerk in each hospital supports them by identifying the charts. Necessary data were extracted by reviewing patient's cards. Then all medical records of patients that fulfill the inclusion criteria in the hospitals reviewed retrospectively by health professional data collectors from January 1, 2018 to December 30, 2019 to know patient's status.

4.11. Data quality assurance

To assure the quality of the data, the checklist was assessed for its completeness and coherence and pretested on 5% of the sample at Menelik II hospital which is out of the study site. Training was given for data collectors and supervised during data collection. On each day of data collection, the collected data were checked for the completeness. Data cleaning was done using Epi data manager version 4.2.0.0 software during data entry.

4.12. Data processing and Analysis

Data was entered and cleaned using Epi-data version 4.2.0.0 statistical software and transferred to SPSS version 24 for further analysis. Frequency, mean, median, mode, cross tabulation and standard deviation were used to summarize descriptive statistics. And tables and graphs were used for data presentation. Bivariate logistic regression analysis used to check variables association with dependent variable individually. Variables found to have association with the dependent variable (p-value up to 0.2) were entered in to multiple logistic regression models for further analysis and variables having P- value of less than 0.05 were considered as significantly associated with the dependent variable. The degree of association between dependent and independent variables expressed by using odds ratio with 95% confidence interval.

4.13. Ethical clearance

Ethical clearance was obtained from ethical review committee of Department of Nursing, College of Health Science, Addis Ababa University and submitted to each selected hospital. The information gathered were held confidentially and their names and any other personal identifiers used during data collection and analysis. The data collectors were notified to keep the patient's information confidentially.

5. RESULT

5.1. Socio demographic characteristics

The study was done on 303 samples with 100% response rate. Nearly three fourth of neonates were born from mothers aged 20-34 with median maternal age of mean ± 26.8 years. Three fourth (66.7%) of neonates aged less than one day with the mean age of 1.44 ± 0.67 days and almost half of the neonates were male. Almost all of the neonates were born in health institution with a skilled birth attendant. (See table 2)

Table 2. Socio demographic characteristics for early neonates and mothers at governmental hospitals in Addis Ababa, Ethiopia, 2020

Variables		Frequency	Percent
Maternal age	<=19	10	3.3
	20-29	96	31.7
	30-34	104	34.3
	35-39	68	22.4
	>=40	25	8.3
Residence	Addis Ababa	267	88.1
	Out of Addis Ababa	36	11.9
Age of neonate	<=1 day	202	66.7
	1- =3 days	70	23.1
	3-=7 days	31	10.2
Sex of neonate	Male	157	51.8
	Female	146	48.2
Place of delivery	health center	67	22.1
	governmental hospitals	232	76.6
	private hospital	3	1.0
	Home	1	.3
Birth attendant	skilled health professional	302	99.7
	health extension workers	1	.3

5.2. Early neonatal characteristics

Quarters of neonate (26.1%) were born as preterm while 9.2% of them as post term and about one fifth of neonates born with birth deficit (19.5%). Neural tube deficit (31.8%) is the leading birth deficit followed by congenital heart disease (24.2%) and Down syndrome (24.2%). (See table 3)

Table 3. Early neonatal characteristics for early neonates and mothers at selected governmental hospitals in Addis Ababa, Ethiopia, 2020

Variables		Frequency	Percent
Gestational age	Preterm	79	26.1
	Term	196	64.7
	post term	28	9.2
Was the pregnancy multiple?	Yes	23	7.6
	No	280	92.4
Was the neonate had been diagnosed with any birth defect or congenital anomaly	Yes	59	19.5
	No	244	80.5
Neural tube defect	Yes	21	31.8
	No	38	68.2
CHD	Yes	16	24.2
	No	43	75.8
Omphalocle	Yes	4	6.1
	No	55	93.9
TEF	Yes	4	6.1
	No	55	93.9
Gasteroschisis	No	59	100
Downe syndrome	Yes	5	7.6
	No	54	92.4
Others	Yes	16	24.2
	No	43	75.8

As shown below, most (94.1%) neonates were diagnosed with medical problems and from sum of frequency of all medical diagnosis about 169 (31.6%) were Sepsis which is the most common medical problem in early aged neonates followed by hypothermia 72(13.5%), perinatal Asphyxia 71(13.3%) and MAS 66 (12.3%). see (Figure 3)

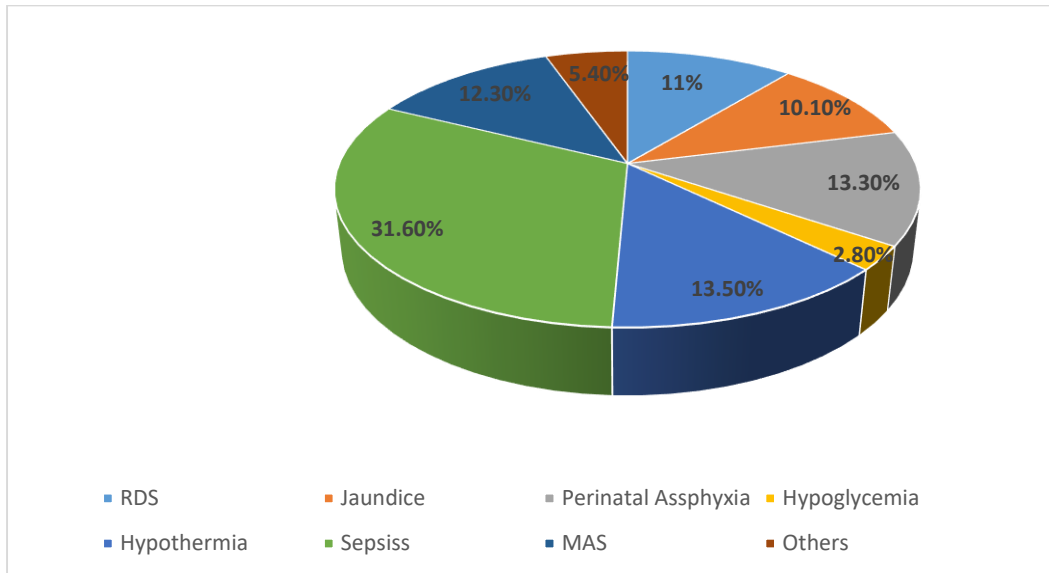


Figure 3. Early neonatal medical diagnosis of neonates in Addis Ababa city selected governmental hospitals 2020.

As the figure shown below, among the total 303 neonates, most of neonates (69.97%) were in normal birth weight and about 1.98% were macrosomic. (Figure 4)

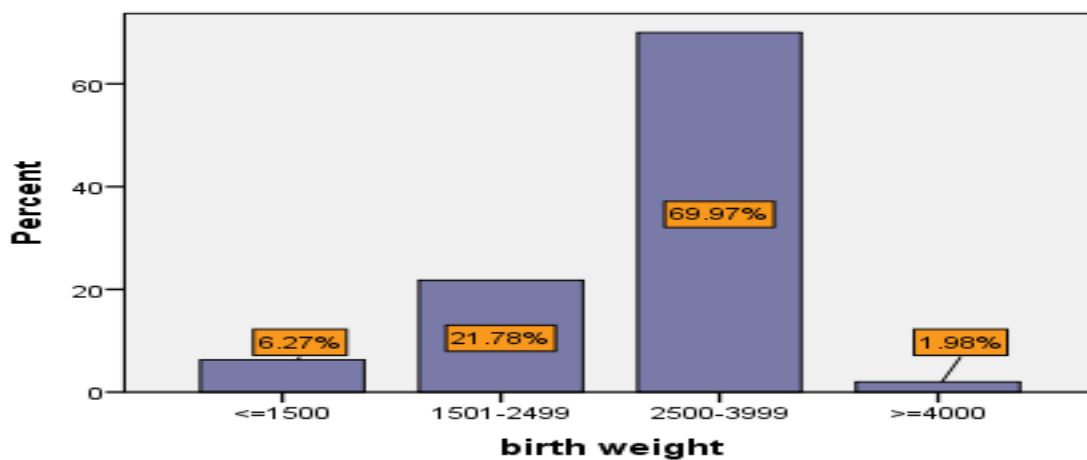


Figure 4: Birth weight of neonates in Addis Ababa city selected governmental hospitals 2020

As the graph shown below, from the total 303 neonates APGAR was done for 281 more than half of the neonates had a first minute APGAR score of greater than seven and only 9 of the had APGAR score less than 3.(Figure 5)

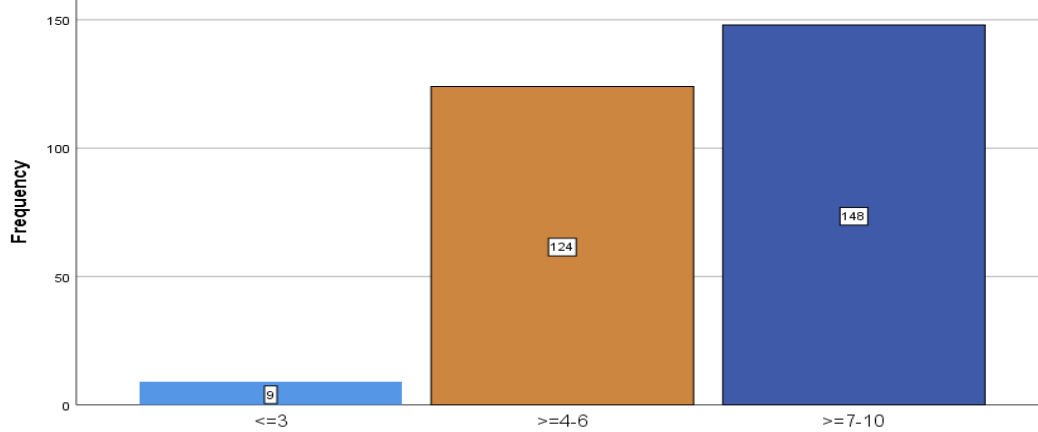


Figure 5: first minute APGAR score of neonates in Addis Ababa city selected governmental hospitals 2020.

From the total 303 neonates APGAR was done for 281 the graph shown below, about 85.4% of neonates had a fifth minute APGAR score of greater than seven. (Figure 6)

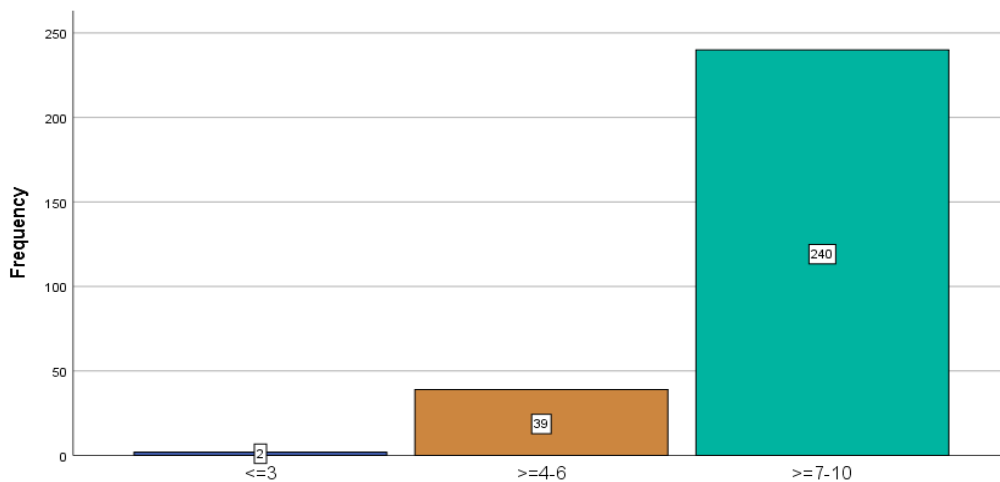


Figure 6: fifth minute APGAR score of neonates in Addis Ababa city selected governmental hospitals 2020.

5.3. Neonatal outcome

As this study revealed, of 303 early neonates 55 (18.2%) neonates died in their early neonatal period and 81.8% of them were alive. (Figure 7)

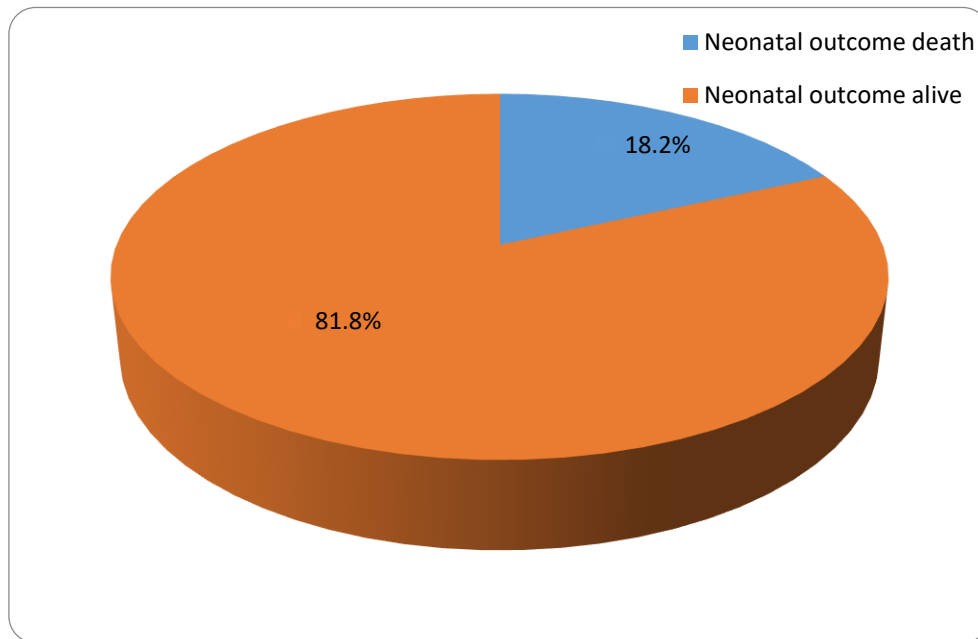


Figure 7: Early neonatal outcome in Addis Ababa city selected governmental hospitals 2020.

5.4. Maternal characteristics

Almost all (98.3%) of mothers had ANC follow up and 3.6% of them had medical problem in their gestational period. During their ANC follow up, 89.1% were diagnosed as RH positive. see(Table 4)

Table 4. Maternal characteristics in early neonatal period at selected governmental hospitals in Addis Ababa from Jan 1-2018 to Dec 30 2019 G.C.

Variables		Frequency	Percent
ANC follow up	Yes	298	98.3
	No	5	1.7
Maternal medical problem	Yes	11	3.6
	No	292	96.4
HTN	Yes	3	27.3
	No	8	72.7
DM	Yes	1	9.1
	No	10	90.9
HIVAIDS	Yes	6	54.5
	No	5	45.5
Cardiac disease	No	11	100
Other specify	Yes	1	9.1
	No	10	90.9
Maternal blood group	A	81	26.7
	B	84	27.7
	AB	20	6.6
	O	100	33.0
	Unknown	18	5.9
Maternal RH	Positive	270	89.1
	Negative	15	5.0

From the maternal obstetric complications in the figure below amniotic fluid related problem (29.2%) were the commonest obstetrics complication followed by sever preeclampsia (15.4%%), abruptio placenta (12.3%) and placenta previa (12.3%).(Figure 8)

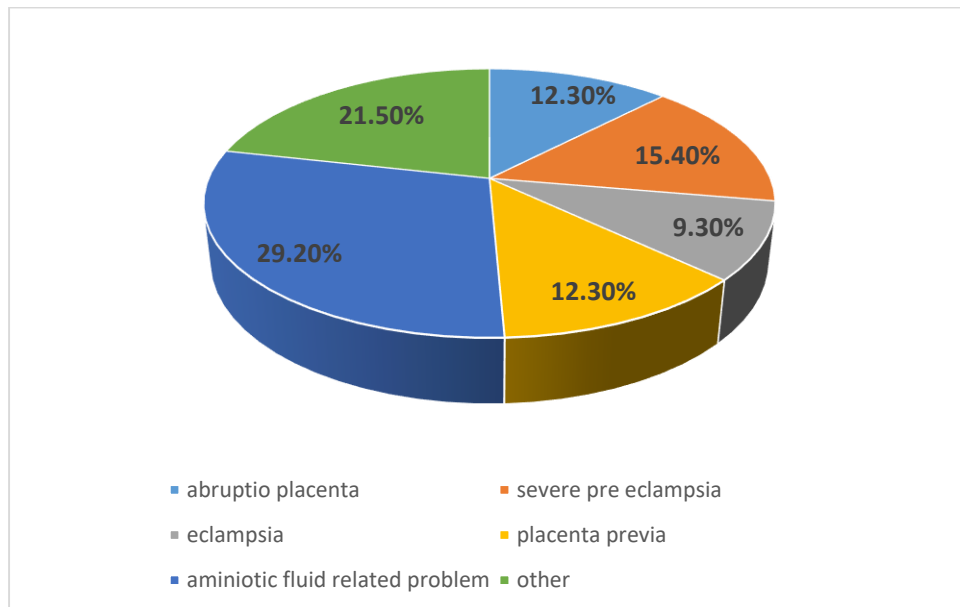


Figure 8. Obstetric problems of mothers of early neonates at selected governmental hospitals in Addis Ababa, Ethiopia, 2020.

Other maternal factors

More than one third of mothers develop PROM (38.9%) and 15.8% had prolonged PROM. 30.4 % mothers deliver with cesarean section and 2.6% by instrumental delivery. (Table 5)

Table 5. Other maternal factors at selected governmental hospitals in Addis Ababa, Ethiopia, 2020

Variables		Frequency	Percent
Time of ROM	PPROM	48	15.8
	PROM	118	38.9
	Intrapartal	137	45.2
How ROM was occurred	Spontaneously	251	82.8
	ARM	52	17.2
Was the mother delivery induced	Yes	6	2.0
	No	297	98.0
Was the mother had augmented delivery	Yes	1	.3
	No	302	99.7
Mode of delivery	SVD	203	67.0
	CS	92	30.4
	Instrumental	8	2.6
If CS what was the indication	CPD	5	1.7 5.4
	NRFHBP	41	13.5 44.6
	Elective	16	5.3 17.4
	Other	30	9.9 32.6
If instrumental delivery what was the indication	prolonged 2nd stage of labor	6	2.0 75
	Other	2	.7 25

5.5. Bivariate and multivariate logistics regression for factors affecting early neonatal outcome

Bivariate and multivariate logistics regression was done to see the association between independent variables with the dependent one. In binary logistics regression age of neonate, gestational age, multiple gestations, birth defect, having medical case, oxygen treatment, early breast feeding initiation, gravidity, parity, maternal blood group, time of PROM, first minute APGAR score and duration of labor were identified as having relationship with neonatal outcome. But, in multivariate analysis being pre-term [AOR: 0.088; 95% CI (0.015-0.515)], having birth defect [AOR: 2.759; 95% CI (1.072-7.1), oxygen treatment in early neonatal period [AOR: 11.629; 95% CI (4.950-27.317) and initiation of breast feeding within one hour [AOR: 0.061; 95% CI (0.014-0.272)] are significantly associated with early neonatal outcome. (Table 6)

Table 6. Factors affecting early neonatal mortality in Addis Ababa selected governmental hospitals, 2020.

Variables		Neonatal outcome		COR (95% CI)	P-value	AOR (95% CI)
		Death	Alive			
Age of neonate	<=1 day	42	160	1.269(.625, 2.576)		1
	1- =3 days	12	58	7.875 (1.043, 59.432)		1
	3-=7 days	1	30	1		1
Multiple	Yes	7	16	2.115 (.825, 5.419)		1
	No	48	232	1		1
Birth defect or congenital anomaly	Yes	15	44	1.739 (.884, 3.421)	0.035	2.759 (1.072, 7.100)*
	No	40	204	1		1
Was neonate been diagnosed with medical case	Yes	54	231	3.974 (.518, 30.515)		1
	No	1	17	1		1
Oxygen treatment	Yes	43	60	11.23 (5.56, 22.67)	0.000	11.629(4.950, 27.317)*
	No	12	188	1		1
Initiation of breast feeding within one hour	Yes	46	242	.127 (.043, .373)	0.000	0.061 (0.014, 0.272)*
	No	9	6	5.261		1
Gravidity	<=1	25	105	1.273 (.695, 2.330)		1
	2-4	26	139	.238 (.056, 1.018)		1
	>=5	4	4	1		1
Parity	<=1	26	122	.987 (.545, 1.786)		1
	2-4	27	125	.107 (.009, 1.219)		1
	>=5	2	1	1		1

*=significant

Table 7. Factors affecting early neonatal mortality in Addis Ababa selected governmental hospitals, 2020.

Variables		Neonatal outcome		COR (CI, 95%)	P-value	AOR (CI, 95%)
		Death	Alive			
Maternal blood group	A	12	69	.800 (.349, 1.833)		1
	B	15	69	.986 (.250, 3.886)		1
	AB	3	17	.741 (.336, 1.635)		1
	O	19	81	.348 (.109, 1.105)		1
Time of ROM	PPROM	5	43	1		1
	PROM	17	101	.691 (.240, 1.992)	0.200	0.367 (0.080, 1.696)
	Intrapartal	33	104	.366 (.134, 1.002)	0.034	0.206 (0.048, 0.888)*
First minute APGAR score	<=3	5	4	5.795 (1.439, 23.342)		1
	4-6	22	102	7.560 (1.876, 30.457)		1
	>=7-10		total 148	1		1
Duration of labour	<=6	12	41	1.110 (.527, 2.342)		1
	6-12	34	129	2.707 (1.024, 7.160)		1
	12-24	8	74	1.171 (.119, 11.489)		1
	>=24	1	4	1		1

*=significant

6. DISCUSSION

The death of neonates, especially early aged neonate is not progressively decreased even though the target is to make it zero level. Neonates are highly exposed to death since they are vulnerable to congenital malformation, environmental change, maternal and neonatal complications in early neonatal period several contributing factors involved for their death. This study assesses the magnitude of early neonatal mortality and determines its predicting factors.

The study found that the magnitude of early neonatal mortality was 18.2% (182/1000). It is much higher than the average early neonatal mortality rate in sub-Saharan country (1, 13,14). It is also higher than the observed rate in Tanzania, Nigeria, South Africa and Equatorial Guinea (6). This may be reasoned as the study is done in small sample and single study site and such studies may cover large study area including rural areas. Economic standard in each country and developmental level may make these differences.

Mortality rate determined by this study is higher than estimated mortality rate by 2016 EDHS but, lower than the single study done in Addis Ababa (11,17). From here we can understand that the magnitude of early neonatal mortality is increased and there is no advancement for those preventable deaths. The reason may be due to poor recognition to health sectors and low establishment of the care centers of congenital anomalies and early neonatal illness.

In this study neonate with birth defect is positively related with early neonatal mortality. This finding is supported by study done in Indonesia where congenital anomalies facilitate early neonatal mortality. The possible reason may because the presence of congenital defect affects the survival of neonates and in this study most of the defects are life threatening and sever congenital abnormalities.

According to this finding oxygen treatment in early neonatal period is positively associated early neonatal mortality. And this finding is supported by a study done at black lion hospital which stated oxygen treatment has positively associated with early neonatal mortality. This may deviate from reality in which oxygen treatment decrease the death of neonates. The possible reason may be the usual prescription of oxygen to risky early neonates and

terminally ill neonates. By its nature oxygen has vasoconstriction effect so that hyperventilation results hypoxia to all over their body.

In this finding, Initiating breast feeding within one hour was about 95%(n=288) and it prevents early neonatal mortality by 39%. But a study done at Arbamich general hospital was about 62.7 %, this difference might be epidemiological and awareness related difference. And We know that colostrum is the first immunization for neonates and prevent from several neonatal and infantile illnesses. So that initiating breast milk in the study participants prevent early neonatal illnesses and mortality.

In the finding ,neonates who have the 5th minute APGAR score less than seven had odds for more likely to die as compared to those neonates whose APGAR score was greater than or equals to seven (23). This finding is supported by the study conducted at arba minch general hospital on magnitude of neonatal mortality and associated factors among neonates . The reason may that usually all most all neonates that had apgar score of less than or equals to seven had associated medical problem or any underlying congenital anomaly or other factors that have negative effect for their outcome. so those neonates that have apgar score of greater than seven are more likely to alive or have greater chance of survival than those with apgar score of less than seven .

7. STRENGTH AND LIMITATION OF THE STUDY

7.1. Strengths:

The study has the following strengths

Since study was conducted on secondary data of admitted early neonates it was easy to get documented early neonatal medical, surgical problems or other important predictors which are diagnosed up to seven days.

Data were collected by health professionals working in NICU which had an important role in the quality of the data.

It was comfortable to establish temporal relationship of outcome with predictor variables.

7.2. Limitations:

Despite the strengths listed above the study had the following limitations.

Despite the effort made to do this thesis it was difficult to get important socio demographic predictors like maternal occupation, maternal educational status, house hold income because it had not documented these information on nursing care plan.

It was also difficult to collect the data as usual because of novel covid19 which restricts the data collectors to go to hospital and to travel by taxi.

8. CONCLUSION AND RECOMMENDATION

8.1. Conclusion

According to this study early neonatal mortality was decreased from the study done previously at Addis Ababa. Initiating breast feeding within one hour of birth, birth defect, Intrapartal rupture of membrane and Oxygen treatment which was found to be a significant predictor of early neonatal mortality by affecting neonatal outcome positively or negatively.

8.2. Recommendation

Federal ministry of health should focus on standardizing NICU facility including oxygen management protocol in order to minimize early neonatal mortality.

Each hospital under federal and Addis Ababa health bureau have to well-equipped and full filled well trained and qualified health professional related to NICU.

All health professionals should create awareness at first ANC follow-up in prevention and early detection of congenital anomaly and birth defects leading to early neonatal deaths.

Further researches are intended to be done via prospective study with the same title.

Further predictors of early neonatal mortality needs to be studied with prospective study design.

NICU nurse should fill nursing care plan properly to get necessary personal information.

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ANNEXS

Annex 1: Information sheet

Title of the Research Project: To assess magnitude and predictors of early neonatal mortality among neonates admitted to NICU from [2018-2019] at selected governmental hospitals in Addis Ababa, Addis Ababa, Ethiopia, 2020.

Name of Investigator: Getachew wedajo (BSc in Nursing)

Name of the Organization: Addis Ababa University, College of health science, school of nursing and midwifery and department of nursing.

Name of the Sponsor: Addis Ababa University.

Introduction: This information sheet was prepared for administration and NICU coordinating offices of selected governmental hospitals in Addis Ababa. The aim of the form is to make the above-concerned offices clear about the purpose of research, data collection procedures and get permission to conduct the research.

Purpose of the Research Project: To determine magnitude and predictor of mortality among early neonate admitted to NICU from 2018-2019 at of selected governmental hospitals in Addis Ababa, Addis Ababa, Ethiopia, 2020.

Procedure: In order to achieve the above objective, information which is necessary for the study was taken from early neonatal medical record form?

Risk and /or Discomfort: Since the study was conducted by taking appropriate information from medical chart, it do not inflict any harm on the patients. The name or any other identifying information was not recorded on the questionnaire and all information is taken from the chart was kept strictly confidential and in a safe place. The information retrieved was only used for the study purpose.

Benefits: The research have no direct benefit for one whose document/ record is included in this research and already died. But it could have indirect benefit for other clients in the program. This is because if program planners are preparing predicted plan there is a benefit for clients in the program of getting appropriate care and treatment services for those survived and other newly born ones. In all, the research work has a paramount direct benefit for health care planners and managers.

Confidentiality: To reassure confidentiality the data on the chart was collected without the name of the clients and the information collected from this research project were kept confidential and stored in a file cabinet. In addition, it has not been revealed to anyone except the investigator and it was kept in a key and locked system with computer pass ward.

Person to contact: This research project was reviewed and approved by the institutional review board of College of Health Science, school of nursing and midwifery and department of nursing, Addis Ababa University. If you have any question you can contact any of the following individuals (Investigator and Advisors) and you may ask at any time you want.

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3. Feven Mulugeta (MSc lecturer) AAU University, College of Health sciences, School of Nursing and midwifery: Co- Advisor.

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Annex 2: Data collection check list

Code-----

Table 8. A checklist to assess the Magnitude and Predictors of Early Neonatal Mortality among neonates admitted in NICU from 2018-2019 in selected governmental hospitals in Addis Ababa Ethiopia, 2020.

s.no	Section 1.socio demographic factors of early neonate and mother	Possible choices
101	Maternal age in years	-----years
102	Residence	1.Addiss Ababa 2.out of Addiss Ababa
103	Maternal education	1. Illiterate 2. Primary 3. Secondary 4. Diploma 5. Degree and above
104	Maternal occupation	1. House wife 2. Governmental employee 3. Private worker 4. Other
105	Household income	1. <=1500 birr 2. >1500 birr
106	Age of neonate	-----days
107	Sex of neonate	1. Male 2. Female
108	Place of delivery	1. Health center 2. Governmental hospital 3. Private hospital 4. Home 5. Other

109	Birth attendant	<ol style="list-style-type: none"> 1. Skilled health professional 2. Health extension worker 3. Untrained birth attendant 4. Other
Section 2. Early neonatal factors		
201	Gestational age	<ol style="list-style-type: none"> 1. preterm 2. term 3. post term
202	Birth weight	-----grams
203	Was APGAR score done	<ol style="list-style-type: none"> 1. Yes 2. No
204	If yes for question no 203 what was 1 st minute and 5 th minute APGAR score	1 st minute..... 5 th minute.....
205	Was the current pregnancy multiple (twin?)	<ol style="list-style-type: none"> 1. Yes 2. No
206	Does the newborn had birth defect or any Congenital anomalies?	<ol style="list-style-type: none"> 1. Yes 2. No
207	If yes for question no 206 which birth defect or Congenital anomalies does the child had	<ol style="list-style-type: none"> 1. Neural tube defect 2. Congenital heart disease 3. Omphalocele 4. TEF 5. Gastroschiasis 6. Down syndrome 7. Other specify
208	Was the neonate been diagnosed with any medical problem	<ol style="list-style-type: none"> 1. Yes 2. No
209	If yes to question no 208, what was the medical	<ol style="list-style-type: none"> 1. Respiratory distress 2. Jaundice 3. Perinatal Asphyxia 4. Hypoglycemia 5. Hypothermia

	diagnosis diagnosis?	6. Sepsis 7. Meconium aspiration syndrome 8. Others
210	Was the neonate been on oxygen treatment?	1. Yes 2. No
211	Was the neonate initiated breastfeed within 1 hr.?	1. yes 2.no
212	What was feeding practice of the child during hospital stay	1. Breast feeding 2. Formula feeding 3. Maintenance fluid 4. Mixed
213	Neonatal status/outcome	1. Death 2. Alive
Section 3. Maternal factors		
301	No of Gravidity	-----
302	No of Parity	-----
303	Does the mother have ANC follow up?	1. Yes 2. No
304	If yes for Q-303 how many times?
305	Which medical problem had the mother been diagnosed during pregnancy?	1. Yes 2. No
306	If yes for question no 305 which medical problem does the mother has?	1. Hypertension 2. Diabetes 3. HIV/AIDS 4. Cardiac diseases 5. Other specify.....

307	What was mothers blood group ?	1.A 2. B 3.AB 4. O 5.unknown
308	What was mothers RH?	1.postive 2. negative
309	Does mother had been diagnosed with obstetric complications?	1. Yes 2. No
310	If yes, for Q- 309 Which among the following the mother had diagnosed?	1. Abruptio placenta 2. Sever preeclampsia 3. Eclampsia 4. Placenta previa 5. Amniotic fluid related problem 6. Other....
311	What was Time of ROM?	1. PPRM 2. PROM 3. Intrapartal
312	How ROM was occurred?	1. Spontaneously 2. ARM
313	Dose the mother induced?	1. Yes 2. no
314	Dose the mother augmented?	1. Yes 2. No
315	Duration of labor	-----hours
316	What was her mode of delivery for this pregnancy?	1.spontaneous vaginal delivery 2.cesarean section 3. Instrumental

317	If the answer for Q 316 is 2 what was the indication?	<ol style="list-style-type: none"> 1. CPD 2. NRFHRP 3. Failed instrumental delivery 4. Elective C/S 5. Others....
318	If the answer for Q 316 is 3 what was the indication?	<ol style="list-style-type: none"> 1. Poor maternal uterine contraction 2. Prolonged 2nd stage of labor 3. Other specify