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

POSTGRADUATE PROGRAM

NEONATAL NEAR MISS AND ASSOCIATED FACTORS AMONG NEONATES DELIVERED AT PUBLIC HOSPITALS, ADDIS ABABA ETHIOPIA: A RETROSPECTIVE CROSS – SECTIONAL STUDY.

BY: BANCHIALEM DEMISSIE (BSc.)

A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF NURSING AND MIDWIFERY DEPARTMENT OF NURSING, FOR PARTIAL FULFILLMENT OF THE DEGREE OF MASTER OF SCIENCE IN NEONATAL NURSING.

JUNE 2021

ADDIS ABABA, ETHIOPIA

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING

NEONATAL NEAR MISS AND ASSOCIATED FACTORS AMONG NEONATES DELIVERED AT PUBLIC HOSPITALS, ADDIS ABABA ETHIOPIA: A RETROSPECTIVE CROSS – SECTIONAL STUDY

BY: BANCHIALEM DEMISSIE (BSC.)

ADVISORS:

MAIN - ENDALEW GEMECHU (PhD, Ass.Prof)

A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF NURSING AND MIDWIFERY DEPARTMENT OF NURSING, FOR PARTIAL FULFILLMENT OF THE DEGREE OF MASTER OF SCIENCE IN NEONATAL NURSING.

JUNE 2021

ADDIS ABABA, ETHIOPIA

STATEMENT OF DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in this or another university and that all sources of materials used for this thesis have been fully acknowledged.

Name: Banchialem Demissie

Signature: _____

Date: June 2021

Place: Addis Ababa University, College of Health Sciences, P

Approved by:

1. Name of Major Advisor: Dr. Endalew Gemechu (PhD, Ass.Prof)

Signature: _____

Date: June 2021

APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Banchialem Demissie is accepted in its present form by the board of examiners as satisfying thesis requirement for degree of Masters of Science in Neonatal Nursing.

1. EXAMINER:

Kalkidan wondwossen (MSc, Ass't Professor)

Signature _____

Date June 2021

2. RESEARCH ADVISORS:

Dr. Endalew Gemechu (PhD, Ass.Prof)

Signature _____

Date June 2021

3. DEPARTMENT HEAD:

Niguse Tadele (MSC, Ass. Prof)

Signature _____

Date _____

ACKNOWLEDGEMENT

First of all, I would like to thank Addis Ababa University College of Health Sciences for giving me this opportunity to work on this valuable research. Second of all, I want to thank St. Paul Hospital Millennium Medical College for availing financial resources for my graduate study.

I would like to express my heartfelt gratitude to my advisors Dr. Endalew Gemechu for his unreserved guidance and constructive suggestions from the stage of proposal development to final thesis.

I also would like to give many thanks to Vermont Oxford Network which supports Neonatal MSc program at Addis Ababa University.

My great appreciation also goes to the study participants, data collectors, supervisors for their contribution and commitment throughout the study period.

Last but not least, I would like to thank my family and friends for their tireless encouragement and viable support.

Contents

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

AGA	Appropriate for Gestational Age
ANC	Ante Natal Care
APH	Antepartum Hemorrhage
AOR	Adjusted Odd Ratio
APO	Adverse Pregnancy Outcome
C/S	Cesarean Section
CLAP	Latin American Center for Perinatology
CPAP:	Continuous Positive Airway Pressure
DM	Diabetic Mellitus
EDHS	Ethiopian Demography Health Survey
EONS	Early Onset Neonatal Sepsis
GA	Gestational Age
LB	Live Birth
LBW	Low Birth Weight
NICU	Neonatal Intensive Care Unit
PLTC	Potentially Life Threatening Condition
PPH	Post-Partum Hemorrhage
PROM	Premature Rupture of Membrane
RDS	Respiratory Distress Syndrome
SDG	Sustainable Development Goal
SMO	Severe Maternal Outcome
SSA	Sub-Saharan Africa
WHO	World Health Organization
WHOGS	World Health Organization Global Survey

ABSTRACT

Introduction: Neonatal Near Misses are newborns that had serious complications at birth or during the neonatal phase but survived. To get relevant controls for neonatal deaths, it is critical to identify Neonatal Near Miss cases and correct contributing factors. However, there are few studies in Ethiopia that look at the prevalence of Neonatal Near Misses and the factors that caused them.

Objective: To determine the prevalence of Neonatal Near Miss and associated factors at Addis Ababa City Administration Public Hospitals, Ethiopia, 2021. **Methods**: A facility based retrospective cross-sectional study was conducted among 367 neonates from January first, 20 20 up to December 31,2020. Four selected hospitals. A pretested structured checklist was used to collect the data. The neonatal and maternal medical charts were chosen using a systematic random sampling technique. To obtain relevant data, the neonatal and maternal charts were reviewed and telephone interviews were done with the mothers as well. Bivariate and multivariate logistic regression modeling were fitted to identify factors associated with neonatal near miss. An adjusted odd ratio (AOR) with 95% confidence interval (CI) was computed to determine the level of significance. **Results**: The prevalence of Neonatal Near Miss was 25.6% with (95% CI 21.0-30.5). Merchant (AOR 0.123, 95% CI 0.018 - 0.859), previous history of preterm birth (AOR 11.828, 95% CI 1.856 - 75.398), caesarian section delivery (2.391 AOR, 95% CI 1.229 - 4.652), Hypertension (AOR 2.674, 95% CI 1.343 - 5.324), Infection (AOR 3.706, 95% CI 1.375 - 9.988), delivered on duty time (AOR 2.304, 95% CI 1.263 - 4.203), Birth injury (AOR 4.759, 95% CI 1.711 - 13.241), and Congenital anomaly (AOR 8.925, 95% CI 2.580 - 30.873) were significantly associated with NNM.

Conclusion: The percentage of Neonatal Near Misses in the study setting was found to be lower when compare to local studies. The opposite is true when it comes to findings from international studies. The majority of near-miss determinants are modifiable/preventable obstetric and health-care utilization-related factors. Hence, stakeholders need to consider the aforementioned factors while they design interventions.

Key terms: Neonatal Near Miss

1. INTRODUCTION

1.1. Background of the study

Neonatal period is that part of life from birth to the first 28 days. This phase is the most vulnerable time for child's survival as it is a transition and adaptation period from intrauterine to extra uterine environment(1).

Neonatal Near Miss (NNM) refers to a life threatening condition of health where a newborn under 28 days become at the verge of death but survived either by chance or because of the good quality of care they received(2).

The Latin American Centre for Perinatology (CLAP) from Pan American Health Organization suggests the definition of NNM any newborn infant who met pragmatic and/or management criteria and survived the first 27 days of life(3).

According to CLAP, **pragmatic criteria** recommended are weight below 1750 gm. at birth, APGAR score below 7 at 5 minutes of life, and gestational age below 33 weeks. **Management criteria** includes, nasal continuous positive airway pressure, any intubation during the first 27 days of life, parenteral therapeutic antibiotics (up to 7 days and before 28 days of life) phototherapy within the first 24 hours of life, the use of vasoactive drugs, anticonvulsants, surfactants, blood products and steroids for refractory hypoglycemia, cardiopulmonary resuscitation and any surgical procedure. They also proposed some management criteria which were not well noted in former studies including use of antenatal steroid, use of parenteral nutrition, congenital malformation(3). Previse studies indicated that factors that predisposing neonate for NNM are Maternal Sociodemographic, medical and obstetric history plays an enormous role in NNM in addition to the neonatal and institutional factors(4–6).

However, in Ethiopia, especially in the capital where there are many referral hospitals, there are hardly likely enough researches done about NNM and associated factors. Therefore, conducting diversified NNM studies in such a way that escalates the service quality of Neonatal care is indispensable to reverse the scenario of this overburdened unit.

1.2. Statement of the problem

In 2017, globally, 2.5 million neonatal deaths occur with estimated neonatal mortality rate of 18 deaths per 1,000 live births due to preventable causes i.e. prematurity, birth asphyxia and infections and congenital abnormalities(7). Virtually all newborn deaths occur in low and middle income countries. Neonatal mortality was 28 deaths per 1,000 live births in Sub-Saharan Africa (SSA). A child born in this regions is ten times more likely than a child born in a high-income country to die in the first month. (8). Ethiopia, Nigeria, the Democratic Republic of Congo, Tanzania, and Uganda accounted for half of all neonatal deaths in SSA (9).

Neonatal Mortality rate in Ethiopia was as high as 30 deaths per 1,000 live births, in 2019. However, NMR is dropping at a slower rate. The leading causes for neonatal death in Ethiopia are prematurity, asphyxia, and neonatal sepsis (10).

The majority of newborn mortality and morbidity cases around the world meet the pragmatic criteria components of NNM cases. Preterm complications, for example, were responsible for 35% of mortality worldwide, whereas asphyxia was responsible for 24% of neonatal mortality(11) . Similarly, 14% of infants delivered worldwide were underweight, with Asian and African countries having the greatest rates. These conditions have additional long-term morbidity by affecting cognitive and neurological development which down the road may bring up other chronic diseases, such as cardiopulmonary disease, diabetes mellitus, and other severe disabilities, like vision impairment and hearing loss,(7)(11). This, in turn, will results in a great deal of psycho-socioeconomic burden in a society.

The number of neonates with critical condition of health was three to seven times greater than the number of neonatal deaths implying that for every neonatal death there were three to seven neonates who were on the verge of death but survived(12)(6)(13). This fact boldly proves the significance of conducting NNM researches.

Further studies on NNM and associated factors seem worthwhile and have a big impact on widening the understanding of the complex nature of neonatal morbidity and mortality to reverse this preventable matter resulting in saving countless lives.

There is an escalating demand in the area of NNM and associated factors in the Ethiopic context but what has been done so far is insufficient. This research endeavors to fill the gap in determining the prevalence of NNM and associated factors in Public Hospitals at Addis Ababa.

1.3 Significance of the study

A goal of this study is to supply evidence-based information for practitioners, health institutions, NGOs, and Addis Ababa Health Bureau concerning the prevalence and factors associated with Neonatal Near Miss at Addis Ababa.

Understanding the prevalence and associated factors that predispose the newborn for life-threatening (near-miss) conditions, therefore, greatly helps to adjust and strengthen their mode of intervention. Hence, investigating NNM cases would aid in taking measures for further amendment of service delivery and programs to be adopted at community and health systems level in the context of the Capital.

The result would also assist decision makers, program planners and policy developers at Addis Ababa health sector in making decisions and taking actions that in turn lead to controlling the factors associated with NNM.

The findings may also be used as a source of information for researchers in future.

2. LITERATURE REVIEW

2.1. Overview of Neonatal Near Miss

Neonates with severe complications at birth or during the neonatal period who nearly died but survived constitute Neonatal Near Miss(14). The magnitude of NNM widely varies across studies because of the discrepancy in the criteria applied and location of the study(15). Additionally, literatures show a number of factors associated with NNM cases in different parts of the world where these factors vary depending on quality of care given for the mother and the child.

2.2. The prevalence of Neonatal Near Miss

A multi-country study done by World Health Organization, Multicounty Survey on Maternal and Newborn Health (WHOMCS) which include 29 countries of 309,644 live born infants, the presence of any pragmatic or management marker identified were 72.5/1000 among live birth neonates(16). A population based cross-sectional study was done in a city located in the Southern Brazil totaling a prevalence of neonatal near miss was 33 per thousand live births(17). A prospective cohort of live births was done from Brazil survey, which was carried out between 2011 and 2012, In this research, 832 was the weighted number of NB who met the Neonatal Near Miss criteria, and 23,005 did not, totaling 23,837 newborns(18). in Brazilian university hospitals the incidence of NNM was 303 per 1000 live births(19).

A study done in India among neonates admitted to NICU shows Neonatal Near Miss rate per 1000 live birth was 87.6 (20). Another prospective cohort study done in Uganda shows the prevalence of NNM shows 36.7 (21) . While study conducted at two teaching hospitals of Ghana shows 57.7 Neonatal Near Misses per 1000 live births(22). A cross-sectional study done in the capital of Northeast Brazil shows that from 24,254 live births, 2,098 cases were found to be Neonatal near misses(23). Similarly, a study conducted in 19 Brazilian hospitals reviled that the proportion of Neonatal Near Miss was 39.2/1000 LB(15).Similar studies conducted in Benin, Burkina Faso and Morocco also define NNM using organ dysfunction criteria where the incidence of Neonatal Near Miss case were 34, 43 and 6 per 1000 live births respectively(24).

An institutional-based cross-sectional study conducted from February 1, 2019 to April 30, in Injibara General Hospital, Awi Zone, Northwest Ethiopia, showed that the proportion of Neonatal Near Miss was found to be 23.3%(25). A facility based cross sectional study done in Jimma Zone, Southwest Ethiopia, revealed that the proportion of NNM cases were 26.7(26). An institutional-based retrospective cross-sectional study was conducted at Debretabor General Hospital from July 1st, 2018, to June 30th, 2019 too. In the study, nearly one in three (32.9%) neonates experienced NNM(12). Another Facility Based Cross-Sectional Study done at Hawassa City Governmental Hospitals from May 9, 2019 to June 7, 2019 the proportion of Neonatal Near Misses cases figured 33.4 % (27) It can be noticed from the last three local studies done that the prevalence of NNM in Injibara, Debretabor and Hawassa is 23.3%, 26.7, 32.9% and 33.4% respectively(12,25–27).

2.3. Factors Associated with Neonatal Near Miss

2.3.1. Sociodemographic Characteristics of the Mother

A Study done in Brazil shown that the factors that remained significantly associated with NNM were maternal age older than 35 years, maternal educational status, Occupation, area of residency(28).

A survey conducted by WHO across 29 countries from Africa, Asia, Latin America and the Middle East shown that young mothers (<20 yrs.) are at higher risk of small for gestational age delivery as well as becoming single and illiterate mother. Significant association was also exhibited between residence of the mother and development of potentially life-threatening conditions in neonates(29)

According to a study conducted in the United States, janitors are two times more likely to have preterm delivery and stillbirth than clerks, teachers, and librarians(30). In Irish, mothers who work in a temporary contract and physical work demand were significantly associated with low birth weight and preterm birth(31). Similarly a study conducted in Iran low birth weight among employed mothers were 5 times more likely than the unemployed ones (32).

At Sub Saharan Africa very young maternal age (below 16) was the risk factor for delivery of low birth weight and preterm infants(33). In a study conducted in Gojjam north west Ethiopia

maternal age < 20 years were identified as factors associated with preterm and low birth weight neonates(34).

A study done in Ayder hospital in northern Ethiopia, revealed that maternal age greater than 35 years was found to be a factor strongly linked to birth asphyxia, low birth weight, and premature birth(35). Furthermore, in Brazil, advanced maternal age is significantly associated with Neonatal Near Misses(36).

Study conducted at Jimma University Specialized Hospital, Ethiopia, shows prematurity and unmarried marital status are associated with LBW(37). In a Facility Based Cross-Sectional Study done at Hawassa City Governmental Hospitals from May 9, 2019 to June 7, 2019 it was observed that employed women with monthly income less than 1650 ETB and never attended any type of formal education were significantly association with NNM(27). A facility-based prospective study were conducted in south Ethiopia showing neonatal near miss were significantly higher among mothers with a low monthly income (< 79 USD monthly)(5). Another cross sectional study done at Debretabor General Hospital, Northern Ethiopia, revealed that Rural residence were significantly associated with NNM(12).

2.3.2. Reproductive and Obstetric history

A cohort study done at six public hospital in the Brazil shows, being primipara, caesarean section delivery and lack of prenatal care were associated with neonatal near miss cases(38). Another study done in Brazil shows the probability of Neonatal Near Miss occurred among multiple gestation in nulliparous women was eight times higher when compared to single pregnancies while in multiparous women the risk of NNM among mothers those give birth assisted by forceps was seven times higher than vaginal delivery(36)

A retrospective cohort study shows that previous history of preterm delivery has great chance of recurrent preterm delivery (39),similarly, a study done in united states reviled that a history of one previous preterm birth is associated a recurrent preterm birth by17 -37%(40).

A prospective cohort study conducted in Brazil identified that caesarean section as protective option to combat Neonatal Near Miss. A population based study done in a city located in Southern Brazil indicate that caesarean section were significantly associated with NNM (19).

A retrospective study done (41)

Study done at national referral hospital in Uganda shows a birth weight less than 2500gm. or more than 4000gm. delivery at gestation age less than 37 weeks, multigravidas were identified as factors associated with risk of neonatal morbidity(21). Similarly, other study done in Uganda shows grand multiparty were significantly associated with NNM cases(42).

A cross sectional study done in Gondar Northern Ethiopia revealed that preterm and low birth weight delivery was related to previous history of preterm/low birth weight(43). A systematic review and meta-analysis done in Ethiopia among 23 studies showed that the common neonatal complications identified following Caesarean section were low APGAR score, perinatal asphyxia, neonatal sepsis, meconium aspiration syndrome, early neonatal death, stillbirth and prematurity(44).

An institutional-based retrospective cross-sectional study was conducted at Debretabor General Hospital from July 1st, 2018, to June 30th, 2019, incomplete ANC visit, primiparous, premature rupture of membrane, antepartum hemorrhage were the independent predictors of neonatal near-miss(12). As study conducted in Gamo Gofa, Southern Ethiopia shows, multiparty, no ANC follow up, premature rupture of membrane (PROM), cesarean mode of delivery was identified as factors significantly associated with NNM cases(5).A cade control study conducted in Gurage zone study reviled that history of abortion severe, maternal morbidity during pregnancy, cesarean section mode of delivery are significantly associated with NNM(45).

2.3.3. Maternal Medical history during pregnancy

A systematic review and Meta-analysis of six studies shows approximately 51% of pregnancies in mothers with untreated syphilis result in some APOs, with estimated proportions of early fetal loss or stillbirth 21%, neonatal death 9.3%, low birth weight or premature birth 5.8%, and congenital syphilis 15%(46).A study conducted in Birmingham USA shows that maternal

infection have association with low birth weight, preterm delivery and congenital abnormality(47)

A cross sectional study held in India revealed that, Antenatal and intranatal complications like Antepartum Hemorrhage, Pregnancy Induced Hypertension, anemia and Gestational diabetes were reported by 36.33% and 23.33% mothers, respectively(48).

Another study done in Addis Ababa showed Maternal factors such as hypertensive disorders were observed to have five times higher potential to cause neonatal death than women without hypertension, previous adverse pregnancy outcome and intra-partum events such as abruption placenta, prolonged or obstructed labor, and prematurity were identified factors associated with neonatal death(49)**.**

Study done in Gondar, north Ethiopia shown mothers with ante partum hemorrhage and hypertension has high risk of delivering preterm and low birth weight neonates(43). Similarly, studies conducted in Brazil shown hypertension during pregnancy can significantly increase the risk of NNM(46). A Cross-Sectional Study done at Hawassa City Governmental Hospitals also revealed pregnancy-induced hypertension and antepartum hemorrhage are significantly associated with NNM(27).

2.3.4. Institution related factors

An Institutional-based cross-sectional study was conducted in south Ethiopia. Of those newborns who experienced neonatal near miss, more than half (59.8%) of their mothers were referred from other health facilities(50).From study done in Tigray, convenient availability (presence or absence of service) and accessibility of health facilities, service, and promotion of antenatal care follow-up with maternal and child health information particularly on delivery complications or danger signs were vital for birth outcome. The majority of births are delivered at home and the proportion of deliveries assisted by a skilled attendant is very low (10%) and the distance Women travel to a health facility less than an hour were four times more likely to have a skilled birth attendant and affect birth outcome and NNM (48).

2.3.4. Fetal and Neonatal Factors

Study conducted in Nigerian tertiary hospital reveals that pregnancy complications and poorer obstetric out comes were significantly high in multiple pregnancy than in singleton(51). Similarly, study done in Tigray Region, Northern Ethiopia shows that multiple birth identified as associated factor with neonatal near miss(52).

A case control study conducted in Addis Ababa and Amhara region shows that congenital abnormality significantly associated with low birth weight(53). furthermore, a study done in India shows that Congenital malformations were more likely to have preterm deliveries, low birth weight and stillbirth(54). a study done in Germany reviled that birth trauma significantly associated with birth asphyxia(55).similarly, other studs shows that subgaliale hemorrhage had high chance of developing encephalopathy(56).

Evidences from a variety of literatures show that non vertex presentation and being male baby were related to NNM and adverse birth outcome(26)(5).

CONCEPTUAL FRAMEWORK

The following conceptual frame work shows the association of each independent variable with dependent variable:

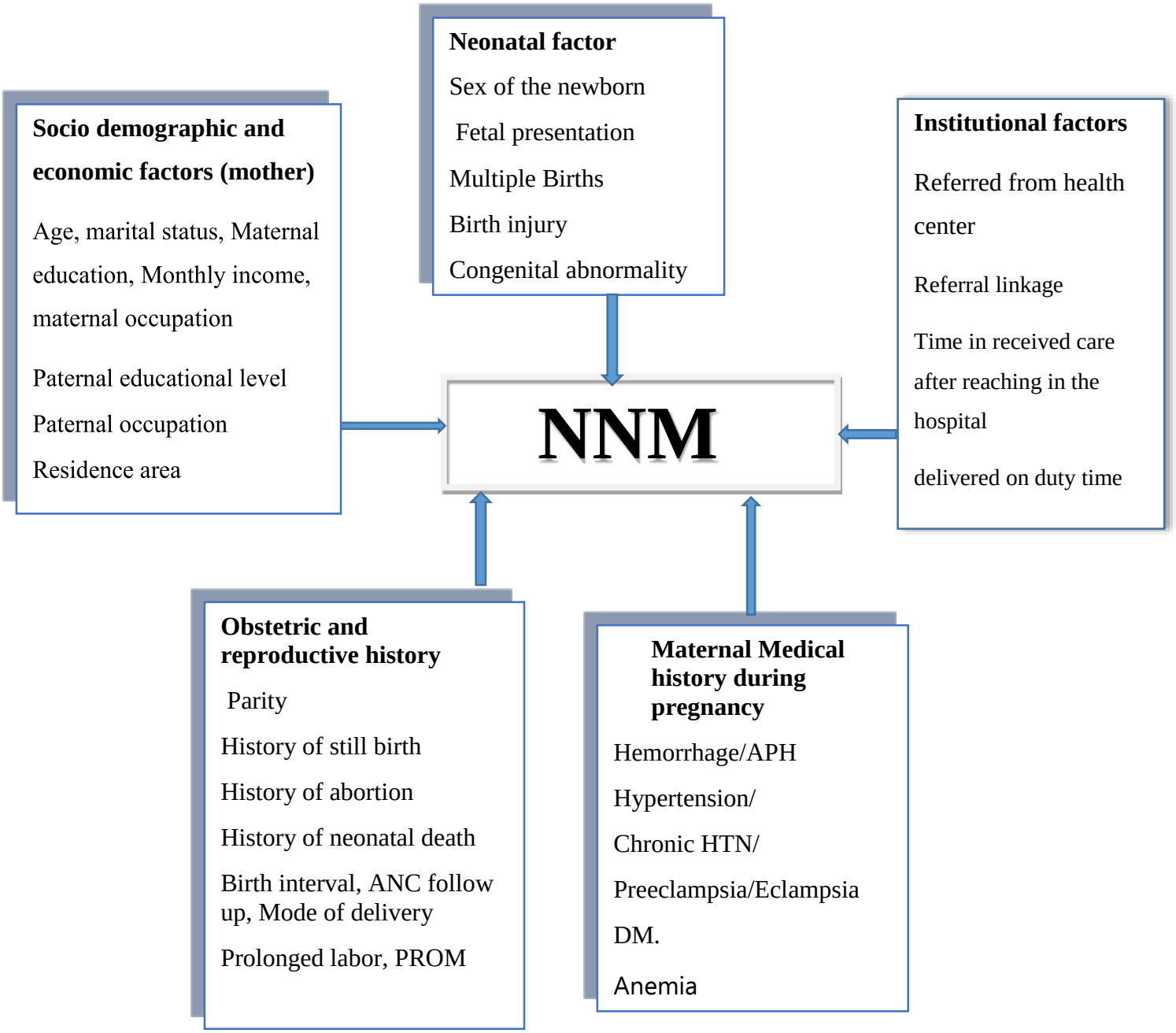

Figure 1: Figure 2: A conceptual framework was adapted for the current study from a range of literature sources (12,24,25,27,36,50,57).

3. OBJECTIVE OF THE STUDY

3.1 General Objective

- To assess the prevalence of NNM and associated factors among neonates delivered at public health hospitals, Addis Ababa, Ethiopia, 2021.

3.2 Specific Objectives

- To determine the prevalence of Neonatal Near Miss among neonates delivered at Addis Ababa public hospitals, Ethiopia, 2021.
- To identify factors associated with NNM among neonates delivered at Addis Ababa public hospitals, Ethiopia, 2021.

4. METHOD AND MATERIAL

4.1. Study Area and Period

The study was conducted in Addis Ababa, Ethiopia. With surface area of 526.7 square kilo meters Addis Ababa has 10 Sub cities. The population projection of 2014/15 of the city was 3,273,000. Addis Ababa has 12 specialized Public hospitals. Delivery and NICU service is inexistent in the two hospitals and hence are excluded. 4 hospitals out of the 10 remaining hospitals were randomly selected by lottery method. These are Gandhi Memorial Hospital, St Paul Millennium Medical College, Tikur Anbessa Specialized Hospital and Yekatit 12 Hospital Medical College. Yekatit 12 Hospital Medical College has 11 Gynecologists, and 36 Midwives. St Paul Millennium Medical College has 16 Gynecologists and 13 neonatal advance life support and also 60 midwives. Ghandhi Memorial Hospital has 12 Gynecologists and 68 Midwives. This study will be conducted from February 1 to February 29, 2021.

4.2 Study Design

Facility based retrospective cross-sectional study design was conducted.

4.3 Population

4.3.1. Source Population

All live birth neonates delivered at Addis Ababa public health hospitals.

4.3.2. Study Population

All live Neonates delivered at selected hospitals from January 1 2020 up to December 31, 2020 and fulfilling the eligibility criteria.

4.4. Eligibility Criteria

4.4.1. Inclusion Criteria

All live birth neonates delivered at selected hospitals during the study period.

4.4.2. Exclusion Criteria

Neonate charts which have no discharge summary or incomplete information were excluded.

Neonates immediately referred or linked for better management after delivery or within 28 days.

4.5. Sample Size Determination

Sample size for the study was determined by using single population proportion formula. Considering 32.9% proportion from a retrospective cross sectional study in Debretabor(12).

Where, n = sample size, p1 = prevalence of neonatal near-miss, d = margin of error 5%, Z= critical value at 95% CI.

$$\boldsymbol{n = \frac{(Z\,\alpha/2)2p1(1-p1)}{d2} = \frac{(1.96)2*(0.32)(0.68)}{(0.05)(0.05)} = 334}$$

Adding 10% contingency = 334*10%= 33, total sample size =334+33= 367

4.5.1. Sampling procedure

Based on report from Addis Ababa Health Bureau, Addis Ababa has 12 specialized Public hospitals. Delivery and NICU service is inexistent in the two hospitals and hence are excluded. 4 hospitals out of the 10 remaining hospitals were randomly selected by lottery method. In the selected Hospitals, an average number of neonates delivered at hospitals per year were about 35351 and we implemented systematic random sampling with interval equal to K, where $= \frac{N}{n}$; $K = 35351/367 = 96.32 = 96$.

The first maternal chart was selected by lottery method and then every other maternal chart was selected with interval determined as 96.

Sample size assignment for each hospitals was done taking live delivery history of neonates from January 1 2020 up to December 30, 2020 into account.

The final sample size allocated to respective hospitals based on proportion is as follows:

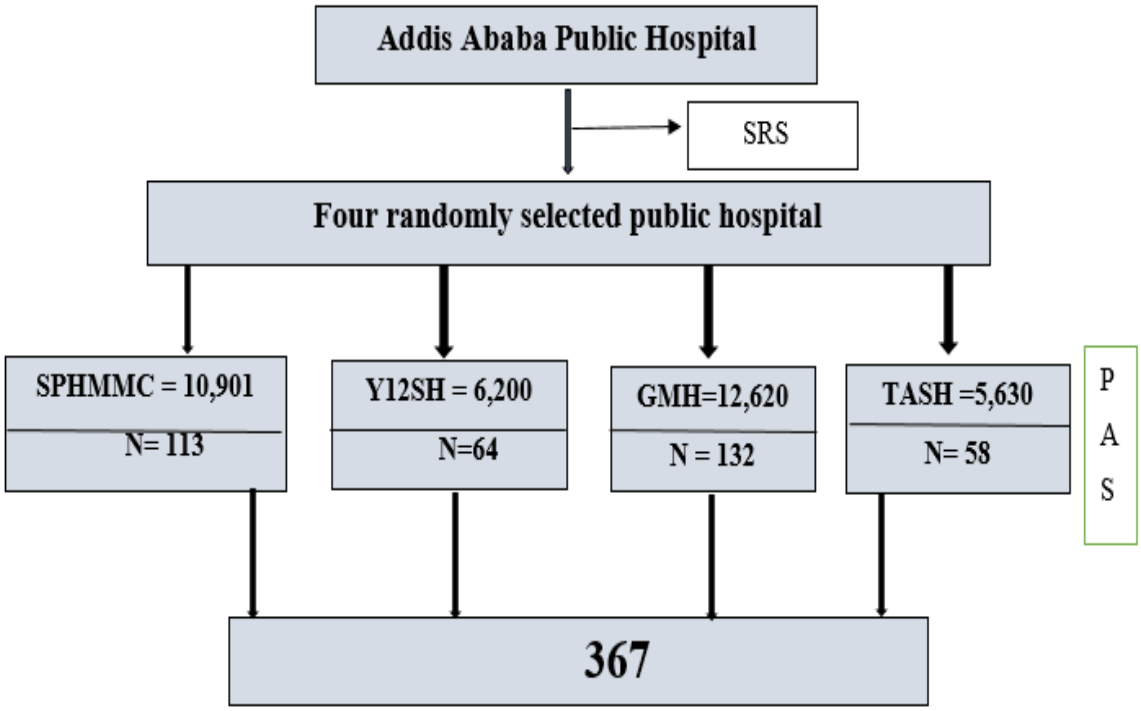

Figure 3 : Sampling procedure for neonatal near miss at Public Health Hospitals of Addis Ababa, 2021.

4.6. Variables

Dependent variables

- Neonatal near miss (NNM)

Independent variables

- **Mothers socio demographic characteristics**
  - Age
  - Maternal education level
  - Marital status
  - Maternal occupation `
  - Residence area

- Monthly income
- Paternal educational level
- Paternal occupation

➢ **Reproductive & Obstetric history**

- Parity
- History of still birth
- History of abortion
- History of neonatal death
- Birth interval
- ANC follow up
- Mode of delivery
- Prolonged labor
- PROM

➢ **Maternal medical complications**

- Hemorrhage: APH
- Hypertension/Chronic HTN/Preeclampsia/Eclampsia
- Diabetes mellitus
- Anemia

➢ **Institution factor**

- Referred from health center
- Referral linkage
- Time in received care after reaching in the hospital
- delivered on duty time

➢ **Fetal and Neonatal factor**

- Neonatal sex
- Fetal presentation during delivery

- Multiple birth
- Birth trauma
- Congenital abnormalities

4.7. Operational Definition

Neonatal Near Miss: NNM was considered when the newborn faced at least one of the following proposed criteria but survived. **pragmatic criteria:** Birth weight < 1750g, gestational age < 33 weeks, 5th-minute Apgar score < 7 or **management criteria**: nasal continuous positive airway pressure; systemic therapeutic antibiotics up to 7 days and before 28 days; intubation during the first 28 days of life; Bag and mask ventilation, cardiopulmonary resuscitation; phototherapy within the first 24 hours of life; the use of vasoactive drugs, anticonvulsants, blood products and steroids for refractory hypoglycemia and any surgical procedures(26).

Prolonged labor

is considered when the labor, after the latent phase of first stage of labor, exceeds 20 hours in primigravida or >14 hours in multipara mothers.

Prolonged rapture of membranes (PROM) considered to rupture of membranes lasting longer than 18 hrs.

Mal-presentation is defined as any fetal presentation other than vertex.

Incomplete information the absence of independent variables and/or basic personal contact information.

Birth interval: The time interval between the present and previous births.

4.8. Data Collection Tools and Procedure

4.8.1. Data Collection Tools (Instrument)

Combinations of data collection methods were used. The data was collected by using structured and pre-tested checklist by reviewing maternal and neonatal charts. The checklist was adapted from relevant literature(5)(26). The tool has generally five parts involving maternal socio-demographic characteristics, reproductive and obstetric history, and maternal medical history during pregnancy, about the newborn and institutional factors. Phone interviews was also held with the mother of the selected neonate. A structured and pretested checklist which is prepared in both Amharic and English was used for data collection.

4.8.2. Data Collection procedure

Data were collected through structured checklist by using maternal and neonatal charts. Phone interviews was also conducted. Data were collected by eight BSc nurses. Two MSc Clinical Midwives were recruited for supervision, guidance and facilitation of the data collection process. Necessary data were collected by reviewing patient's chart.

4.9. Data Quality Control

Before starting data collection, training was offered to data collectors for one day on technique of data collection, purpose of data collection, and content of the checklist, on how to review the neonatal and maternal cards, and how to deal with difficulties that may arise during data collection phase. Pretest was done at Minilik the second specialized hospital by taking 37 (10%) of the total sample size before the actual data collection to assess instrument simplicity, flow and consistency. Every day the collected data were reviewed and cross-checked for completeness and relevance before data entry.

4.10. Data processing, analysis and presentation

The data were coded, cleaned, and entered to Epi-Data version 4.6 and exported to statistical package for social science (SPSS) version 25 for analysis. Inconsistencies and missing values was checked by running frequencies. Descriptive statistics like frequency distributions, mean, and standard deviation were computed. Bivariate analysis was done primarily to check which independent variables had an association with that of the dependent variable (NNM).

Independent variables with marginal associations (P <0.20) in the bivariate analysis were selected for a multivariable logistic regression analysis in order to detect association with NNM. Adjusted odds ratios (AOR) with 95% CI was estimated to assess the strength of associations. Statistical significance was declared at a p-value < 0.05. Finally, the results of the study were presented with text, graph and table.

4.11. Ethical issue

Ethical clearance was obtained from the Addis Ababa University Heath Sciences' Ethical Committee and Addis Ababa City Health bureau to the research team to conduct the research in the respective Hospitals. Verbal Informed Consent was undertaken from the participants. Participants do have maximum freedom to refuse or take their time to thinks.

Names and other personal information that can violate the confidentiality of the respondents will not take or record. The information was kept confidential and only used for research purposes. During data collection privacy of respondents were kept and they were free to withdrawn from the interview at any time.

4.12 Dissemination Plan.

The result of this study will be disseminated to Addis Ababa University College of Health Sciences, School of Nursing and Midwifery and Addis Ababa Health Bureau. Attempts to publish parts of the research findings in reputable local and/or international journals will finally be made. The results will also be disseminated through workshops and seminars.

5. RESULTS

5.1. Socio-Demographic Characteristics of mothers

This study was carried out at public health hospitals in Addis Ababa to assess the prevalence and associated factors of neonatal near miss among neonates delivered at Black lion, St. Paul's, Yekatit 12 and Gandhi memorial hospitals. A total of 367 mothers and their neonates' cards were reviewed with a response rate of 100%. More than three-fourth, 154 (42.0%) of mothers were between the age interval of 25-29 with the overall mean of 26.6 years and standard deviation 4.66 years (± 4.66 SD). Almost all, 357 (97.3%) of mothers were married and live together with their husbands, and Three hundred nine (84.2%) of them were permanently resident of urban.

Regarding mothers' educational level, more than one-fourth, 135(36.8%), of mothers had primary (1-8) education level and more than half, 217(59.1%), of mothers were housewife in occupation. The Paternal education of study participants of secondary (9-12) was 119(32.4%) and 138 (37.6%) of them participated on private work in occupation. One hundred twenty (32.7%) of mothers earned monthly income interval of 1651-3200 Ethiopian birr with overall median of 4000 birr and standard deviation 3304.9 (± 3304.9 SD) (Table 1)

Table 1: Socio-demographic characteristics of mothers of neonates delivered in public hospitals in Addis Ababa, Ethiopia, 2021.

Table 2: Socio-demographic characteristics of mothers of neonates delivered in public hospitals in Addis Ababa, Ethiopia, 2021.

Variable	Category	Frequency	Percent
Age	15-19	11	3.0
	20-24	113	30.8
	25-29	154	42.0
	30-34	59	16.1
	35-39	27	7.4
	40-44	3	0.8
	Mean ± SD	26.6 ± 4.66	
Marital status	Single	3	.8
	Married and live together	357	97.3
	Married but Separated	6	1.6
	Divorced	1	.3
permanent place of residence	Urban	309	84.2
	Rural	58	15.8
mother's educational status	No formal education	58	15.8
	Primary (1-8)	135	36.8
	Secondary (9-12)	103	28.1
	More than secondary	71	19.3
Occupation of the mother	House wife	217	59.1
	Merchant	29	7.9
	Government employer	56	15.3
	private work	54	14.7
	Daily laborer	11	3.0
Paternal Educational status	No formal education	25	6.8
	Primary (1-8)	116	31.6
	Secondary (9-12)	119	32.4
	More than secondary	107	29.2
Occupation of the father	Farmer	16	4.4
	Merchant	46	12.5
	Government employer	70	19.1
	private work	138	37.6
	Daily laborer	97	26.4
Monthly Income	<600	3	.8
	601-1650	46	12.5
	1651-3200	120	32.7
	3201-5250	97	26.4
	5251-7800	39	10.6
	7801-10900	42	11.4
	>10901	20	5.4
	Median ± SD	4000 ± 3304.9	

5.2. Reproductive and obstetric history related characteristics of mothers

Concerning number of pregnancies regardless of outcome, about two hundred forty-four (66.5%) of mothers were multigravida and 204(55.6%) of mothers were multiparous in parity. Only 22(6.0%) of mothers experienced pervious history of still birth. Similarly, 54(14.7%) of mothers faced pervious history of abortion and three (0.8%) of them had pervious history of neonatal death. About 7(1.9%) of mothers had previous history of preterm birth and one hundred twenty-one (33.0%) of mothers were less than 24 months of birth interval. Almost all, 365(99.5%) of mothers had ANC follow-up and 260(70.8%) of mothers had more than four times ANC visited (Table 2).

Table 3: Reproductive and obstetric history characteristics of mothers, Addis Ababa,Ethiopia,2021.

Variable	Category	Frequency	Percent
Gravidity	Primigravida	123	33.5
	Multigravida	244	66.5
Parity	Primiparous	153	41.7
	Multiparous	204	55.6
	Grand multipara	10	2.7
Pervious history of still birth	Yes	22	6.0
	No	345	94.0
Pervious history of abortion	Yes	54	14.7
	No	313	85.3
Pervious history of neonatal death	Yes	3	.8
	No	364	99.2
Previous history of preterm birth	Yes	7	1.9
	No	360	98.1
birth interval(in months)	< 24	121	33.0
	25-48	94	25.6
	>49	34	9.3
Did the woman have ANC follow up	Yes	365	99.5
	No	2	.5
Number of ANC visits	1-3	107	29.2
	>4	260	70.8
Prolonged Labor	Yes	69	18.8
	No	298	81.2
Prolonged rapture of membrane	Yes	74	20.2
	No	293	79.8

Around Sixty-nine (18.8%) of mothers had prolonged labor and 74(20.2%) of mothers were prolonged rapture of membrane. According to the study finding of our study, one hundred ninety-one (52.04%) of study participants were delivered through spontaneous vaginal, 23(6.3%) of mothers were with instrumental assisted and 153(41.7%) of mothers were Caesarean section delivery, respectively figure 3.

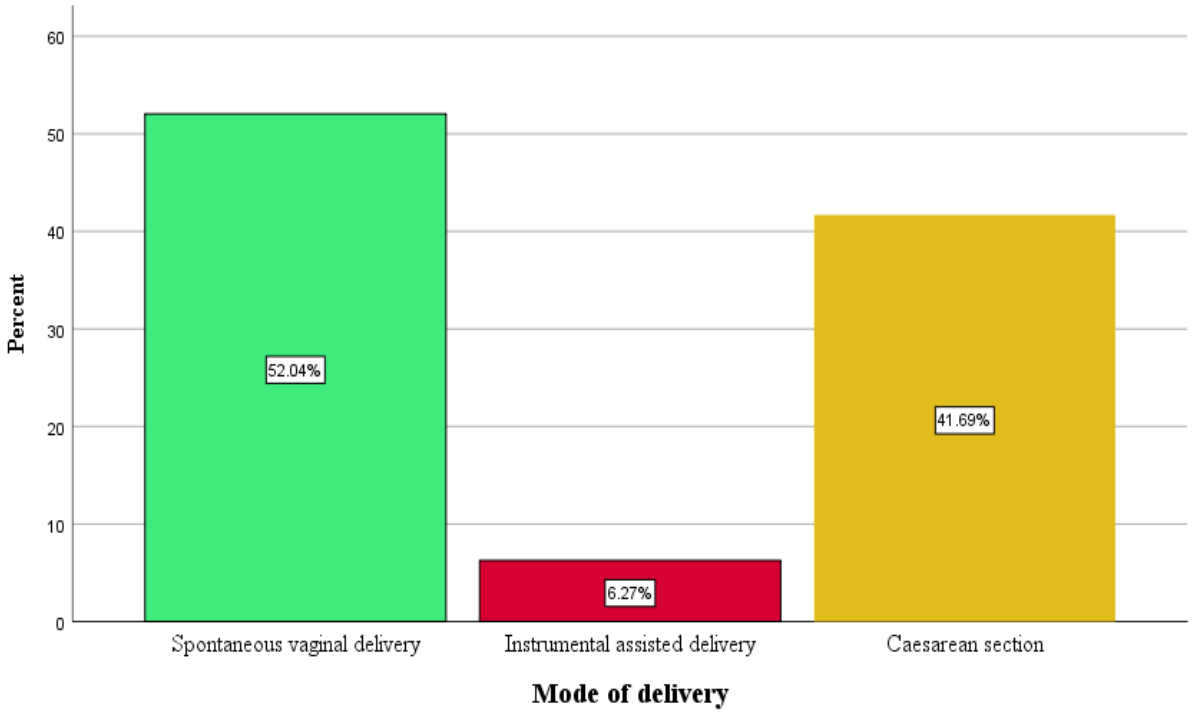

Figure 4: Mode of delivery of mothers at public hospitals in Addis Ababa, Ethiopia,2021.

5.3. Maternal Medical history during pregnancy related characteristics

This study finding revealed that twenty-four (6.5%) of mothers had experienced ante partum hemorrhage. Seventy-three (19.9%) of mothers had hypertension and from this, 49(13.4%) of mothers were experienced pre-eclampsia. Only 15(4.1%) of mothers had Diabetes mellitus and 9(2.5%) of them had diabetes mellitus during gestational period. In addition, sixteen (4.4%) of mothers had anemia. Similarly, thirty-four (9.3%) of mothers were developed infection and 16(4.4%) of them infected with chorioaminonitis (Table 3).

Table 4:Maternal Medical history during pregnancy related characteristics public hospitals in Addis Ababa, Ethiopia, 2021.

Variables	Category	Frequency	Percent
Ante partum Hemorrhage	Yes	24	6.5
	No	343	93.5
Hypertension	Yes	73	19.9
	No	294	80.1
Yes to hypertension	Pre-eclampsia	49	13.4
	Eclampsia	3	.8
	HELLP	2	.5
	Chronic hypertension	6	1.6
	Gestational hypertension	15	4.1
Diabetes mellitus (DM)	Yes	15	4.1
	No	352	95.9
Yes to Diabetes mellitus	Pre-gestational	6	1.6
	Gestational	9	2.5
Anemia	Yes	16	4.4
	No	351	95.6
Infection	Yes	34	9.3
	No	333	90.7
Yes to Infection	Septicemia	1	.3
	UTI	10	2.7
	HIV/AIDS	5	1.4
	Syphilis	4	1.1
	Chorioaminonitis	16	4.4
Other Comorbidities	Yes	24	6.5
	No	343	93.5
Yes to Comorbidities	Heart disease	9	2.5
	Pulmonary disease	8	2.2
	Other*	8	2.2

Other* indicates that hematologic, hepatic, neurologic and renal disease

5.4. Institutional Factors

According to the findings of the report, 93.2 percent of mothers were referred by other health facilities, with 73.8 percent having a referral linkage. Furthermore, nearly half of the mothers (48.8%) gave birth during duty hours, with a mean time of 0.711 minutes and a standard deviation of 0.566 minutes for obtaining care after arrival at the hospital (Table 4).

Table 5:Institution Factors in Addis Ababa, Ethiopia,2021

Variable	Category	Frequency	Percent
Mothers who have been referred by another health facility	Yes	342	93.2
	No	25	6.8
Referral linkage	Yes	271	73.8
	No	71	19.3
Delivered on duty time	Yes	179	48.8
	No	188	51.2
After arriving at the hospital, the amount of time spent receiving treatment.	Mean ± SD	0.711 ± 0.566	

5.5. Characteristics of the newborn

According to the findings of the report, more than half of newborns [51.0 percent] were male in sex and the majority [94 percent] was single at birth.

Just 7.4% of newborns had birth injuries, with 3.8 percent of those suffering from subgalial hemorrhage. A congenital defect 5.7 percent of newborns (Table 5).

Table 6: Neonatal related characteristics among newborns, public hospitals in Addis Ababa, Ethiopia, 2021.

Variable	Category	Frequency	Percent
Sex	Male	187	51.0
	Female	180	49.0
Birth type	Single	345	94.0
	Twin	22	6.0
Birth injury	Yes	27	7.4
	No	340	92.6
Yes to Birth injury	Subgalial hemorrhage	14	3.8
	Cephalohematoma	6	1.6
	Brachial plexus injury	1	.3
	other,	1	.3
Congenital anomaly	Yes	21	5.7
	No	345	94.0

In terms of newborn presentation, 88.8% of newborns had a cephalic presentation, while Breech presentation accounted for 9.3% of newborns [Fig 4].

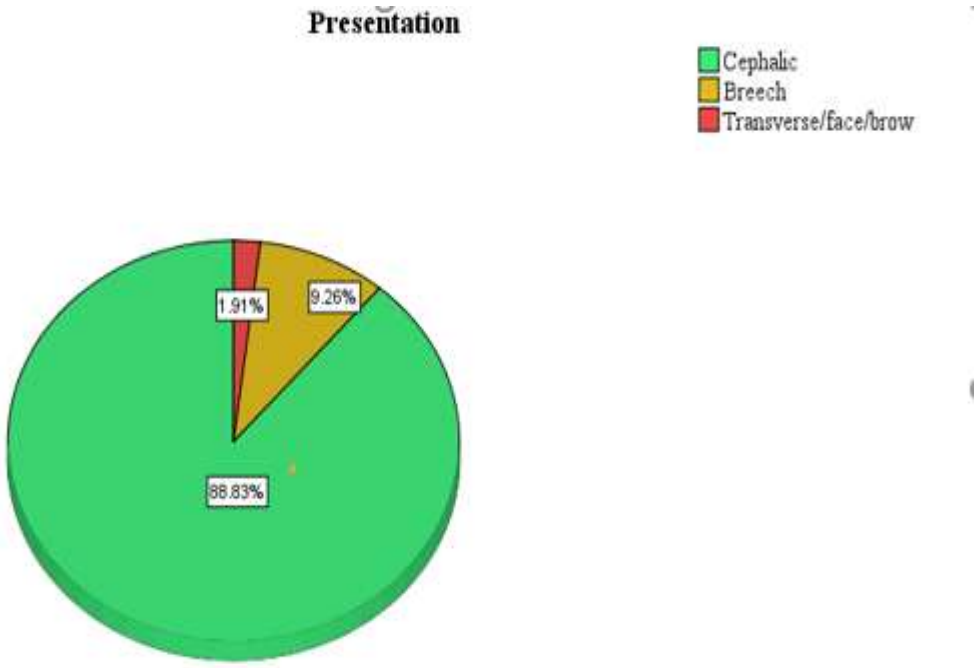

Figure 5:Presentation of newborns delivered at public hospital, Addis Ababa,2021

5.6. Characteristics of neonatal near misses

According to the study's finding, the most frequently identified pragmatic criteria of NNM cases were low birth Weight less than 1750,33(9.0%), 22(6.0%) of newborns scored Apgar less than 7 at 5th minutes, and 21(5.7%) of newborns were less than 33weeks gestational respectively. On the other hand, 88 (24%) of the neonates met the management criteria - Parenteral antibiotics for about 7days 72 (19.6%), Nasal CPAP 48 (13.1%) and bag and mask ventilation 25(6.8%) outstandingly. (Table 6)

Table 7:Neonatal near miss characteristics among newborns at public hospitals, Addis Ababa, 2021

Criteria	Variables	Category	Frequency	Percent
Pragmatic criteria	Gestational Category	> 34 weeks	346	94.3
		<33weeks	21	5.7
	Weight category	>1750gm	334	91.0
		< 1750gm	33	9.0
	Apgar core 5th minuet	>7	345	94.0
		< 7	22	6.0
Management criteria	Nasal CPAP	No	319	86.9
		Yes	48	13.1
	Any intubation	No	362	98.6
		Yes	5	1.4
	Parenteral antibiotics for about 7days	No	295	80.4
		Yes	72	19.6
	Transfusion of blood derivatives	No	344	93.7
		Yes	23	6.3
	Phototherapy during the first 24hrs	No	362	98.6
		Yes	5	1.4
	Vasoactive drugs	No	360	98.1
		Yes	7	1.9
	Surgical procedures	No	361	98.4
		Yes	6	1.6
	Anticonvulsants	No	355	96.7
		Yes	12	3.3
	Bag and mask ventilation	No	342	93.2
		Yes	25	6.8
	Cardiopulmonary resuscitation	No	360	98.1
		Yes	7	1.9
	Use of corticosteroid for treatment of refractory hypoglycemia	No	362	98.6
		Yes	5	1.4
Overall management criteria		No	276	76
		Yes	88	24

As the study result indicated that the overall prevalence of neonatal near miss among new born delivered at public hospitals in Addis Ababa was 25.61%(figure 5).

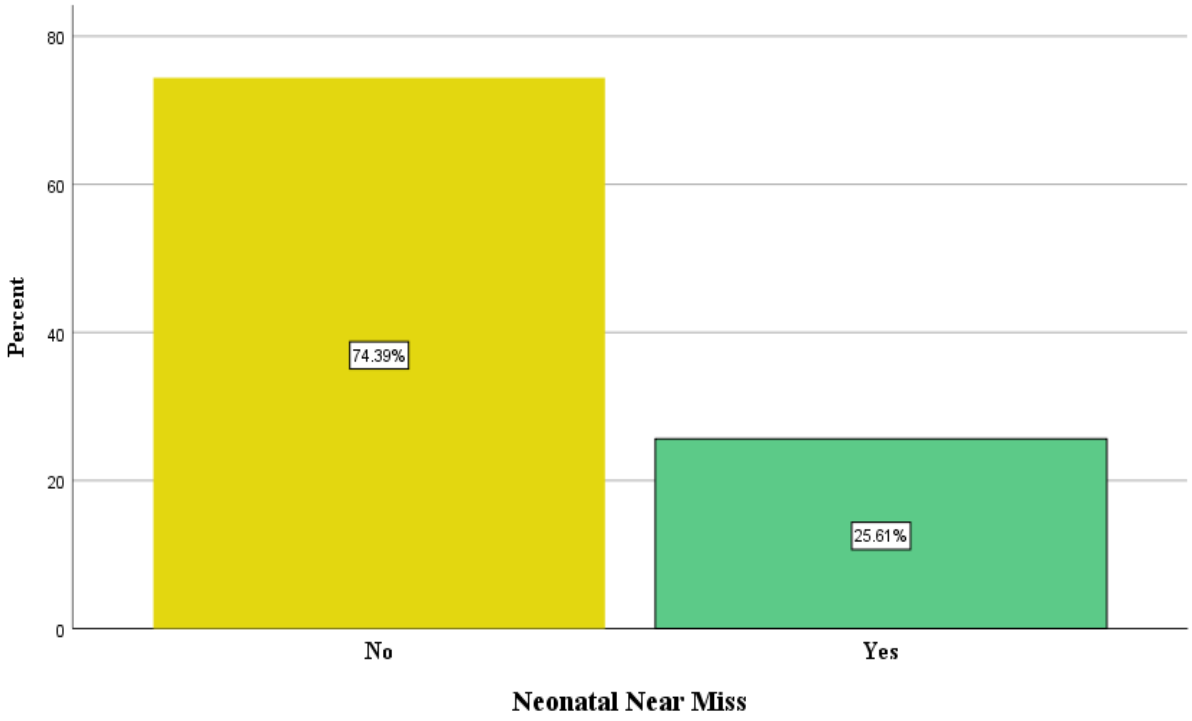

Figure 6: Prevalence of Neonatal Near Miss among newborns at public hospitals, Addis Ababa,2021

5.7. Factors associated with neonates near miss

Bivariate logistic regression demonstrated that permanent place of residence, mother's educational status, occupation of the mother, parity, pervious history of still birth, pervious history of abortion, pervious history of neonatal death, previous history of preterm birth, ANC visit, mode of delivery, prolonged rapture of membrane, Ante partum Hemorrhage, Hypertension, Anemia, infection, other comorbidities, delivered on duty time, presentation, birth type, birth injury and congenital anomaly were significant variables selected for multivariable logistic regression at p-value less 0.2. occupation of the mother

Multivariable logistic regression revealed that occupation of the mother, previous history of preterm birth, Mode of delivery, Hypertension, Infection, delivered on duty time, Birth injury, and Congenital anomaly were significantly associated with NNM.

As compared to daily laborers, mothers who worked as merchant had an 87.5 lower risk of NNM (AOR: 0.123, 95 % CI: 0.018 - 0.859). In terms of obstetric and reproductive history, Mothers who had privies history of preterm delivery twelve times more likely to have NNM than mothers without previous history of preterm (AOR 11.828, 95% CI 1.856 - 75.398). the mode of delivery was statistically significant, indicating that mothers who delivered newborns by caesarian section two times higher compare with spontaneous vaginal delivery (2.391 AOR, 95% CI 1.229 - 4.652).

NNM ware three times higher than those mothers who had hypertension compared to without hypertension during pregnancy (AOR 2.674, 95% CI 1.343 - 5.324). In comparison to infection, mothers who had infection four times high risk for NNM than no infection (AOR 3.706, 95% CI 1.375 - 9.988). delivered on duty time (AOR 2.304, 95% CI 1.263 - 4.203), Birth injury (AOR 4.759, 95% CI 1.711 - 13.241), Congenital anomaly (AOR 8.925, 95% CI 2.580 - 30.873) were significantly associated with NNM.

Table 8:Multiple logistic regression analysis on factors associated with neonatal near miss at public Hospitals, Addis Ababa, 2021

Variables	Category	NNM		COR with 95% C.I	AOR with 95% C.I.	P-value
		No,N(%)	Yes,N(%)			
permanent place of residence	Urban	237(76.7)	72(23.3)	.497 (.275 -.899)	0.4439 (0.192 - 1.019)	0.055
	Rural	36(62.1)	22(37.9)	Reference		
mother's educational status	No formal education	37(63.8)	21(36.2)	1.803 (.840 - 3.871)	1.525 (0.465 - 5.001)	0.486
	Primary (1-8)	107(79.3)	28(20.7)	.831(.419 - 1.650)	0.753 (0.257 - 2.205)	0.605
	Secondary (9-12)	75(72.8)	28(27.2)	1.186 (.591 - 2.380)	1.015 (0.408 - 2.525)	0.975
	College and above	54(76.1)	17(23.9)	Reference		
occupation of the mother	House wife	161(74.2)	56(25.8)	.290 (.085 - .987)	0.269 (0.058 -1.245)	0.093
	Merchant	23(79.3)	6(20.7)	.217 (.049 - .963)	**0.123 (0.018 - 0.859)**	**0.035***
	Government employer	42(75.0)	14(25.0)	.278 (.073 - 1.052)	0.199 (0.033- 1.199)	0.078
	private work	42(77.8)	12(22.2)	.238(.062 -.918)	0.212 (0.037 - 1.195)	0.079
	Daily laborer	5(45.5)	6(54.5)	Reference		
Parity.cat	Primiparous	108(76.6)	45(24.4)	.625 (.168 - 2.321)	1.148 (0.211 - 6.244)	0.873
	Multiparous	159(77.9)	45(22.1)	.425 (.115 - 1.570)	0.714 (0.132 - 3.876)	0.697
	Grand multipara	6(60.0)	4(40.0)	Reference		
pervious history of still birth	Yes	12(54.5)	10(45.5)	2.589 (1.080 - 6.208)	1.343 (0.415 - 4.351)	0.623
	No	261(75.7)	84(24.3)	Reference		
pervious history of abortion	Yes	32(59.3)	22(40.7)	2.301 (1.259 - 4.207)	1.186 (0.518 - 2.716)	0.687
	No	241(77.0)	72(23.0)	Reference		
pervious history of neonatal death	Yes	1(33.3)	2(66.7)	5.913 (.530 - 65.972)	18.265 (0.781 - 427.093)	0.071
	No	272(74.7)	92(25.3)	Reference		
previous history of preterm birth	Yes	3(42.9)	4(57.1)	4.000 (.878 - 18.213)	**11.828 (1.856 - 75.398)**	**0.009***
	No	270(75.0)	90(25.0)	Reference		
ANC visit	1-3	73(68.2)	34(31.8)	1.553 (.943 - 2.557)	1.658 (0.863 - 3.185)	0.129

	>4	200(76.9)	60(23.1)	Reference		
Mode of delivery	Spontaneous vaginal delivery	156(81.7)	35(18.3)	Reference		
	Instrumental assisted delivery	14(60.9)	9(39.1)	.462 (.281 - .761)	2.952 (0.917 - 9.501)	0.069
	Caesarean section	103(67.3)	50(32.7)	1.324 (.537 - 3.267)	**2.391 (1.229 - 4.652)**	**0.010***
Prolonged rapture of membrane	Yes	50(67.6)	24(32.4)	1.529 (.877 - 2.666)	2.017 (0.973 - 4.184)	0.059
	No	223(76.1)	70(23.9)	Reference		
Ante partum Hemorrhage	Yes	15(62.5)	9(37.5)	1.821 (.769 - 4.312)	1.372 (0.402 - 4.681)	0.614
	No	258(75.2)	85(24.8)	Reference		
Hypertension	Yes	44(60.3)	29(39.7)	2.322 (1.348 - 4.000)	**2.674 (1.343 - 5.324)**	**0.005***
	No	229(77.9)	65(22.1)	Reference		
Anemia	Yes	8(50.0)	8(50.0)	3.081(1.123 - 8.458)	1.139 (0.274 - 4.732)	0.858
	No	265(75.5)	86(24.5)	Reference		
Infection	Yes	21(61.8)	13(38.2)	1.926 (.923 - 4.019)	**3.706 (1.375 - 9.988)**	**0.010***
	No	252(75.7)	81(24.3)	Reference		
Other comorbidities	Yes	15(62.5)	9(37.5)	1.821 (.769 - 4.312)	1.203 (0.371 - 3.901)	0.759
	No	258(75.2)	85(24.8)	Reference		
delivered on duty time	Yes	119(66.5)	60(33.5)	2.284 (1.408 - 3.705)	**2.304 (1.263 - 4.203)**	**0.007***
	No	154(81.9)	34(18.1)	Reference		
Presentation	Cephalic	249(76.4)	77(23.6)	.232 (.051-1.059)	0.299 (0.045 - 1.995)	0.212
	Breech	21(61.8)	13(38.2)	.464 (.089 - 2.415)	1.127 (0.147 - 8.617)	0.908
	Transverse/face/brow	3(42.9)	4(57.1)	Reference		
Birth type	Single	262(75.9)	83(24.1)	.317 (.133 - .757)	0.471 (0.151 - 1.465)	0.193
	Twin	11(50.0)	11(50.0)	Reference		
Birth injury	Yes	12(44.4)	15(55.6)	4.130 (1.856 - 9.188)	**4.759 (1.711 - 13.241)**	**0.003***
	No	261(76.8)	79(23.2)	Reference		
Congenital anomaly	Yes	6(28.6)	15(71.4)	8.558 (3.212 - 22.797)	**8.925 (2.580 - 30.873)**	**0.001***
	No	267(77.4)	78(22.6)	Reference		

6. DISCUSSION

This study was conducted to determine the prevalence of NNM and associated factors at public hospitals, Addis Ababa, Ethiopia.

The finding of this study discloses that the magnitude of NNM was 25.61% with 95% CI: (21.0 -30.5). This finding is in line with research conducted in Brazilian university hospitals which found that 30.37% of NNM(19). The rate is 22% in Northeastern Brazil(23).

This finding is also agreeable with a study done in Injibara, Northwest Ethiopia, which found 23.3 % of neonate close misses(25), and the same is true in Jimma Zone, Southwest Ethiopia, where the NNM occurrence is 26.7% (26).

However, this finding is lower than the situation in Uganda which account for 36.7% NNM(21). This result is also lower when compared to a study from Debretabor, Northern Ethiopia, which used an institutional-based retrospective cross-sectional study and found that NNM prevalence was 32.9% (12). The study finding is also lower when compared with another study from Hawassa, South Ethiopia, which found that the prevalence of NNM is 33.4% (27).

In contrast, the magnitude of NNM in this study is greater than that of a study done by WHO multicounty Survey that found the magnitude of NNM is 7.2%(16).This finding also greater than that of study done in Brazil where the prevalence of NNM rate was 3.3% (13). the rate was 8.76% when it comes to India (20).

The observed variance in NNM prevalence may be due to the likely difference in socio-economic characteristics of participants, the health care delivery system of institutions and/ or the study design applied. Furthermore, the variation could be due to the criteria utilized in identifying NNM instances. Examples could be studies done in the Southeastern and Northeastern Brazil, India and Hawassa (Southern Ethiopia) which used solely pragmatic criteria to identify NNM. (13,19,26). Whereas Injibara (Northwest Ethiopia), Jimma(Southwest Ethiopia) and Debretabor (North Ethiopia) applied both pragmatic and management criteria like that of this study(12,25,26)

The occupation of mothers was found to be statistically significant in the development of NNM. When compared to daily laborers, merchants are at lower risk of NNM (87%). This finding is also supported by three studies conducted in united states , Ireland and Iran which found mothers working environments are significantly associated with obstetric outcome (30)(31)(32). It may be that merchants are likely to have more time freedom to take better care and rest for themselves and their newborn.

This study also indicated that the odds of NNM in mothers who had privies history of preterm delivery 11.82 times higher than compared to mothers without previous history of preterm delivery. This proves that women who had previous history of preterm delivery have an increased risk of spontaneous preterm delivery in the subsequent pregnancy(39).similarly, our study finding agree with the study conducted in united states that shows a history of one previous preterm delivery is 17-37% increase the risk of recurrent preterm delivery (40). It seems that repeated history of preterm delivery might potentially predispose to NNM.

This study finding revealed that Mothers who give birth via cesarean section are 2.39 times more likely to have Neonatal Near Miss compared to mothers who had given spontaneous vaginal delivery. This research finding is in line with the finding of the study done in Gamo Gofa, Southern Ethiopia, Jimma Zone, Southwest Ethiopia, and Gurage zone which founds that cesarean delivery was having an increased risk of NNM(5)(26)(45). A number of studies also shown that cesarean delivery is related with increased risk of low APGAR score, neonatal resuscitation and NICU admission(41,44).

This could be due to many reasons such as, the underlying reason that led the mother to CS might be highly relevant with the condition of the fetus, the likely negative impact of surgical wound and anesthetic effect impairing the mother's ability to care the newborn which may cause NNM.

As opposed to this, cesarean section were protective factors against NNM from study conducted in Hawassa (27). The discrepancy might have been resulted from the instrumental delivery worsening vaginal delivery outcome. The study done in Hawassa seemed to undermine the impact of instrumental delivery in reversing the figure. But in our case, we investigated spontaneous vaginal delivery and instrumental vaginal delivery explicitly.

In this study maternal infection increased the odds of NNM by 3.7 times as compared to those mothers who had no maternal infection during pregnancy. This evidence is also in agreement with findings from a study conducted in Birmingham USA shows that maternal infection have association with low birth weight, preterm delivery and congenital abnormality(47). Similarly, mothers with untreated syphilis has bad obstetric outcome(46).

Our study shows that the odds of NNM were 2.6 times higher than those mothers who had no history of hypertension during pregnancy. This result is consistent with research conducted in Brazil, which found that hypertension during pregnancy was linked to an increased likelihood of NNM cases. (4,38).This finding is also supported by two other studies done in Hawassa, South Ethiopia and Jimma Zone, Southwest Ethiopia, which reported that hypertension was significantly associated with NNM(26)(27).

This could be due to hypertension effect on uteroplacental insufficiency compromising blood flow and nutrients into the fetus which in turn makes the new born prone to intra uterine growth restriction, asphyxia, premature delivery, low birth weight altogether leading the new born to NNM.

This study shows that the odds of Neonatal Near Miss were 8.9 times higher among neonate delivered with congenital abnormality. This finding supported by a study done in Addis Ababa, Ethiopia which states that congenital abnormality was identified as a factor associated with low birth weight neonates(53). Furthermore, a study conducted in Gujarat, India indicated that Congenital malformations were more likely to have preterm deliveries, low birth weight and stillbirth(54).

Our research also shows that neonate with birth injury was 4.7 times higher chance of developing NNM than neonate without birth injury. This study finding agree with study done in Germany that birth injury highly linked with birth asphyxia(55).

This result might be due to neonates who have birth injury particularly head who may have severe bleeding and encephalopathy, this may lead to hypovolemic shock and low APGAR score. Thus, they require cardiopulmonary resuscitation and blood transfusion.

This study disclosed that delivered on duty time two times higher risk to have NNM than neonates delivered on regular working hours. This might have been resulted from the lack of specialists, seniors and caregivers on duty hours as well as the job burden caused by the tendency of medical practitioners to postpone regular hour tasks to duty time.

6.1. Strength and Limitation of the study

Limitation

- The primary limitation of this paper is its reliance on cross sectional data, which limits our ability to draw causal inferences. It is commonly known that in all cross-sectional studies - we can infer association but not causation.
- Since the study is undertaken in only government health institutions, it seems to lack representativeness due to excluding the private health institution.

Strength

- The study also applied standardized Neonatal Near Miss identification criterion to prevent misclassification.

7. CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion

The prevalence of Neonatal Near Misses in our study setting was found to be (25.6%) lower when compared with other studies undertaken in Ethiopia. The opposite is true when it comes to findings from international studies.

Occupation of the mother, previous history of preterm birth, Mode of delivery, Hypertension, Infection, delivery on duty time, Birth injury, and Congenital abnormality were significantly associated with NNM.

7.2 Recommendations

The following recommendations are made based on the key findings:

- **To health professionals and health institutions**

- Healthcare providers need to take greater caution to mothers with a history of preterm delivery in a way they can adhere in receiving antenatal and postnatal care.
- Clinicians have to take into account the potential complications of cesarean section delivery and pay attention to deliver additional postnatal care for a better outcome.
- The obstetrics and gynecology department ought to constantly perform a caesarian section audit to help identify the gap that leads to NNM.
- Efforts should be made by Healthcare providers to perform early investigation and management in a way to address maternal medical related problem like hypertension and infection as one approach to prevent NNM.
- Healthcare Professionals must be aware enough about the advantages of early screening to prevent Congenital abnormality by facilitating antenatal care such as folic acid administration, treatment of infections that are factors for congenital abnormalities including obtaining family histories and carrier screening.
- Expansion of knowledge and understanding about the many different preventable causes of NNM among Public Health Professionals where down the road increased attention is given to this big health matter.

- Medical professionals working in delivery unit, obstetric and midwifery environment ought to do antenatal period screening, as early as possible, to sort out babies at risk of being traumatized during vaginal delivery.
- Healthcare providers have to do post-delivery physical and neurologic assessment for every newborn to make the detection and management of birth trauma and associated complications easy.
- Hospital Managers must endeavor to reverse the consequences of disproportionate patient to nurse/ specialist / senior ratio during regular work verses duty hours.
- Physicians ought to perform their regular operation timely as opposed to postponement that put pressure on duty hour caregivers.

➢ **Addis Ababa Health Bureau**

- Even though the magnitude of NNM in the context of the Capital is better than other regions, Addis Ababa Health Bureau needs to increase its effort to further strengthen its capacity to implement health strategies based on the identified Neonatal Near Miss predictors.
- The Bureau must avail enough resources to extend the provision of estate-of-the-art antenatal care through procurement of adequate medical equipment and ongoing endeavors to elevate the staff profile in the area to enrich the quality and attractiveness of the service provided.
- Addis Ababa Health Bureau must launch designated community based awareness raising strategies to be implemented in a way that advocates ANC.
- Health bureau ought to use researches done by scholars and researchers to improve their plans, policies and strategies.
- Perhaps Addis Ababa Health Bureau could develop a guideline that can narrow down the aforementioned gap due to the nature of working hour.

➢ **Stakeholders**

- Non-governmental and community based organizations working on maternal and children care are highly recommended to play their role in resource provision and expansion.

- **Researchers**

- Researchers are highly encouraged to do further investigation to identify other factors by using various tools and study design.

REFERENCES

1. WHO. Every newborn: An action plan to end Preventable deaths: Executive summary Geneva: World Health Organization. Who, Unicef [Internet]. 2014;1–58. Available from: www.who.int/about/licensing/copyright_form/en/index.html

2. Say L. Neonatal near miss : a potentially useful approach to assess quality of newborn care. J Pediatr (Rio J). 2010;86(1):1–2.

3. Santos JP, Cecatti JG, Serruya SJ, Almeida P V., Duran P, de Mucio B, et al. Neonatal Near Miss: The need for a standard definition and appropriate criteria and the rationale for a prospective surveillance system. Clinics. 2015;70(12):820–6.

4. Martinelli KG, Gama SGN da, Almeida AH do V de, Pacheco VE, Santos Neto ET Dos. Advanced maternal age and factors associated with neonatal near miss in nulliparous and multiparous women. Cad Saude Publica. 2019;35(12):e00222218.

5. Mersha A, Bante A, Shibiru S. Factors associated with neonatal near-miss in selected hospitals of Gamo and Gofa zones , southern Ethiopia : nested case- control study. BMC Pregnancy Childbirth. 2019;(https://doi.org/10.1186/s12884-019-2684-x):1–8.

6. Nakimuli A, Mbalinda SN, Nabirye RC, Kakaire O, Nakubulwa S, Osinde MO, et al. Still births, neonatal deaths and neonatal near miss cases attributable to severe obstetric complications: A prospective cohort study in two referral hospitals in Uganda. BMC Pediatr. 2015;15(1).

7. World Health Organization. Survive and thrive: transforming care for every small and sick newborn. Key Findings. 2018;9. Available from: https://apps.who.int/iris/bitstream/handle/10665/276655/WHO-FWC-MCA-18.11-eng.pdf?ua=1

8. Estimation UNIG for CM, (UN IGME) L& T in CM. Child Mortality 2019. 2019;

9. Afolabi BM. Journal of Neonatal Biology Sub-Sahara African Neonates – Ghosts to Statistics. J Neonatal Biol. 2017;6(1):1–3.

10. Agency CS. Ethiopia, Mini Demographic Health Survey. 2019.

11. Estimation CM. UN IGME Child mortality report 2019 [Internet]. 2019. 52 p. Available from: https://www.unicef.org/media/60561/file/UN-IGME-child-mortality-report-2019.pdf

12. Tassew HA, Kassie FY, Mihret MS. Neonatal near Miss and Its Predictors among Neonates Delivered at Debretabor General Hospital, Northern Ethiopia; A Retrospective Analysis. Int J Pediatr. 2020;2020(Mlic):1–8.

13. Silva GA, Rosa KA. A populational based study on the prevalence of neonatal near miss in a city located in the South of Brazil : prevalence and associated factors. 17(1):159–67.

14. Sr M, Ds M, Adhikari D, Shrestha J, Rai C, Rana H, et al. Neonatal Near Miss Cases of Different Health Facilities. 2014;34(2):115–9.

15. Silva AAM our. da, Leite AJ org. M, Lamy ZC arvalh., Moreira ME lisabet. L, Gurgel RQ ueiro., Cunha AJ os. LA lve. da, et al. Neonatal near miss in the Birth in Brazil survey. Cad Saude Publica. 2014;30:S1–10.

16. Pileggi-Castro C, Camelo JSJ, Perdoná GC, Mussi-Pinhata MM, Cecatti JG, Mori R, et al. Development of criteria for identifying neonatal near-miss cases: analysis of two WHO multicountry cross-sectional studies. BJOG. 2014 Mar;121 Suppl 1:110–8.

17. Silva GA, Rosa KA, Saguier ESF, Henning E, Mucha F, Franco SC. A populational based study on the prevalence of neonatal near miss in a city located in the south of Brazil: Prevalence and associated factors. Rev Bras Saude Matern Infant. 2017;17(1):159–67.

18. Santos JP, Pileggi-Castro C, Camelo JS, Silva AA, Duran P, Serruya SJ, et al. Neonatal near miss: A systematic review. BMC Pregnancy Childbirth. 2015;15(1):1–10.

19. Morais LR, Patz BC, Campanharo FF, Dualib PM, Sun SY, Mattar R. Neonatal Near Miss among Newborns of Women with Type 1 Diabetes Mellitus. Hindawi Obstet Gynecol Int. 2019;2019:1–5.

20. Shroff BD, Ninama NH. A Call for Eminence Obstetrics Care by Way of "Neonatal Near Miss" Events (NNM): A Hospital-Based Case–Control Study. J Obstet Gynecol India. 2019;69(1):50–5.

21. Nakimuli A, Nakubulwa S, Kakaire O, Osinde MO, Mbalinda SN, Nabirye RC, et al. Incidence and determinants of neonatal morbidity after elective caesarean section at the national referral hospital in Kampala, Uganda Womens Health. BMC Res Notes. 2015;8(1):1–7.

22. Bakari A, Bell AJ, Oppong SA, Bockarie Y, Wobil P, Plange-rhule G, et al. Neonatal near-misses in Ghana : a prospective , observational , multi-center study. BMC Pediatrics; 2019 p. 1–10.

23. Rodrigues D, Araujo P De, Bezerra M, Vilela R, Eveline K, França X De, et al. NEONATAL MORBIDITY NEAR MISS IN TERTIARY HOSPITALS IN A CAPITAL OF NORTHEAST BRAZIL Morbidade neonatal near miss em hospitais. 2019;

24. Ronsmans C, Cresswell JA, Goufodji S, Agbla S, Ganaba R, Assarag B, et al. Characteristics of neonatal near miss in hospitals in Benin, Burkina Faso and Morocco in 2012-2013. Trop Med Int Health. 2016 Apr;21(4):535–45.

25. Gebrehana Belay H, Limenih SK, Wassie TH, Ambie MB. Neonatal Near Miss and Its Associated Factors at Injibara General Hospital, Awi Zone, Northwest Ethiopia, 2019. Explor Res Hypothesis Med. 2020;000(000):1–8.

26. Wondimu M, Balcha F, Bacha G, Id AH. The magnitude of neonatal near miss and associated factors among live births in public hospitals of Jimma Zone , Southwest Ethiopia , 2020 : A facility-based cross-sectional study. 2021;1–13. Available from: http://dx.doi.org/10.1371/journal.pone.0251609

27. Tekola A. Neonatal Near Misses and Associated Factors Among Mother ' s Who Give a Live Neonate at Hawassa City Governmental Hospitals , 2019 . A Facility Based Cross-Sectional Study Design. 2019;

28. de Lima THB, Katz L, Kassar SB, Amorim MM. Neonatal near miss determinants at a maternity hospital for high-risk pregnancy in Northeastern Brazil: a prospective study. BMC Pregnancy Childbirth [Internet]. 2018;18(1):401. Available from: https://doi.org/10.1186/s12884-018-2020-x

29. Ota E, Ganchimeg T, Morisaki N, Vogel JP, Pileggi C. Risk Factors and Adverse Perinatal Outcomes among Term and Preterm Infants Born Small-for-Gestational- Age : Secondary Analyses of the WHO Multi-Country Survey on Maternal and Newborn Health. 2014;9(8).

30. Savitz DA, Olshan AF, Gallagher K. Maternal occupation and pregnancy outcome. Epidemiology. 1996 May;7(3):269–74.

31. Niedhammer I, Mahony DO, Daly S, Morrison JJ, Cross-generation L. Occupational predictors of pregnancy outcomes in Irish working women in the Lifeways cohort. 2009;943–52.

32. Mahmoodi Z, Karimlou M, Sajjadi H, Dejman M, Vameghi M, Dolatian M, et al. Association of Maternal Working Condition with Low Birth Weight: The Social Determinants of Health Approach. Ann Med Health Sci Res. 2015;5(6):385–91.

33. Mombo-ngoma G, Mackanga JR, González R, Ouedraogo S, Kakolwa MA, Manego RZ, et al. Young adolescent girls are at high risk for adverse pregnancy outcomes in sub-Saharan Africa : an observational multicountry study. 2016;

34. Kassa GM, Arowojolu AO, Odukogbe AA, Yalew AW. Adverse neonatal outcomes of adolescent pregnancy in Northwest Ethiopia. 2019;1–20.

35. Mehari M, Maeruf H, Robles CC, Woldemariam S, Adhena T, Mulugeta M, et al. Advanced maternal age pregnancy and its adverse obstetrical and perinatal outcomes in Ayder comprehensive specialized hospital , Northern Ethiopia , 2017 : a comparative cross-sectional study. 2020;6:1–10.

36. Martinelli KG, Pacheco VE. Advanced maternal age and factors associated with neonatal near miss in nulliparous and multiparous women Idade materna avançada e

fatores associados com o near miss neonatal em mulheres nulíparas e multíparas Edad avanzada en la maternidad y factores asociados a la casi pérdida / near miss neonatal en mujeres nulíparas y multíparas. 2019;35(12).

37. Berhane M, Workineh N, Girma T, Lim R, Lee KJ, Nguyen CD, et al. Prevalence of Low Birth Weight and Prematurity and Associated Factors in Prevalence of Low Birth Weight and Prematurity and Associated Factors in Neonates in Ethiopia : Results from a Hospital-based Observational Study. 2019;(July 2020).

38. Kale PL, Mello-jorge MHP De, Fonseca SC. Neonatal near miss and mortality : factors associated with life-threatening conditions in newborns at six public maternity hospitals in Southeast Brazil Casos de near miss e óbitos neonatais : fatores associados aos recém-nascidos com ameaça à vida em sei. 2017;33(4):1–12.

39. Damaso EL, Rolnik DL, Cavalli RDC, Quintana SM, Duarte G, Costa S, et al. Prediction of Preterm Birth by Maternal Characteristics and Medical History in the Brazilian Population. 2019;2019.

40. Hoffman HJ, Bakketeig LS. Risk factors associated with the occurrence of preterm birth. Clin Obstet Gynecol. 1984 Sep;27(3):539–52.

41. Kongwattanakul K, Thamprayoch R, Kietpeerakool C. Risk of Severe Adverse Maternal and Neonatal Outcomes in Deliveries with Repeated and Primary Cesarean Deliveries versus Vaginal Deliveries : A Cross-Sectional Study. 2020;2020.

42. Nakimuli A, Mbalinda SN, Nabirye RC, Kakaire O, Nakubulwa S, Osinde MO, et al. Still births , neonatal deaths and neonatal near miss cases attributable to severe obstetric complications : a prospective cohort study in two referral hospitals in Uganda. BMC Pediatr. 2015;1–8.

43. Adane AA, Ayele TA, Ararsa LG, Bitew BD. Adverse birth outcomes among deliveries at Gondar University Hospital , Northwest Ethiopia. BMC Pregnancy Childbirth. 2014;14(1):1–8.

44. Gedefaw G, Demis A, Alemnew B, Wondmieneh A, Getie A, Waltengus F. Prevalence,

indications, and outcomes of caesarean section deliveries in Ethiopia: A systematic review and meta-analysis. Patient Saf Surg. 2020;14(1):1–10.

45. Yeshaneh A, Shitu S, Mose A, Adane D. Determinant Factors of Neonatal Near Miss Among Neonates in Gurage Zone Hospitals , Ethiopia : A Case-Control Study. 2021;

46. Gomez GB, Kamb ML, Newman LM, Mark J, Hawkes SJ. Systematic reviews Untreated maternal syphilis and adverse outcomes of pregnancy : a systematic review and meta-analysis Maternal syphilis and adverse pregnancy outcomes. 2013;(May 2012):217–26.

47. Goldenberg RL, Culhane JF. Maternal Infection and Adverse Fetal and Neonatal Outcomes. 2020;(January).

48. Hala NA, Unadkat S V, Parmar D V, Shah M. Morbidity profile of neonates and biological factors associated with it among admitted newborn babies at tertiary care institute , Jamnagar. 2017;6(8):1280–4.

49. G. D. Maternal risk factors for prematurity related neonatal mortality among preterm neonates admitted to Neonatal Intensive Care Unit of selected referral Hospitals in Addis Ababa, Ethiopi. 2017;

50. Tekelab T, Chojenta C, Smith R, Loxton D. Incidence and determinants of neonatal near miss in south Ethiopia : a prospective cohort study. 2020;1–13.

51. Azikiwe N, State A, State A, Azikiwe N. Twin versus singleton pregnancies : the incidence , pregnancy complications , and obstetric outcomes in a Nigerian tertiary hospital. 2011;227–30.

52. Nugussie F, Alemayehu M MK. A Case-Control Study Examining Determinants of Neonatal Near-Miss in Public Hospitals in Tigray Region NE_ N_ R& RJ of MS and T 2018. A_Case_Control_Study_Examining_Determinants_of_Neonatal_Near_Miss.

53. Taye M, Afework M, Fantaye W, Diro E, Worku A. Factors associated with congenital anomalies in Addis Ababa and the Amhara Region , Ethiopia : a case-control study. 2018;1–11.

54. Parmar A, Rathod SP, Patel S V, Patel SM. A Study of Congenital Anomalies In Newborn Original Article : A Study of Congenital Anomalies In Newborn. :13–7.

55. Collins KA, Popek E. Birth Injury : Birth Asphyxia and Birth Trauma. 2018;788–864.

56. El-dib M, Parziale MP, Johnson L, Benson CB, Grant PE, Robinson J, et al. Encephalopathy in neonates with subgaleal hemorrhage is a key predictor of outcome. Pediatr Res [Internet]. 2019;(March). Available from: http://dx.doi.org/10.1038/s41390-019-0400-1

57. Akinyemi JO, Bamgboye EA, Ayeni O. Trends in neonatal mortality in Nigeria and effects of bio-demographic and maternal characteristics. BMC Pediatr. 2015;1–12.

8. ANNEX

8.1. English Version Questionnaires

INTRODUCTION AND CONSENT

Hello. My name is _____. I am data collector on research working on assessing the prevalence of neonatal near miss and associated factors by one of neonatal nursing MSC student at Addis Ababa university, college of health sciences in partial fulfillment for requirement of Masters of neonatal nursing. An objective of this study is to assess magnitude of Neonatal Near miss and factors associated with it in Addis Ababa public hospital. I would like to ask you some questions and it might take 10 -15 minutes. I would also like to assure you that, if you are willing and able to participate in this research, our mode of communication throughout the study will be via telephone and only at your convenient time. If there is any question you do not want to answer just tell me or you can stop the interview at any time.

Risk: - No any risk will come to you or to your neonate for that you are selected as sample and information you provide us. If there is any question you do not want to answer just tell me or you can stop the interview at any time. The study will be carried out by asking your permission with already prepared and structured questionnaire. Besides, you have full right to stop any time you wish and you won't be obliged to give any information which you don't want to answer.

Benefits: for being involved in this study, there is no payment you will be granted with and no special privilege is also given to you. Perhaps, participating and giving information for the questions being asked plays a pivotal role in the effort made to identify NNM and associated factors is preferred and improving service and care so that neonatal mortality can be reduced.

Confidentiality: any information you give will be kept confidential and won't be accessible to any third party. Your name won't be mentioned anywhere. The information you give is only used for research purpose and will be burnt at the end.

Person to contact

. If you have any question you can contact and ask at any time you want.
Contact No. Banchialem Demissie Tel no +251- 911930230

VOLUNTARY PARTICIPATION

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. Withdrawing from this study will not affect the relationship you have, if any, with the researcher/data collector

CONSENT

I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I voluntarily agree to take part in this study.

- Code number of the mother…...
- Date of interview……...
- Interviewer name……
  .

Record Review **Identification Number** _____

S.No	Questions	Response	Skip
Part I: Identifications			
101	Hospital Name	1. Blacklione hospital 2. St. Pauls hospital 3. Yekatite 12 hospital 4. Gandi memorial hospital	
102	Date form filled to start	____/___/____ EC	
103	Admission date	____/___/____	

Part II Socio demographic characteristics of the mothers			
201	Age in years	_____ (in completed year)	
202	Marital status	1.Single 2. Married and live together 3. Married but Separated 4. Divorced 5. Widowed	
203	Where is permanent place of residence?	1. Urban 2. Rural	
204	What is mother's educational status?	1. No formal education 2. Primary (1-8) 3. Secondary (9-12) 4. More than secondary	
205	What is the occupation of the mother?	1. House wife 2. Merchant 3. Government employer 4. private work 5. Daily laborer	

206	What is paternal Educational status?	1. No formal education 2. Primary (1-8) 3. Secondary (9-12) 4. More than secondary	
207	What is the occupation of the father?	1. Farmer 2. Merchant 3. Government employer 4. private work 5. Daily laborer	
208	Average monthly income of Family (ETB)	_____(ETB)	

Part III: maternal obstetric reproductive related questions			
301	Number of pregnancies (gravidity)?	_____(in number) **If prime** →	3**08**
302	Number of birth orders (parity)?	_____	
303	pervious history of still birth?	1. Yes 2. No	
304	pervious history of abortion?	1. Yes 2. No	
305	pervious history of neonatal death?	1. Yes 2. No	
306	previous history of preterm birth?	1. Yes 2. No	
307	The duration between the current birth and the preceding birth in months (birth interval)?	_____ (in months)	
308	Did the woman have ANC follow up?	1. Yes 2. No →	310
309	If yes, number of visits	_____	
310	Date of delivery	____/___/____	
311	Mode of delivery	1. Spontaneous vaginal delivery 2. Instrumental assisted delivery 3. Caesarean section	
312	Prolonged Labor ≥ 20hrs. for prime 14hrs. for multi	1. Yes 2. No	
313	Prolonged rapture of membrane ≥ 18	1. Yes 2. No	

Part IV Maternal disease related question			
401	Ante partum Hemorrhage	1. Yes 2. No	
402	Hypertension	1. Yes 2. No →	404
403	If, Yes	1. Pre-eclampsia 2. Eclampsia 3. HELLP 4. Chronic hypertension 5. Gestational hypertension	
404	Diabetes mellitus (DM)	1. Yes 2. No →	**406**
405	If, yes	1. Pre gestational 2. Gestational	
406	Anemia	1. Yes 2. No	
407	Infection	1. Yes 2. No →	409
408	If, yes	1. Unspecified infection 2. Septicemia 3. Peritonitis 4. UTI 5. HIV/AIDS 6. Syphilis 7. Chorioamininitis 8. HBsAg	
409	Other comorbidities	1. Yes 2. No →	501
410	If, yes	1. Heart disease 2. Pulmonary disease 4. Other (specify): _____ hematologic, hepatic, neurologic , renal	

Part V: Institutional characteristics (maternal interview)			
501	Mother Referred from other health institution	1. Yes 2. No →	**504**
502	Referral linkage	1. Yes 2. No	
503	Time in received care after reaching in the hospital	_____Hr.	
504	delivered on duty time (time from 6pm to 8am ,weekends and holy days)	1. Yes 2. No	

Part VI Neonatal related characteristics			
601	Presentation	1. Cephalic 2. Breech 3. Transverse/face/brow 4. Other, specify_____	
602	Sex	1. Male 2. Female	
603	Birth type	1. Single 2. Twin 3. More than tow	
604	Birth injury	1. Yes 2. No →	605
605	If yes	1. Subgalial hemorrhage 2. Cephalohematoma 3. Brachial plexus injury 4. other, specify _____	

606	Congenital anomaly	1. Yes 2. No	

Part: V. neonatal near miss characteristics		
S.NO	**Variable**	**Response**
Pragmatic criteria		
701	Gestational age	_____wk.
702	Weight	_____gm
703	Apgar score	At 1st minute _____ At 5th minute_____
Management criteria		YES/NO
704	Nasal CPAP	1. Yes 2. No
705	Any intubation	1. Yes 2. No
706	Parenteral antibiotics for about 7days	1. Yes 2. No
707	Transfusion of blood derivatives	1. Yes 2. No
708	Phototherapy during the first 24hrs	1. Yes 2. No
709	Vasoactive drugs	1. Yes 2. No
710	Surgical procedures	1. Yes 2. No
711	Anticonvulsants	1. Yes 2. No

712	Bag and mask ventilation	1. Yes 2. No
713	Cardiopulmonary resuscitation	1. Yes 2. No
714	Use of corticosteroid for treatment of refractory hypoglycemia	1. Yes 2. No

Data collector signature _____ Date _____

Signature of Supervisor: _____Date _____

8.2 Amharic Version Questionnaire

ሰላም ስሜ ---------- እባላለሁ የአዲስ አበባ ዩኒቨርሲቲ ህክምና እና ጤና ሳይንስ ኮሌጅ የጨቅላ ህጻናት የ2ተኛ ዲግሪ ተመራቂ ተማሪ የሆነችዉ የባንቺአለም ደምሴ በምታካሂደዉ ጥናት ላይ የመረጃ ሰብሳቢ ነኝ ። አላማዉ የጨቅላ ህጻናት ለጽኑ ህመም የሚያበቁ ምክንያቶችን ለይቶ ለማወቅ እና በዚህ ጥናት የተገኙ መረጃዎችን ለተሸለ የጨቅላ ህጻናት ጤና አጠባበቅ እና የጨቅላ ህጻናት ጽኑ ህመምን እና ሞትን ለመግታት ለሚደረጉ ስራዎች መረጃ ይሆናል።

ለጥናቱ ተሳታፊ ለመሆን ፍቃደኛ ከሆንሽ የመነጋገሪያ መንገዳችን የስልክ ቃለ ምልልስ ሲሆን አንቺን በሚመችሽ ሰአት ይሆናል ጥያቄዎቹ ከ 5-10 ደቂቃ ሊፈጅ የሚችል ሲሆን ማንኛዉም ጥያቄ ካለዎት ወይም ጥያቄዉን መመለስ ከፈለጉ በማንኛዉም ሰዓት ማስቆም ይችላሉ

<u>ጉዳት</u> ፡- ይህ ቃለ መጠይቅ በአንቺም ሆነ በልጅሽ ላይ ምንም የሚያመጣዉ ጉዳት የለም ጥያቄ ካለሽ በማንኛዉም ሰዓት መጠየቅ ትችያለሽ

<u>ጥቅም</u> ፡- የዚህ ጥናት ተሳታፊ በመሆንሽ የምታገኝዉ የገንዘብ ጥቅም የለም ነገር ግን ይህንን መረጃ በመስጠትሽ የህጻናትን የህክምና አገልግሎት እንዲሻሻል ትልቅ አስተዋጽኦ ይኖርሻል

<u>መተማመኛ</u> ፡- ይህ ***የድምጽ ምልልስ*** መረጃ በምንም አይነት ለለሶስተኛ ሰዉ አይተላለፍም በተጨማሪም ስምሽ በየትኛዉም ቦታ ላይ አይጠቀስም

<u>ጥያቄ ካለ</u> ፡- በስልክ ቁጥር 0911930230 ባንቺአምላክ ደምሴ ብለዉ መጠየቅ ይችላሉ

<u>የስምምነት ቅጽ</u> ፡- በዚህ ጥናት ዉስጥ ያለዎት ተሳትፎ በፍቃደኝነት ነዉ። በዚህ ጥናት ዉስጥ ለመሳተፍ ፍቃደኛ ካልሆኑ መወሰን የእርስዎ ምርጫ ነዉ።

የቀረበልኝን መረጃ ተረድቼአለሁ። የእኔ ተሳትፎ በፍላጎት እና በማንኛዉም ጊዜ ነጻ እንደሆንኩ እረዳለሁ። በዚህ ጥናት ለመሳተፍ በፍቃደኝነት እስማማለሁ

የመረጃ ሰብሳቢ ስም ----------

የተቆጣጣሪ ፊርማ----------

ተ.ቁ	መጠይቆች	መልስ	መዝለል
ክፍል አንድ: መለያ			
101	የሆስፒታል ስም	1.ጥቁር አንበሳ ሆስፒታል 2. ቅዱስ ፓውሎስ ሆስፒታል 3. የካቲት 12 ሆስፒታል 4.ጋንዲ ሆስፒታል	
102	መጠይቁን መሙላት የተጀመረበት ቀን	____/___/____	
103	ሆስፒታል የገቡበት ቀን	_____/____/____ዓ.ም	

ክፍል ሁለት: የነባራዊ ሁኔታ ጥያቄዎች

201	የእናት እድሜ	_____(በሙሉ አመተ)	
202	የጋብቻ ሁኔታ	1.ባለ ትዳሪ 2. ያላገባች 3. ባሏየሞተባት 4. የፈታች 5. በስራ ምክንያት የተለያየች	
203	ቋሚ መኖሪያ ቦታ	1. ከተማ 2. ገጠሪ	
204	የእናት የትምህርት ደረጃ	1. አልተማሪችም 2. አንደኛ ደረጃ(1-8) 3. ሁለተኛ ደረጃ(9-12) 4. ኮሌጅና ከዝሃ በላይ	
205	የእናት የስራ ሁኔታ	1. የቤት እመቤት 2. ነጋደ 3. የመንግስት ሰራተኛ 4. የጉልበት ሰራተኛ	
206	የአባት የትምህርት ደረጃ	1. አልተማሪም 2. አንደኛ ደረጃ (1-8) 3. ሁለተኛ ደረጃ (9-12) 4. ኮሌጅና ከዝያ በላይ	
207	የአባት የትምህርት ደረጃ	1. አሪሶ አደሪ 2. ነጋደ 3. የመንግስት ሰራተኛ	

		4. የግል ስራ 5. የጉልበት ሰራተኛ	
208	በአማካይ በወር ምን ያክል ገቢ አላቹ?	_____ ብር	

ክፍል ሶስት፡ የእረጊዝና እና የወልድ ጊዜ ሁኔታዎችና የምመጡ ችግሮችን በተመለከተ መጠይቅ

301	ስንት ጊዜ አረጊዘሻል?	_____(በቁጥር) የመጀመረያ ከሆነ → **308**	
302	ስንት ጊዜ ወልደሻል?	_____ (በቁጥር)	
303	ሞቶ የተወለደ ልጅ ?	1. አዎ 2. አይ	
304	ዉረጃ አጋጥሞሻል?	1. አዎ 2. አይ	
305	በህይውት ከተወለዱ ቦሀላ በ28 ቀን የሞቱ ልጅ አለ?	1. አዎ 2. አይ	
306	ያለ ቀኑ የተወለደ ልጅ አለ	1. አዎ 2. አይ	
307	ያሁኑ አረጊዝናና የቀድሞ በማሃላቸዉ ስንት ወር ልዩነት አለ?	_____ (በወር)	
308	ለዚህ እረጊዝና ቅድመ ወልድ ክትትል አድረገሻል?	1. አዎ 2. አላደረኩም →	401
309	ከላይ ላለዉ ጥያቀ መልሱ አዎ ከሆነ፤ ስንት ጊዜ አድረገሻል?	_____	
310	በትኛዉ የአወላለድ አይነት ነዉ የወለድሽዉ?	1. በተጥሮፈ ምጥ 2. መሳረያ ታጊዘዉ 3.በቀዶ ጥገና	
311	የምጥ መርዘመ	1. አዎ 2. አይ	
312	የሽንት ዉሃ ከድሞ ነው የፈሰሰው	1. አዎ 2. አይ	

ክፍል አራት፡ በወልድ ጊዜ ሁኔታዎችና የምመጡ ችግሮችን በተመለከተ መጠይቅ

401	ከወሊድ በፊት ደም መፍሰስ አጋጥሞሻል?	1. አዎ 2. አይ	
402	የደም ጊፍት ጨምራል?	1. አዎ 2. አይ →	403
403	ከላይ ላለዉ ጥያቀ መልሱ አዎ ከሆ፤ የትኛዉ አይነት?	1. ፒሪ-እክላምሽያ 2. እክላምሽያ 3. ሄልፐ ስንድረም 4. የቆየ የደም ጊፍት 5. የእረጊዝና ጊዜ ደም ጊፍት	
404	የስኪር በሽታ አለብ ዎት	1. አዎ 2. አይ →	405
405	ከላይ ላለዉ ጥያቄ መልሱ አዎ ከሆነ	1. ከእርግዝና በፊት 2. ከእርግዝና ጋር ተያይዞ	
406	የደም ማነስ	1. አዎ 2. አይ	
407	“እንፈክሽን”	1. አዎ 2. አላጋጠመኝም →	408
408	ከላይ ላለዉ ጥያቀ መልሱ አዎ ከሆነ፤	1. ያልተለየ “እንፈክሽን” 2. “ሰፕቲሰምያ” 3. “ፓረቶናይተስ” 4. የማህጸን ኢንፌክሽን 5. ኤች ኤድስ 6. ቅጥኝ 7. ኮሪኦ 8. የጉበት በሽታ	
409	ሌላ የህመም ሁኒታ	1. አለ 2. የለም	
410	ከላይ ላለዉ ትያቄ መልሱ አለ ከሆነ	1.የልብ 2. የመተንፈሻ 3. ሌላ	

ክፍል አምስት የተቻም ሁኔታ

501	ከጤናጣቢያ ሪፈር ተደርጋ ነው የመጣችው	1. አዎ 2. አይ	
502	ከላይ ያለው መልስ አዎ ከሆነ ስትላኪ ሆስፒታሉ ጋር ተደውሎ ነበር አሳውከው ነበር	1. አዎ 2. አይ	
503	ሆስፐታል ከደረስሽ በስንት ሰአት ውስት ህክምና አገኘሽ.	_____ ሰአት	
504	የተወለደበት ቀን እና ሰአት ማታ ነው፣የእረፍት ቀን፣ከስራ ሰአት ውጪ	1. አዎ 2. አይ	

የጨቅላ ህፃናት ሁኔታ

601	ፐርዘንተሽን	1. በጭንቅላቱ 2. በመቀመጫው 3. በትከሻው፣በፊቱ 4. ሌላ(_____)	
602	የጨቅላ ህፃኑ ፆታ?	1. ወንድ 2. ሴት	
603	የተወለዱት የልጆች ቁጥር	1. አንድ 2. ሁለት 3. ከሁ ለት በላይ	
604	ልጁ ጉዳት ደርሶበት ነበር?	1. አዎ 2. አይ →	1606
605	ከላይ ያለው መልስ አዎ ከሆነ	1. Subgalial hemorrhage 2. Cephalohematoma 3. Brachial plexus injury 4. other, specify _____	
606	ሲወለድ የአፈጣጠር ችግር ነበረበት		

የመ ረጃ ሰብሳቢ ስም ፊርማ _____

ሱፐርቫይዘር ስም ፊርማ _____

APPROVAL SHEET

ADDIS ABABA UNIVERSITY

COLLEGE HEALTH SCIENCE SCHOOL OF ALLIED SCIENCES

DEPARTMENT OF NURSING AND MIDWIFERY

I, the undersigned, MSc in Neonatal Nursing student declare that I have this thesis is my original work in partial fulfillment of the requirement for the degree of Master of Science in Neonatal Nursing.

Submitted by

Banchialem Demissie _____ ____May 26, 2021__

Name of student Signature Date

This thesis has been submitted for examination with my approval as an advisor(s).

Approved by:

1. Dr. Endalew G Sendo[Assistant Prof]  May 26, 2021
   Name of Major Advisor Signature Date

DEPARTMENT HEAD:

Nigussie Tadele (MSc, Ass. Prof) _____ _____

Name of Department Head Signature Date