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

PREVALENCE AND PREDICTORS OF HYPOGLYCEMIA AMONG NEONATES ON ADMISSION TO NEONATAL INTENSIVE CARE UNIT IN SELECTED PUBLIC HOSPITALS, ADDIS ABABA, ETHIOPIA, 2021. A CROSS SECTIONAL STUDY

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Title	Prevalence and predictors of hypoglycemia among neonates on admission to NICU in Addis Ababa public Hospitals, Addis Ababa, Ethiopia, 2021.
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I, the undersigned MSc student, declare that I have submitted my original work on a title prevalence and predictors of hypoglycaemia among neonates on admission to neonatal intensive care unit in public hospitals, Addis Ababa, Ethiopia 2021 for the examination.

Submitted by:

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This thesis work has been submitted for examination with my approval as an advisor.

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This thesis by Fikirte Kasaye is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters in neonatal nursing.

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Table of Contents

LIST OF TABLE

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

AAU - Addis Ababa University

AAP - American Academy of Pediatrics

ANC - Antenatal Care

APGAR- Appearance, Pulse Rate, Grimace, Activity, Respiration Rate

BLSH - Black Lion Specialized Hospital

BSc - Bachelor of Science

DM - Diabetes Mellitus

ETB- Ethiopian Birr

GMH - Gandhi Memorial Hospital

GDM- Gestational Diabetes Mellitus

IDM - Infant of Diabetic Mother

IV - Intra Venus

LGA - Large for Gestational Age

NICU - Neonatal Intensive Care Unit

OR - Odds Ratio

PES- Pediatrics Endocrine Society

PGDM- Pre-Gestational Diabetes Mellitus

SGA - Small for Gestational Age

SVD - Spontaneous Vaginal Delivery

WHO - World Health Organization

ABSTRACT

Background: Hypoglycemia is one of the most common and preventable metabolic problems seen in the neonatal intensive care unit (NICU). It occurs in 1.3-4.4 per 1000 full- tern newborn and 15-55per 1000 preterm newborns. Studying the prevalence and predictors related with neonatal hypoglycemia, may help in preventing morbidity, serious neurological complications and mortality due to hypoglycemia.

Objective: This study aims to determine the prevalence and predictors of hypoglycemia among neonates on admission to NICU in selected public hospitals, Addis Ababa, Ethiopia 2021.

Method: Institutional based cross-sectional study was carried out among 317 neonates admitted to neonatal intensive care units in selected public hospitals Addis Ababa .The study participants were selected by systematic random sampling method. Data was collected from February 20/2021 - April 20/2021. Data was collected with a checklist, neonatal chart review, and blood glucose level was checked by pricking the neonate's heel. A glucometer with a test strip was used to check blood glucose. A blood glucose level < 40mg/dl was taken as a cut-off point to define hypoglycemia for newborn. Then the collected data was coded and entered in to Epi data of version 4.6 and exported to SPSS for windows version 26.0 for cleaning, editing, and analysis. Binary and multiple logistic regressions have been used to observe the association between independent variables and dependent variable.

Results: The prevalence of hypoglycemia among public hospitals was 20.8 %. Maternal DM, gestational (AOR=5.16, 95% CI; 1.23-21.64) and pre-gestational DM (AOR =7.79, 95%CI: 1.14-53.03), and preeclampsia (AOR=2.44, 95% CI; 1.10-5.38), feeding initiation time less than one hour [AOR=0.38, 95% CI: 0.15-0.96] shows association to hypoglycemia.

Conclusion: The result of this study showed that maternal DM (pre-existing and gestational) and preeclampsia were more likely associated with hypoglycemia, whereas feeding initiation time within one hour was protective effect to hypoglycemia. Therefore early initiation of feeding is important factor to prevent hypoglycemia for all newborns.

Recommendation: Health education on preventive measures is very essential for parents and caregivers.

Keywords- Hypoglycemia, Predictors, Neonatal Intensive Care Unit, Addis Ababa

1. INTRODUCTION

1.1 Background

The term hypoglycemia directs a low blood glucose concentration (1). It is the most common metabolic abnormality in the newborn (2). A numerical explanation for neonatal hypoglycemia remains controversial even currently (3). Neonatal hypoglycemia defined as a blood glucose value of less than 40 mg/dL (2.2 mmol/L) or plasma glucose value less than 45mg/dl (2.6mmol/L) (4).

It can be transient or persistent, most cases of neonatal hypoglycemia are transient and respond easily to treatment, and are associated with good prognosis (5). Persistent hypoglycemia is more likely to be related with anomalous endocrine conditions, for instance hyperinsulinemia, along with possible neurologic disability (2).

Different factors have been identified as risk for neonatal hypoglycemia like prematurity, macrosomia, SGA, maternal DM, PIH, maternal drug uses during pregnancy (β blockers or oral hypoglycemic agent), delay of feeding initiation, hypothermia, and perinatal asphyxia (6). The mechanism by which these risk factors predispose a neonate for hypoglycemia may consist of decreased glycogen storage, increased utilization of glucose, diminished glycogenolysis, or a combination of these mechanisms depending upon the cause of neonatal hypoglycemia (7). The fall in glucose production is interrelated to limited glycogen stores and insufficient gluconeogenesis. High consumption of glucose is related to increased insulin or anaerobic glycolysis (8).

A hypoglycemic infant can be symptomatic or asymptomatic, a number of signs may be seen in cases of severe or persistent hypoglycemia and in infants who have mild-to-moderate hypoglycemia(9). Signs and Symptoms of hypoglycemia include abnormal respiratory patterns, such as tachypnea, apnea, or respiratory distress; cardiovascular signs, such as tachycardia or bradycardia; and neurologic findings, including jitteriness, lethargy, weak suck, temperature instability, and seizures (10).

Management of neonatal hypoglycemia targets to prevent and treat acute symptomatic hypoglycemia, which can result in possible permanent brain damage and long-term adverse outcomes. (11). Initiation of intravenous (IV) dextrose therapy should be considered if blood glucose levels remain below the operational threshold after an enteral feed or if the infant is unable to tolerate oral intake (12). A bolus of 2ml/kg glucose 10% IV should be

administered for those symptomatic, followed by continuous glucose perfusion to maintain glycemic levels in the normal range (13).

If the problem is not identified and managed timely the most concerning outcomes of neonatal hypoglycemia are seizures that may progress to coma and death or development of severe neuro-developmental abnormalities (14).

1.2 Statement of the problem

Neonatal hypoglycemia is a common co-morbid condition contributing to neonatal morbidity and mortality (15). About 30–60% of at high-risk infants are hypoglycemic and require immediate intervention (6).

In Indonesia, yearly about 190,000 newborn babies suffered from a certain degree of hypoglycemia and it is seen in about 17% of the babies that are hospitalized in the neonatal intensive care unit (NICU) (16). In a study conducted in Macedonia hypoglycemia is a significant factor in general neonatal mortality (17).

Sub-Saharan Africa had the highest neonatal mortality rate in 2018 at 28 deaths per 1000 live births. In developing countries like Africa neonates with hypoglycemia have approximately twice the risk of death compared to normal(18). According to a study conducted in Nigeria the mortality rate in babies with hypoglycemia was 32.7%, higher than 18.8% in babies without hypoglycemia (19). Another study conducted in Egypt the mortality rate was 47.4% among neonates with hypoglycemia compared to 16.5% neonates normal blood glucose level (20). Studies identified risk factors like, prematurity, LGA, birth asphyxia, SGA, infant of diabetic mother, infant of hypertensive mother and maternal use of drugs (b- blockers) hypothermia, delay of feeding initiation (21). There are few studies regarding neonatal hypoglycemia in Ethiopia. In spite of this, little is known on prevalence and predictors of neonatal hypoglycemia among neonates admitted to NICUs of public hospitals in Addis Ababa.

Identification of predictors of neonatal hypoglycemia helps to make a preventive action. Although WHO recommends early initiation of breastfeeding and prevention of hypothermia at birth to prevent hypoglycemia, due to maternal and neonatal and institutional problems delay of feeding initiation and hypothermia are major problems seen among neonates on admission to NICUs. On the other hand, majority of public hospitals in Addis Ababa perform screening for hypoglycemia on admission. But little concern was given for preventive measures. The researcher of this study believes by identifying predictors of neonatal hypoglycemia helps to plan and act on the general prevention of neonatal hypoglycemia in delivery and neonatal intensive care units.

Therefore the purpose of this study was to assess the prevalence of neonatal hypoglycemia and its predictors among neonates on admission to neonatal intensive care units of Addis Ababa public hospitals and to fill the gap.

1.3 Significance of the study

Little is known about prevalence and factors associated hypoglycemia in Ethiopia among neonates on admission to NICUs. Therefore, this study will be helpful by identifying relevant information on those predictors related to of neonatal hypoglycemia and the finding will be important to health care planner, policy makers, governmental and nongovernmental organizations (NGOs) that are working on neonatal health care services and other stake holders. Similarly, the findings was help the health professionals to take special consideration on general preventive measures for those risk groups. Also it will serves as a baseline data for health institutions.

2. LITERATURE REVIEW

2.1 Prevalence of hypoglycemia

Globally hypoglycemia occurs in 1 to 5 per 1,000 live births but it is higher up 30% among at high risk populations(22). Although information on the prevalence of neonatal hypoglycemia in low income countries is very limited, because of the increased existence of low birth-weight, intrauterine growth restriction (IUGR), poor nutrition and inadequate care, its occurrence expected to be higher (23) (24).

In United States neonatal hypoglycemia are estimated between 3% and 29% of the whole pregnancies(25) . A study finding from New Zealand showed that among neonates identified at risk hypoglycemia was occurred in 51% of study participants(26). Based on a study conducted in Canada the prevalence of hypoglycemia among preterm (< 33weeks) of gestational age was 33.7%(27).

According to a cross sectional study conducted in Iran the prevalence of neonatal hypoglycemia was 39.1% (28). Based on a prospective cross-sectional study done in Erbil Maternity Teaching Hospital in Iraq, the prevalence of hypoglycemia was 16.25% (29).

A prospective observational study conducted in India prevalence of hypoglycemia among neonates admitted to NICU was 15.38% (30). Another ross sectional study conducted in India prevalence of neonatal hypoglycemia among IDM was 39% (31).

Based on a cross sectional study conducted in Benue state University teaching hospital, Nigeria prevalence of neonatal hypoglycemia was 11%(32). A community based cross sectional study conducted in Uganda prevalence of neonatal hypoglycemia was 2.2% (33) .

There are few information on prevalence and predictors of neonatal hypoglycemia in Ethiopia. A cross-sectional study conducted at St. Paul hospital millennium medical college (Addis Ababa), showed the prevalence of hypoglycemia among neonates admitted to NICU was 25% (23). Another study carried out in Ethiopia at Tikur Anbessa specialized hospital prevalence of hypoglycemia was 14.89% (34).

2.2 Predictors of hypoglycemia in neonates

Predictors or risk factors for neonatal hypoglycemia include socio-demographic factors (maternal age, educational status, maternal occupation), obstetric factors (ANC follow up, parity, mode of delivery) neonatal factor (sex, gestational age, birth weight, IDM, being small for gestational age (SGA) or large for gestational age (LGA) and asphyxia hypothermia), and maternal factors like (DM, preeclampsia, eclampsia and maternal drug use like beta-blockers or oral hypoglycemic agents (16).

2.2.1 Socio-demographic predictors

Different literatures showed that the association between maternal age and hypoglycemia, for instance, a retrospective cohort study in Japan maternal age (over 35 years) as independent risk factors of neonatal hypoglycemia (AOR: 3.385; 95% CI, 1.082–10.588, $p = 0.036$) (35).
Based on a cross-sectional study conducted in India among high-risk groups hypoglycemia was found to be more in newborns whose mother's age was > 30 years than in newborns whose mother's age was < 30 years at the time of delivery (36).

Another hospital based cross-sectional descriptive study conducted in India showed that hypoglycemia was not recorded in LGA babies born to mothers who were < 20 years of age but its incidence significantly increased from 31.3% in the maternal age group 20-34 years to 68.8% in mothers aged >35 years (p=0.000).The study also showed there was no statistically significant co-relations observed between hypoglycemia and sex of the neonate (37).

A cross-sectional study conducted in Ethiopia presented neonates born to mothers in the age range 20-35yrs have a 32.3% decrement in occurrence hypoglycemia (AOR 0.323; 95% CI 0.121–0.862) (23)

2.2.2 Neonatal related predictors

Among neonatal predictors gestational age is one the factors which have an association with neonatal hypoglycemia. For instance a study conducted in USA showed that hypoglycemia was less commonly associated with late- preterm and term (OR: 0.66; 95% CI, 0.53- 0.85) (6). Another study conducted in Netherlands showed that hypoglycemia was significantly associated with prematurity (OR = 1.84, 95% CI 1.24–2.73, p = 0.002) (38).

According to a study carried out in Israel , low birth weight, being small for gestational age, and birth asphyxia had an association with hypoglycemia, (OR 2.979; 95% CI 1.532 to 5.795; P<0.001), (OR 1.805; 95% CI 1.054 to 3.095; P=0.031), (OR 3.386; 95% CI 1.945 to 5.895; P<0.001), respectively (24). Based on a study conducted in Iran hypoglycemia had a significant association with preterm birth (P = 0.002), low birth weight (P = 0.001), and low Apgar score at 1^{st} and 5^{th} minutes after birth (P < 0.05) (28).

A case- control study conducted in Java, Indonesia prematurity, low birth weight and birth asphyxia were associated with neonatal hypoglycemia (OR 6.537; 95%CI 3.543 to 12.063; P <0.001), (OR 2.979; 95% CI 1.532 to 5.795; P<0.001), and (OR 3.386; 95%CI 1.945 to 5.895; P<0.001) respectively (39)

Infants born to diabetic mothers (IDM) have increased risk of neonatal morbidities including hypoglycemia (40). Infant of a diabetic mother usually large at birth (LGA), even when the mother was able to keep the blood glucose within normal or near-normal range throughout pregnancy (41).

Preterm neonates are commonly predisposed to developing hypoglycemia and its associated complications due to their inadequate glycogen and fat stores, failure to generate new glucose using gluconeogenesis pathways, have higher metabolic demands due to relatively larger brain size, and are unable to mount a counter-regulatory response to hypoglycemia (33).

Another neonatal-related factor is perinatal asphyxia. Continuously high insulin release due to asphyxia causes extreme exhaustion and damage in the b-cell of the pancreas. This condition often results in hypoglycemia.(33). A case-control study conducted in Indonesia showed that a neonate with asphyxia was 2.8 times more likely to develop hypoglycemia (OR= 2.8 (95% CI: 1.01 – 7.80) (42).

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A study report from India showed that newborns with asphyxia develop hypoglycemia which requires medical management (43). Another study conducted in this country also indicates babies with APGAR score < 6 at 5^{th} min was at risk of developing neonatal hypoglycemia (p=0.001) (37). .

Different studies shows that early initiation of breast feeding prevents the occurrence of neonatal hypoglycemia. A study conducted in Bangladesh revealed that neonates who were delayed for more than 2 hours to start initial feeding had an increased risk of hypoglycemia(5). According to a community based cross-sectional study conducted in Uganda neonatal hypoglycemia was associated with delayed breastfeeding initiation (adjusted mean difference, − 2.6; 95% CI, − 4.4, − 0.79) (33). An institutional based cross-sectional study conducted in Nigeria low birth weight(< 2500g)(p =0.009), hypothermia (p= 0.001) and preterm birth (p = 0.020) were significantly associated in babies with hypoglycemia (19).

Based on a cross- sectional study conducted in Ethiopia at St. Paul hospital birth weight was significantly associated with neonatal hypoglycemia. The study showed that neonates with low birth weight have 2.14 times more likely to develop hypoglycemia (COR 2.14; 95%CI 1.03–4.47) while VLBW neonates have a 3.9 times increased risk (COR3.99; 95% CI 1.54–10.33) (23).

2.2.3 Maternal related predictors

A study done in Canada maternal hypertension was significantly associated with neonatal hypoglycemia (hypertension vs. normal: OR 3.07 (95%CI 1.51–6.30) p= 0.002 (27). A cohort study conducted in US showed that pregnancies exposed to β blockers at the time of delivery increases the risk of neonatal hypoglycemia by 4.3% (44). The odds of hypoglycemia among neonates born from a mother with preeclampsia was increased on a study done in California was (OR 1.3 95% CI 1.2-1.5) (45)

A case control study conducted in China showed that infants born from gestational DM were 2 times more likely to develop neonatal hypoglycemia (OR = 2.184, 95% CI: 1.153–4.134) (21).

A prospective cross sectional study in a tertiary hospital of Pakistan, showed that maternal risk factors associated to neonatal hypoglycemia were maternal diabetes, eclampsia, and maternal drug use (46)

Based on a study conducted in South - Africa among infant of diabetic mother hypoglycemia was seen in 39% (47)**.**

Maternal use of medications like, B-blockers increases the risk of hypoglycemia (AOR 1.68, 95% CI. 1.50–1.89), for example, propranolol, atenolol, labetalol (9). A study conducted in US among 10 585 (0.5%) pregnancies exposed to β blockers at the time of delivery. The risk of neonatal hypoglycemia was 4.3% in the β blocker–exposed neonates versus 1.2% in the unexposed(44). A meta analytic study conducted in China showed that mothers who took beta-blockers during pregnancy were 2.6 times more likely to have hypoglycemia (OR: 2.60 95% CI 1.55-4.38, P<0.001) (48).

2.2.4 Obstetric related predictors

Based on a cohort study conducted in Denmark Primi parity was associated with hypoglycemia (AOR: 1.29 (1.17e1.42) (51). Another study conducted in Mangalore babies born to primipara mothers were more prone for hypoglycemia (49). A study conducted in Sudan showed that a cord blood glucose levels at delivery were significantly lower in women who had a cesarean delivery compared with those who delivered vaginally (99.8 ± 20.6 vs. 106.8 ± 11.1 mg/dl, P = 0.026), but there was no significant difference (97.8 ± 16.7 vs. 102.1 ± 9.6, P = 0.110) in newborn glucose levels at 2 hours after delivery between the groups. In linear regression, cesarean delivery (−6.475 mg/dl, P = 0.013) and maternal blood glucose levels at the time of delivery (+0.619 mg, P < 0.001) were significantly associated with mean cord glucose levels(50).

A study conducted in India showed that neonates born from a multigravida mother and who were delivered by cesarean section were found with a higher occurrence of hypoglycemia (36). A cross-sectional observational study conducted in west Bengal among cesarean- section delivery the incidence of neonatal hypoglycemia at 48 hours was 16.3%(51).

2.3 Conceptual framework

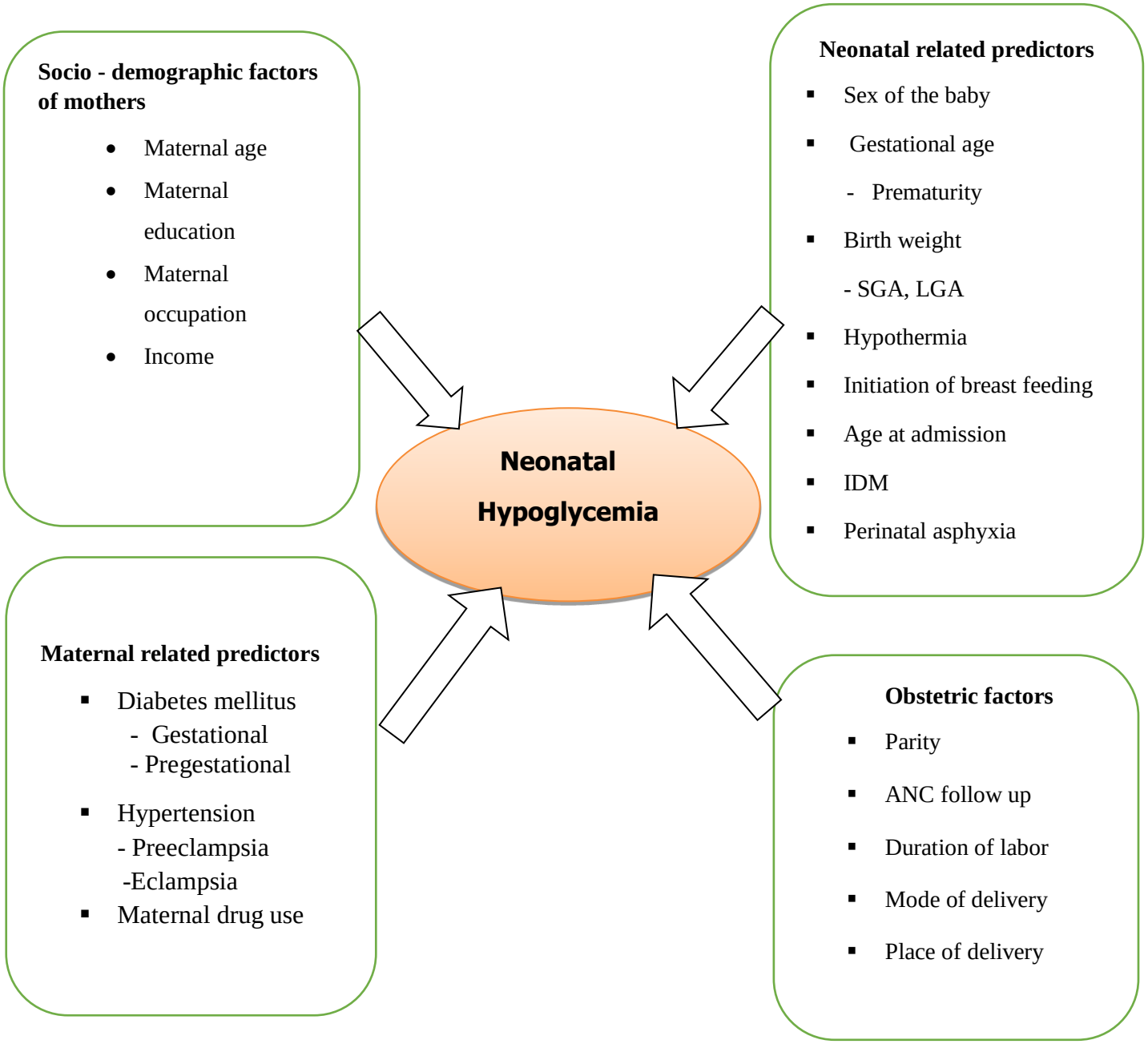

Figure1: Conceptual framework adapted and modified from literature review (14**,** 42**,** 45)**.**

3. OBJECTIVES

3.1 General objective

- To assess prevalence and predictors of hypoglycemia among neonates on admission to NICU in selected public hospitals, Addis Ababa, Ethiopia 2021.

3.2 Specific Objective

- To determine the prevalence of hypoglycemia among neonates on admission to NICU in selected public hospitals, Addis Ababa, Ethiopia 2021.
- To identify predictors of hypoglycemia among neonates on admission to NICU in selected public hospitals, Addis Ababa, Ethiopia 2021.

4. METHODS AND MATERIALS

4.1 Study area and period

Addis Ababa is the capital city of Ethiopia. The city lies at an elevation of 7,546 feet (2,300metres). Based on 2017 population projection the total population of the city is 3,194,999. Among this 1,515,001 are men and the rest 1,679,998 are female. Addis Ababa has ten sub-cities. In this sub-cities there are 52 hospitals in which 6 are administrated by Addis Ababa regional health bureau, 5 by federal ministry of health, 3 by NGO, 3 by defense and police and the remaining administered by private owners and there are 101 health centers. It is divided into 11 sub-cities containing 116 woredas (52). All public hospitals attend delivery services and eleven of them have NICU. The study was conducted in four randomly selected public hospitals of Addis Ababa Ethiopia from February 11 to April 11, 2021. Those randomly selected public hospitals are Menelik, Yekatit 12, Gandi, and Tikur Anbessa specialized hospital.

Menelik II hospital: In neonatal intensive care unit a total of 31 nurses, 2 pediatricians and 3 general practitioners are working in the unit. The number of admitted neonates varies from time to time; the average annual admission rate was being 1200. The NICU had a 29-bed capacity.

Tikur Anbessa Specialized Hospital (TASH): In neonatal intensive care unit a total of 2 neonatologists, 30 nurses working in the unit. The number of admitted neonates varies from time to time; the average annual admission rate was being 1250. The NICU had a 41-bed capacity.

Yekatit 12 Hospital Medical College (Y12HMC): In neonatal intensive care unit a total of 38 nurses, 1 neonatologist fellow and 3 pediatricians are working in the unit. The number of admitted neonates varies from time to time; the average annual admission rate was being 2500. The NICU had a 44-bed capacity.

Gandhi Memorial Hospital (GMH): In neonatal intensive care unit a total of 2 pediatricians, 5 General practitioners, 2 Health officers, 2 MSc neonatal nurse practitioners and 26 Nurses are working in the unit. The number of admitted neonates varies from time to time; the average annual admission rate was being 3,200. The NICU had a 44-bed capacity.

4.2 Study design

An institution-based cross-sectional study was conducted.

4.3 Populations

4.3.1 Source population

All neonates who were admitted in the neonatal intensive care units of Addis Ababa public hospitals

4.3.2 Study population

All randomly selected neonates who were admitted in the NICUs of selected public hospitals during the study period.

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion criteria

All neonates who was admitted to NICU in the selected hospitals during the data collection period and whose mothers were willing to give consent for their neonates.

4.4.2 Exclusion criteria

Neonates whose mothers were critically ill were excluded from the study.

4.5 Sample size determination and sampling technique

The sample size is calculated by using a single population proportion formula taking the prevalence of neonatal hypoglycemia 25 % in St. Paul Hospital in Addis Ababa, Ethiopia (23).

P=proportion hypoglycemia=25%

d = margin of error 5%

Z α/2= the corresponding Z score of 95% CI

N = Sample size

$$N = \frac{Z\,(a/2)^2\,P\,(1-P)}{d^2} = \frac{(1.96)\,2*0.25*(1 - 0.25)}{0.0025} = 288.12$$

By adding a 10 % non-response rate, a total of 317 participants was included in the study.

4.5.1 Sampling technique and procedure

Four public hospitals (Menelik II, Yekatit 12, Gandhi memorial, Tikur Anbessa specialized hospital) are selected by lottery methods from eleven public hospitals in Addis Ababa which have NICU. To select the study participants from each hospital, the proportional allocation formula was used based on caseloads by fixing one-month total admission before the survey. Simple random sampling was used to select the first participant and systematic random sampling was used for the next consecutive samples.

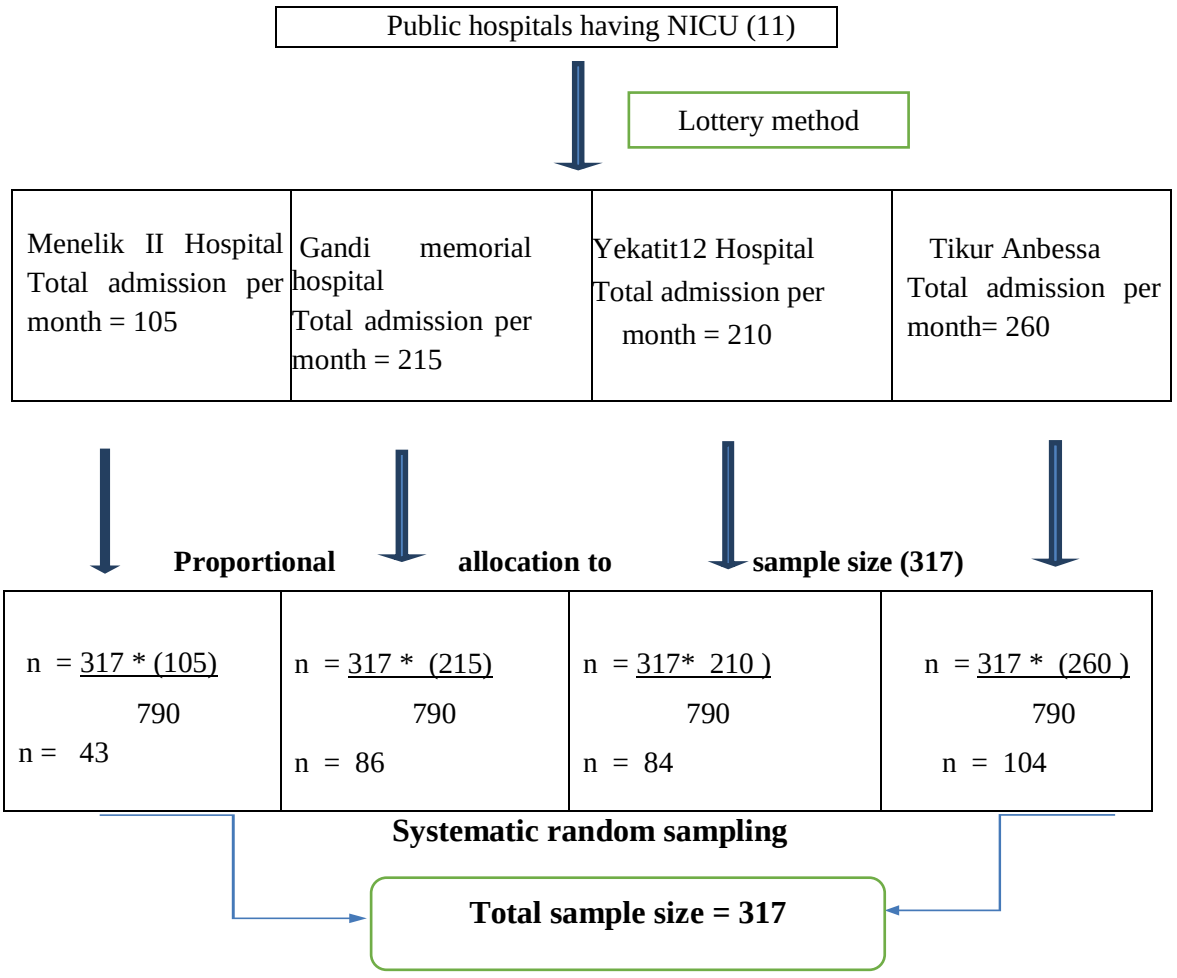

Figure 2: Schematic presentation of the sampling procedure in selected public Hospitals AA, Ethiopia, 2021.

4.6 Variables

4.6.1 Dependent variables

- ✓ Hypoglycemia of Neonates

4.6.2 Independent variables

- Socio-demographic predictors: maternal (age, education, occupation, income), Sex of the baby
- Obstetrics predictors: Parity, ANC follow up, mode of delivery, place of delivery
- Neonatal related predictors: gestational age (Prematurity, birth weight (SGA, LGA), hypothermia, perinatal asphyxia.
- Maternal related predictors: Gestational or pre-gestational DM, pregnancy induced hypertension, maternal drug use (beta blockers, oral hypoglycemic agents).

4.7 operational definitions and terms of variables

Neonatal hypoglycemia: - A measure of blood glucose level less than 40 mg/dl(53).

ANC follow up: any history of visit or follow up during current pregnancy at any health institution for check-up of pregnancy recorded on the chart.

Hypothermia: A neonate's axillary body temperature below 36.5 ^{o}C (54).

Perinatal asphyxia: was considered when the 5th minute APGAR score is less than 7 or a neonate did not cry immediately at birth or resuscitation needed at birth and documented on the chart.

SGA: A newborn's birth weight smaller than many other babies of the same gestational age and diagnosed by a professional.

Prevalence of hypoglycemia: The number of neonates who develop hypoglycemia on admission to NICU during the study period.

4.8 Data collection instruments

A structured questionnaire is prepared and adapted from different works of literature. The instrument was prepared in English and translated to the Amharic language then retranslated to English for consistency and flow. The instrument consists of five parts, part

one: socio demographic characteristics (maternal age, maternal education maternal occupation, Postnatal age, age of the neonate at admission, sex of the baby), part-two: obstetric related characteristics (Parity, mode of delivery, place of delivery, number of ANC visit), part-three: neonatal characteristics (GA, birth weight, hypothermia, PNA, feeding history, APGAR score), Part four: Maternal characteristics (history of DM and HTN, drug history) and, Part five: Blood glucose level of the neonate.

4.9 Data collection procedure

Primary and secondary data was collected from the respondents and the neonatal card. Data was collected by interviewing mothers, reviewing a neonate medical chart and taking a blood sample by pricking the heel of the neonate, those neonates who had a recent blood sugar result we used that result. Four BSC Nurses for data collection and two BSC Nurses for supervision were recruited. A two days training was given for data collectors and supervisors on data collection tools, the importance of the study and honest completion of the checklist, and ethical considerations, the supervisors were monitor the data collection process.

4.10 Data quality assurance

To keep data quality, supervisors and data collectors were oriented on how and what information they should collect from the targeted data sources. Supervision was held during data collection and each questionnaire was checked for completeness. A pretest was done on 5% (16) of similar neonates at St. Paul hospital to assess clarity, length, reliability and feasibility. Completeness of the collected data was checked onsite daily during data collection and give prompt feedback from the supervisor and the principal investigator. All completed data collection forms were examined for completeness and consistency during data management, storage, cleaning, and analysis.

4.11 Data processing and analysis

The collected data was coded and entered in Epi data version 4.6 and was transferred and cleaned to SPSS 26.0 for analysis. Descriptive statistics used to identify distributions of socio-demographic characteristics of study participants. Odds ratio (OR) with 95% CI was used to assess the relationship between factors associated with the occurrence of the

outcome variable. A logistic regression model was used and bivariate and multivariate logistic regression was done to determine the association between each independent variable with the outcome variable.

All variables with a significant association in the bivariate logistic regression analysis ($p < 0.25$) was enter into the final multivariate analysis model to control confounders and identify independent effects of different factors for the occurrence of hypoglycemia. Variables having $p < 0.05$ were considered as statistically significant. Finally, the data presented by using text, table, and figure.

4.12 Ethical clearance

Ethical clearance was obtained from the Institutional Review Board (IRB) of Addis Ababa University, school of nursing, and midwifery. After the approval of the proposal, the letter obtained from the school of nursing and midwifery to Tikur Anbessa specialized Hospital department of pediatrics and child health ethical review board and Addis Ababa Public Health research and Emergency management Institutional Review Board. Formal letter was obtained from Addis Ababa public health research and emergency management Institutional Review Board and Tikur Anbessa specialized hospital pediatrics department public health core process in order to get permission to carry out the study. Written consent was obtained from the mother before data collection. Each study participant was adequately informed about the purpose, method and anticipated benefit and risk of the study by their data collector. The respondents had the right to respond or refuse to the interview. Even they had the right to withdraw the interview at any time or skip any question that they do not want to respond. All information collected from an interview and patients' chart were kept strictly confidential and were not disclosed to any person other than the principal investigator.

4.13 Dissemination of result

Final result of the study was presented and submitted to Addis Ababa University collage of Health Science, School of Nursing and Midwifery to serve as reference material for subsequent researches and teaching purposes. The study finding was submitted to Addis Ababa Public Health Research and emergency management Institutional Review Board and for those hospitals included in the research.

5. RESULT

5.1 socio demographic characteristics

A total of 317 participants were included with 100% response rate. From those respondents, (289) 91% of the mothers age were between 20 -35years and more than half, (181) 57.1% of their neonates post natal age was less than 24 hours. The mean age the other was 27.2 (±4.67) years. Around (188)59.3% of mothers had secondary and above educational status. More than one-third, (124)39.1% of mothers were housewife. Majority of the respondents, (263) 83%) had monthly income above 2500 ETB.

Table 1:- Socio demographic characteristics of hypoglycemia among neonates on admission to neonatal intensive care unit in selected public Hospitals, Addis Ababa, Ethiopia 2021.

Variables	Frequency	Percent
Maternal age		
< 20 Years	15	4.7
20 - 35 Years	289	91.2
> 35 years	13	4.1
Maternal education		
Unable to read & write	13	4.1
Primary Education	116	36.6
Secondary Education	125	39.4
College & above	63	19.9
Maternal occupation		
Government employee	36	11.4
Private employee	108	34.1
Merchant	9	2.8
Daily laborer	40	12.6
House wife	124	39.1
Monthly income		
< 1500 ETB	7	2.2
1500- 2400 ETB	47	14.8
> 2500 ETB	263	83.0

As shown in table 2- Among admitted neonate around 168 (53%) were male and more than half 195(61.5%) were gestational age between 37-42 weeks and 181 (57.1%) of them had birth weight between 2500gm - 4000gm. Majority 260 (82%) of neonate's 5th minute APGAR score was seven and above. Around two-third, 208 (65.6%) of the neonates had hypothermia. Regarding feeding initiation time 98 (30.9%) of neonates were start feeding within one hour.

Table 2. Neonatal related predictors of hypoglycemia among neonates on admission to neonatal intensive care unit in selected public Hospitals, Addis Ababa, Ethiopia 2021.

Neonatal related predictors (n=317)		
Variables	**Frequency**	**Present**
Sex of the baby		
Male	168	53.0
Female	149	47.0
Gestational age		
Less than 37 weeks	117	36.9
37-42 weeks	195	61.5
Greater than 42 weeks	5	1.6
Birth weight		
Birth weight < 2500g	125	39.4
Birth weight 2500g - 4000g	181	57.1
Above 4000g	11	3.5
APGAR score		
At 1st minute		
Less than 7	170	53.6
7 and above	147	46.4
At 5th minute		
Less than 7	57	18.0
7 and above	260	82.0
Age at admission		
Birth to 24hours	181	57.1
After 24 hours	136	42.9

Axillary body temp.		
Hypothermia	208	65.6
Normal	109	34.4
Initiation of feeding		
Within 1 hour	98	30.9
After 1 hour	219	69.1

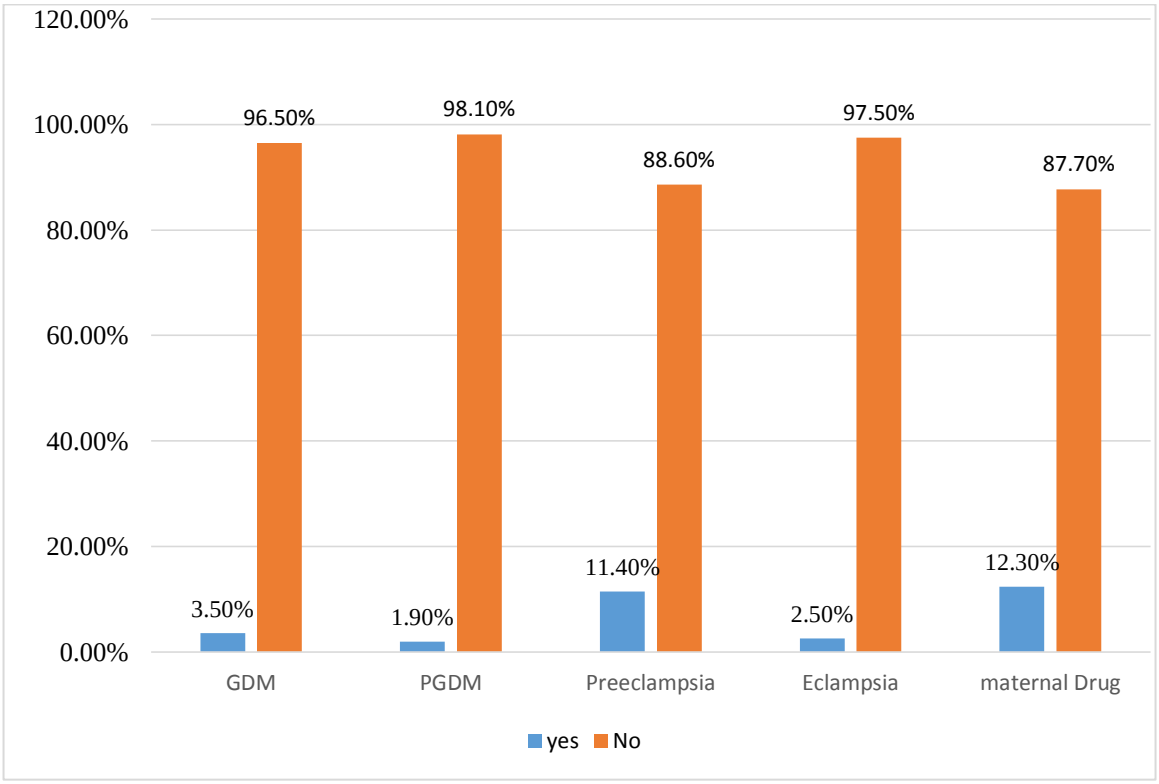

Figure 3.Maternal related predictors of hypoglycemia among neonates on admission to neonatal intensive care unit in selected public Hospitals, Addis Ababa, Ethiopia 2021.

As shown in figure 3- Around 11 (3.5%) of the mothers had gestational DM, similarly 6 (1.9%) of them had pre-gestational diabetes mellitus. Regarding of pregnancy induced hypertension 36(11.4%) of mothers had preeclampsia, and 8(2.5%) of the mothers were eclamptic. Majority 278(88.7%) of mothers had no history of drug intake (beta blockers and oral hypoglycemic agent).

As shown in table 3- Around half, 163(51.4%) of mothers were primipara. Majority of the respondents, 302(95.2%) had ANC follow up, and out of them 190(59.9%) had 4 and above visit. Most of the mothers, 305 (96.2%) had duration of labor less than 24 hours. More than half 181(57.1%) of mothers were gave birth via SVD. Around 191(60%) of mothers were delivered their child at hospital.

Table 3.Obstetic related predictors of hypoglycemia among neonates on admission to neonatal intensive care unit in selected public Hospitals, Addis Ababa, Ethiopia 2021.

Obstetric factors(n=317)		
Variables	**Frequency**	**Present**
Parity		
Primipara	163	51.4
Multipara	154	48.6
ANC follow up		
No History of Visit	15	4.7
1 – 3	112	35.3
4 and above	190	59.9
Duration of labor		
Less than 24 hours	305	96.2
More than 24 hours	12	3.8
Mode of delivery		
SVD	181	57.1
Assisted Vaginal Delivery	41	12.9
C/S	95	30.0
Place of delivery		
Health Center	117	36.9
Hospital	191	60.3
Home	9	2.8

The prevalence of hypoglycemia among neonate on admission to NICUs was 20.8 %.

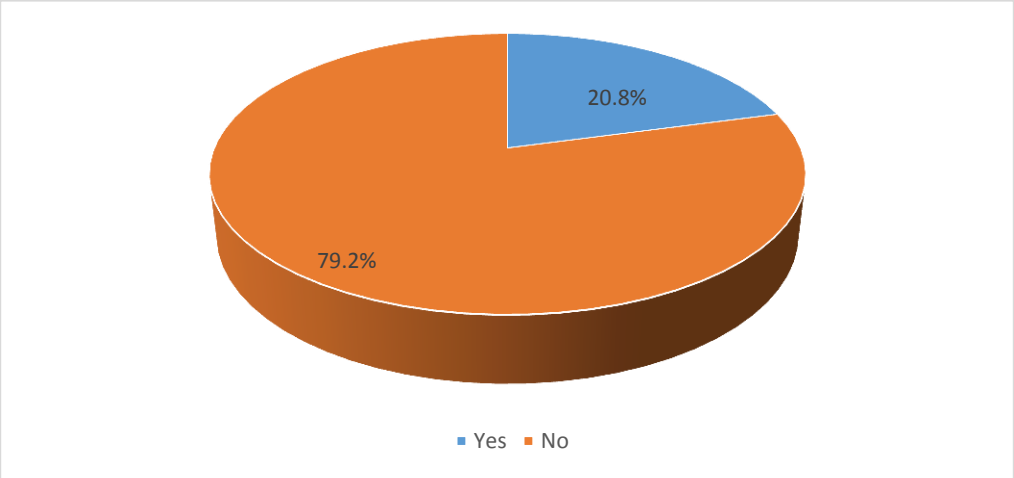

Figure: 4 prevalence of hypoglycemia among neonates on admission among neonates on admission to neonatal intensive care unit in selected public Hospitals, Addis Ababa, Ethiopia 2021. (n=317)

5.2 Factor associated with Hypoglycemia

Variables maternal age, sex of the baby, number of ANC visit, place of delivery, birth weight, gestational and pregestational maternal DM, preeclampsia, feeding initiation time, neonate's age at admission, and hypothermia were significant with bivariate analysis (P< 0.25). After controlling confounders in the final model, maternal DM gestational and pregestational, preeclampsia, feeding initiation time within one hour, remained significant (P<0.05).

Neonates who start feeding within one hour were 62% less likely to develop hypoglycemia compared to neonates who start feeding later (AOR=0.38, 95% CI: 0.15-0.96). Neonates born from a mother with preexisted DM were 8 times more likely to develop hypoglycemia compared to neonates born from non-diabetic mother (AOR =7.79, 95%CI: 1.14-53.03). Similarly neonates born from a mother with gestational DM were 5.16 times more likely to develop hypoglycemia compared to those neonates born from non-diabetic mother (AOR=5.16, 95% CI; 1.23-21.64).

In addition, neonates born from a mother with preeclampsia were 2.44 times more likely to develop hypoglycemia compared to neonates born from a non-hypertensive mothers (AOR=2.44, 95% CI; 1.10-5.38).

Maternal age, sex of the baby, birth weight, place of delivery, hypothermia, and age at admission were not found to have statistically significant association with neonatal hypoglycemia in this study.

Table 4. Factors associated with Hypoglycemia among neonates on admission to neonatal intensive care unit in selected public Hospitals, Addis Ababa, Ethiopia 2021.(n=317)

	Hypoglycemia		**COR 95% CI**	**AOR 95% CI**
	No	**Yes**		
Maternal age				
<20 years	10(66.7%)	5(33.3%)	0.48(0.16,1.46)	2.16(0.39,12.02)
20-35 years	233(80.6%)	56(19.4%)	1.25(0.26,5.89*	0.91(0.24,3.43)
>35 Years	8(61.5%)	5(38.5%)	1	1
Sex of the baby				
Male	126(75.0%)	42(25.0%)	1.74(0.99,3.04)*	1.81(0.96,3.39)
Female	125(83.9%)	24(16.1%)	1	1
Birth weight				
<2500gm	97(77.6%)	28(22.4%)	0.24 (0.07,0.85)*	0.55(0.11,2.81)
2500-4000gm	149(82.3%)	32(17.7%)	0.18(0.05,0.620*	0.46(0.09,2.32)
>4000gm	5(45.5%)	6(54.5%)	1	1
Maternal DM (Pre-existed)				
Yes	2(25.0%)	6(75.0%)	0.08(0.02,0.41)*	**7.79(1.14,35.03)****
No	249(80.6%)	60(19.4%)	1	**1**

Maternal DM (gestational)				
Yes	4(36.4%)	7(63.6%)	0.14(0.04,0.48)*	**5.16(1.23,21.64)****
No	247(80.7%)	59(19.3%)	1	**1**
Place of delivery				
Health center	98(83.8%)	19(16.2%)	1	0.52(0.11,2.41)
Hospital	147(77.4%)	43(22.6%)	1.51(0.83,2.74)*	0.43(0.09,1.87)
Home	6(60.0%)	4(40.0%)	3.44(0.89,13.36)*	1
Preeclampsia				
Yes	23(56.1%)	18(43.9%)	3.72(1.86,7.42)*	**2.44(1.10,3.38)****
No	228(82.6%)	48(17.4%)	1	**1**
Axillary body Temperature				
Hypothermia	161(74.2%)	56(25.8%)	3.65(0.83,16.07)*	2.22(0.41,11.94)
Normal	69(89.6%)	8(10.4%)	1.22(0.24,6.18)*	1.16(0.19,6.94)
Hyperthermia	21(91.3%)	2(8.7%)	1	1
Feeding initiation time				
< 1 Hour	88(92.6%)	7(7.4%)	4.55(1.99,10.39)*	**0.38(0.15,0.96)****
> 1 Hour	163(73.4%)	59(26.6%)	1	**1**
Age at admission				
< 24 Hours	134(73.6%)	48(26.4%)	2.33(1.28,4.23)*	1.3(0.64,2.65)
>24 Hours	117(86.7%)	18(13.3%)	1	1

*p-value <0.25 significantly associated with COR

**p-value<0.05 significantly associated with AOR

6. DISCUSSION

Neonatal hypoglycemia occurs while the normal process of metabolic adaptation from intra uterine to extra- uterine life fails to occur(55). If it is persistent and not detected early, it could lead to adverse neurological complications and poor prognosis (56).

The prevalence of hypoglycemia in this study was 20.8%. The finding is slightly higher than study conducted in Benue state teaching hospital, Nigeria that was 11% (32), in India 15.2% (57) and a study done in Iraq which was 16.25% (58). The possible reasons may be due to that the study conducted in Nigeria include a smaller sample size and neonates less than 24 hours of age were included in the study. Additionally the study conducted in Iraq and India excludes, infant of diabetic mother, neonates born from hypertensive mother, newborns with severe congenital malformation. Another study done in Uganda showed a 2.2% prevalence, which is much lower compared to the current study. The possible explanation for this may be due to the difference in the study area and number of study participants. It was conducted in the community which is different from institutional based and large number of study participants involved in the study.

In contrast, the result was found a lower prevalence of neonatal hypoglycemia as compared to studies carried out in Ethiopia St. Paul 25% (23), Nigeria 30.5 % (59). This might be due to that these two studies used a higher cut-off point to diagnose neonatal hypoglycemia.

The prevalence of hypoglycemia found much higher in studies conducted in, Iran 39.1% (28), and New Zealand 51%,(60). The possible explanation for that could be due to that the studies conducted in, Iran and New Zealand were carried out among neonates identified as high risk groups.

The four variables with significant association of hypoglycemia among neonates on admission were maternal DM (gestational and pre - existed), preeclampsia, and feeding initiation time.

The study finding showed that neonates born from a mother with preexisted DM were 8 times more likely to have hypoglycemia compared to neonates born from non-diabetic mother. Similarly neonates born from a mothers with gestational DM were 5 times more likely to have hypoglycemia compared to neonates born from non-diabetic mothers**.**

This finding supported by the fact that infants of diabetic mothers (IDM) are large for gestational age, because of maternal hyperglycemia especially if diabetes is un - controlled and that causes a transient hyperinsulinemia which causes hypoglycemia after few hours birth(61). The other reason may be due maternal intake of oral hypoglycemic agents like metformin and sulfonylureas to control blood glucose. The result also supported by studies conducted in South Africa (47), Bangladesh (5), and China(49).

In contrast to the current study the studies carried out in Ethiopia, at St. Paul (23), and Indonesia (62), and Israel (24), maternal DM was not found to be a contributing factor of neonatal hypoglycemia**.** The possible reason for this may be due to the absence or a small number of a mother with DM was found in the study participants or as a result of maternal blood glucose level was properly controlled during pregnancy.

Another factor which was found significantly associated with hypoglycemia was found to be maternal preeclampsia. Neonates born from a mother with preeclampsia were 2.44 times more likely to develop hypoglycemia compared to neonates born from mothers who were non hypertensive. The finding of the study supported by different literatures that preeclampsia is a condition characterized by decreased uteroplacental blood flow and ischemia, is a significant risk factor in the development of IUGR and premature delivery(63), (64). SGA and premature babies had an increased risk of hypoglycemia compared to neonates with a normal birth weight and term. The other reason might be due to maternal intake of beta-blockers to control blood pressure can increases the insulin secretion and causes neonatal hypoglycemia at birth.

This result also supported by the research conducted in Canada that neonates born from a mother with preeclampsia were three times more likely to develop neonatal hypoglycemia (27), similar result was also reported from Indonesia (62), and a study carried out in California showed that neonates born from the mother with preeclampsia were more likely to develop hypoglycemia (45).

Early initiation of feeding was found a protective effect on hypoglycemia. The finding of the study showed that neonates who start feeding earlier (within one hour) were 62% less likely developing hypoglycemia.

The finding also supported by meta-analysis of five studies from four countries, including more than 130,000 breastfed newborns, those who began breastfeeding between 2 and 23 hours after birth had a 33 per cent greater risk of having hypoglycemia and death compared with those who began breastfeeding within one hour of birth(65). The result also supported by the research conducted in Uganda(33). Similarly a study done in Indonesia Showed that hypoglycemia was strongly associated with delay of feeding initiation (5).

The study finding did not reveal statistically significant association in some predictors that previous studies have identified as a risk factors like, hypothermia, gestational age, birth weight, asphyxia, and maternal age (5), (23), (28), (32).

A studies carried out in Indonesia, Nigeria, and Bangladesh showed that prematurity and low birth weight were strongly associated with neonatal hypoglycemia. Whereas the current study did not show any association with those variables. The reason might be due to that majority of study participants in this study were found term in gestational age and normal birth weight.

In a study conducted in Ethiopia St. Paul showed that neonates born from a mother aged between 20 - 35 years were found protected from hypoglycemia(23). In contrast there was no statistically significant association between maternal age and hypoglycemia in current study.

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

In this study the prevalence of hypoglycemia slightly low compared to other study. The result of this study proved that maternal DM (pre-existing and gestational) and preeclampsia were associated with the increasing risk of hypoglycemia, whereas feeding initiation time within one hour protective effect to hypoglycemia. Therefore early initiation of feeding is important factor to prevent hypoglycemia for all newborns.

7.2 Recommendation

1. Health care providers

- To reduce the risk of hypoglycemia, focus on preventable causes like early initiation of breast feeding for all newborns and identifying and take a preventive measures for high risk groups.
- Health education about neonatal hypoglycemia and its risk factors and preventive measures should be given for all family and starting from ANC follow up.

2. Policy makers

- Integrate the need of training for health professionals on general prevention of hypoglycemia and develop standard protocols for all facilities to aware all the health professionals attending delivery and working in NICUs.

3. Researchers

- Further research should be conducted among high risk groups like, infant of diabetic mother, LGA, SGA, preterm, infant of preeclamptic mother and other risk groups.
- We also recommend a longitudinal study should be done among neonates who develop hypoglycemia to determine the long-term consequences especially the neuro developmental sequelae associated with this condition.

8. STRENGTH AND LIMITATIONS OF THE STUDY

8.1 Strength of the study

- In this study participants were selected by using a systematic random sampling technique this can decrease selection bias.

8.2 Limitation of the study

- Since it is an institutional based study it makes it difficult to represent for the general population.
- This study does not include other risk factors like sepsis, polycythemia.

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10. ANNEXES

Annex i: Information sheet (English version)

Hello

My name is Fikirte Kasaye, I am MSc student at Addis Ababa University College of Health Science Department of Nursing and Midwifery, and now I am conducting research to assess prevalence and predictors of hypoglycemia among neonates on admission to neonatal intensive care unit in public Hospitals. Addis Ababa, Ethiopia, 2021.

1. **Title of the research**: Prevalence and predictors of hypoglycemia among neonates on admission to neonatal intensive care unit in public hospitals, Addis Ababa, Ethiopia, 2021.

2. **Objective**: this study is aimed to assess prevalence and predictors of hypoglycemia. The main aim of this study is to prepare thesis for partial fulfillment of the requirement for masters of Science in neonatal nursing by investigator. In addition, the study finding will be used as baseline data, evidence and input to develop future quality improvement projects so this hospital will have benefited for this study, and also governmental and non-governmental organizations will be used this study finding for designing proper implementation and evaluation on reduction of neonatal morbidity and mortality related to neonatal hypoglycemia.

3. **Participants**: All Neonates admitted to NICU in the selected public hospitals

4. **Potential Risks and Benefits:** There is no predicted risk by being involved in this study; but only taking few minutes from the mother's time. No financial benefits are related with this study. But by participating in this study, most importantly, the result of the study will be beneficial to design effective preventive and control measures for neonatal hypoglycemia. Hence, you are indirectly benefiting other patients and the society in this respect. I would like to ask you few questions.

5. **Confidentiality**: The questionnaire will be coded to keep privacy of the participants. The information which you will give us will be kept confidentially. There will be no information that will identify you in particular. The findings of the study will be

generalized for the study population and it will not reflect anything specific of individual participants. No reference will be made in oral or written reports which link participants to the research. Your honest response to the questions can make the study to achieve its objective.

6. **Rights:** Mothers have the right to participate or not in this study, participation for this study is fully voluntary. If the mother agrees to participate, she has the right to withdraw from the study at any time and this will not label her for any loss of benefits which she otherwise is entitled. Mothers do have the right to not respond any question that she doesn't want to answer.

7. **Contact address**: At any time that you have questions, you can contact me by using the following Addresses:

Fikirte kasaye

Phone: +251-921995619, **Email**: fikirtekassaye1@gmail.com

Appendix II: Consent form

In signing this document, I am giving my consent to participate in the study entitled "Prevalence and predictors of hypoglycemia among neonates on admission to neonatal intensive care unit in public hospitals, Addis Ababa". I have been informed that the purpose of this study is to assess the prevalence hypoglycemia among neonates and to identify those predictors related to neonatal hypoglycemia. I have understood that participation in this study is entirely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve risks. I understood that Fikirte Kasaye is the contact person if I have questions about the study or about my rights as a study participant.

Respondent's signature _____

Date of interview: _____ Time started: _____ Time finished: _____

Interviewer Name _____ Signature _____ Date_____

Supervisor's name _____ signature _____

Results of interview questionnaire

1. Completed

2. Refused

3. Partially completed

Appendix III: English version Questionnaire

A questionnaire to assess prevalence and predictors of hypoglycemia among neonates on admission to neonatal intensive care unit in public hospitals, Addis Ababa, Ethiopia, 2021.

1. Questionnaire ID number _____

2. Name of health facility_____

Part I: Socio-demographic characteristic			
No	**Socio-demographic information**	**Possible responses**	**Remark**
101	Age of the mother	---------- Years	
102	Maternal education	1. Unable to read and write 2. Primary Education 3. Secondary Education 4. College and above	
103	Occupation	1. Government Employee 2. Private employee 3. Merchant 4. Daily labor 5. House Wife 6. Other, Specify _____	
104	Monthly income	----------ETB	
PARTII Obstetric characteristics			
201	Parity	----------	

202	ANC visit	1. No history of visit 2. 1- 3 times 3. 4 and above	
203	Duration of labor	---------- Hours.	
204	Place of delivery	1. Home 2. Health center 3. Hospital	
205	Modes of delivery	1.Spontaneousvaginal delivery 2. Assisted vaginal delivery 3. section	
301	Sex of baby	1. Male 2. Female	
302	Gestational age	_____ weeks _____ days	
303	Birth weight	_____ grams	
304	APGAR score	1st min---------- 5th min----------	
305	Age at admission	_____ hours/ days	

306	Axillary body temperature at admission	----------	
307	Time of initiation of feeding	1. Within 1 hour	
		2. After 1 hour	
401	Maternal DM	Pre- gestational	1. Yes 2. No
		Gestational	1. Yes 2. No
402	Pregnancy-induced hypertension	Preeclampsia	1.Yes 2. No
		Eclampsia	1. Yes 2. No
403	and Late antepartum intrapartum drug use	Beta-blockers Oral hypoglycaemic agents	1. Yes 2. No
501	Blood glucose level of the neonate	---------- mg/dL	

Appendix IV: Amharic version የተሳታፊዎች የመረጃ ቅፅ

ሰላም

ሥሜ ፍቅርተ፡ካሳዬ ይባላል፤ በአዲስ አበባ ዩኒቨርሲቲ፣ ጤና ሳይንስ ኮሌጅ፣ ነርሲንግና ሚድዋይፈሪ ትምህርት ክፍል የድህረ ምረቃ ተማሪ ስሆን ፡ በአሁኑ ሰዓት በአዲስ አበባ ከተማ አስተዳደር ጥናቱ በሚካሄድባቸው ሆስፒታሎች ውስጥ በጨቅላ ህፃናት፡ የደም ዉስጥ የስኳር መጠን ማነስ እና አጋላጭ ሁኔታዎችን ለመለየት የጥናትና ምርምር ስራ በመስራት ላይ እገኛለሁ፡፡

1. **የጥናቱ ርዕስ፡** - በጨቅላ ህፃናት የደም ውስጥ የስኳር መጠን ማነስ እና አጋላጭ ሁኔታዎችን መለየት በአዲስ አበባ ከተማ አስተዳደር በሚገኙ ሆስፒታልች በጨቅላ ህፃናት ክፍል ውስጥ ተኝተው ለመታከም በሚመጡ ህፃናት ላይ የሚደረግ ጥናት አዲስ አበባ፣ ኢትዮጵያ፣ 2013 ዓ.ም፡፡

2. **የጥናቱ አላማ፤** በጨቅላ ህፃናት የደም ውስጥ የስኳር መጠን ማነስን፡አስመልክቶ መረጃ፡መሰብሰብ እና አጋላጭ ሁኔታዎችን መለየት፡፡

3. **ተሳታፊዎች፡-** ተኝተው ለመታከም ጥናቱ ወደ ሚደረግባቸዉ ሆስፒታሎች የሚመጡ ጨቅላ ህፃናት በሙሉ

4. **የጎንዮሽ ጉዳት፡-** በዚህ ጥናት መሳተፍ ምንም አይነት ጉዳት የለውም፡፡

5. **ጥቅማ ጥቅም፡-** በጥናቱ ለሚሳተፉ ፍቃደኛ ተሳታፊዎች ምንም አይነት የገንዘብ ክፍያ የለም፣ ነገር ግን የጥናቱ ውጤት የህጻናት የደም ውስጥ የስኩር መጠን ማነስ ለመቆጣጠርና ለመከላከል ስለሚጠቅም በተዘዋዋሪ መንገድ ለላ ህመምተኛ እንዱሁም ህብረተሰቡን የመጥቀም እድል ያገኛል፡፡ ስለዚህ የተወሰኑ ጥያቄዎችን ልጠይቅዎት እወዳለሁ፡፡ የእርስዎ በእውነት ላይ የተመሰረተ መልስ ለዚህ ጥናት መሳካት አስተዋፅኦ ያደርጋል፡፡ እርስዎ የሚሰጡት መረጃ ከአጥኚውና ቃለመጠይቅ አድራጊው በስተቀር በማንኛውም መልኩ ለላላ 3ኛ ወገን ተላልፎ አይሰጥም፡፡

6. **በጥናቱ የተከበረው መብት፡** ጥናቱ በእናተየው ሙሉ ፈቃደኝነት ላይ የተመሰረተ ነው፡፡ በጥናቱ የመሳተፍም ያለመሳተፍም ሙለ መብት አላት፡፡የጥናቱ አካል ለመሆን ፈቃደኛ ከሆነች መልስ ለመስጠት ፍቃደኛ ያልሆነችባቸውን ጥያቄ ያለመመለስ እንዲሁም ከጥናቱ በማንኛውም ጊዜ የማቋረጥ ሙለ መብት ሲኖራት በዚህም ምክኒያት የሚደርስባት የተለየ ጥቅም መጓደል ወይም ጉዳት ፈጽሞ ሊኖር አይችልም፡፡

7. **የጥናቱ አድራሻ፡** ይህ ጥናት በሚካሄድበት ማንኛውም ጊዜ የጥናቱን አካሄድ በተመለከተ ወይም ለላ ማንኛውም ጥያቄ ካሎት ከዚህ በታች በተሰጠው አድራሻ ማግኘት ይቻላል ። እስከ አሁን በነገርኮት ነገር ላይ ጥያቄ ካልት እኔን መጠየቅ ይችላሉ፡፡

8. ስም፡ ፍቅርተ፡ካሳዬ ስልክ: + 251-911463277, ኢ- ሜይል fikirtekassaye1@gmail.com

Appendix V: Amharic version

የስምምነት መግለጫ ፎርም

አዲስ አበባ ዩኒቨርሲቲ፤ጤና ሳይንስ ኮሌጅ፤ነርሲንግ ትምህርት ክፍል፤ድህረ ምረቃ ፕሮግራም እኔ ለዚህ ጥናት የስምምነት ፊርማዬን ስሰጥ፤የዚህ ጥናት ዓላማ በደንብ የተብራራልኝ ሲሆን የጥናቱንም ዓላማ ተረድቻለሁ፡፡ በዚሁ ጥናት ላይ መሳተፍ በሙለ ፈቃደኝነት ላይ የተመሰረተ መሆኑን በሚገባ የተረዳሁ ሲሆን በማንኛውም ጊዜ ከጥናቱ ራሴን የማግለል መብት እንዳለኝ አውቄአለሁ፡፡ ስለሆነም የምሰጠው መረጃ እስከተጠበቀ ድረስ በዚህ ጥናት ለመሳተፍ ተስማምቻለሁ፡፡ በጥናቱ ስሳተፍ በህጻኑ/ኗ ወይም በኔላይ ምንም አይነት ጉዳት እንደል ሌለው በግልጽ ተረድቻለሁ፡፡በዚህ ጥናት ለመሳተፍ ስምምነቴን ስገልፅ ለምጠየቀው ጥያቄ በእውነት ላይ የመሰረተ መልስ ለመስጠት የተስማማሁ መሆኔን አረጋግጣለሁ፡፡በመብቴ ዙሪያም ሆነ ስለ ጥናቱ ማንኛውንም ያልገባኝን ጥያቄ መጠየቅ እንደምችል ተገልፆልኛል፡፡ የመረጃ ሰጪ ፊርማ _____ ቀን _____ የተጀመረበት ሰዓት _____ የተጠናቀቀበት ሰዓት _____

የጠያቂው ስም_____ ፊርማ_____ ቀን_____ የተቆጣጣሪ፤ስም_____ ፊርማ_____ ቀን_____

የመጠይቁ ውጤት፡

1. **ሙለ በሙሉ የተሞላ**

2. **ያልተስማሙ**

3. **በከፊል የተሞላ**

Appendix VI: Amharic version መጠይቅ ፎርም

በአዲስ አበባ ዩኒቨርሲቲ፤ ጤና ሳይንስ ኮጅ ፤ ነርሲንግ ዲፓርትመንት፤ ድህረ ምረቃ ፕሮግራም ይህ መጠይቅ የተዘጋጀው በአዲስ አበባ ከተማ አስተዳደር በተመረጡ የህዝብ ሆስፒታሎች ውስጥ በጨቅላ ህፃናት የደም ውስጥ የስኳር መጠን ማነስ መረጃ መሰብሰብ እና ችግሩን ሊያመጡ የሚችሉ አጋላጭ ሁኔታዎችን ለመለየት ነው፡፡ የመጠይቁ መለያ ቁጥር _____ የተቋሙ ስም _____

ክፍል 1፡ የወላጆች ማህበራዊ እና ስነ- ህዝብ መጠይቆች			
ተ.ቁ	መጠይቆች	ምላሾች	ምርመራ
101	እድሜዎ ስንት ነው?	-------- ዓመት	
102	የትምህርት ደረጃዎ ስንት ነው?	1.ማንበብም፡ሆነ፡መጻፍ የማይችል 2.የመጀመሪያ ደረጃ ትምህርት ያጠናቀቀች 3. የ2ኛ ደረጃ ያጠናቀቀች 4. ኮሌጅ እና ከዛ በላይ	
103	የርስዎ የስራ ሁኔታ ምንድን ነው?	1.የመንግስት መ/ቤት፡ ተቀጣሪ 2.የግል ድርጅት ተቀጣሪ 3. በንግድ ስራ ላይ ያለች 4. የቀን ሠራተኛ 5.የቤት እመቤት 6.ሌላ ካለ----------	
104	ወር ሀዊ ፡ገቢዎ፡ ምን ፡ያህል ነው?	_____ በኢትዮጵያ ብር	

	ክፍል 2፡- የእናትነት፤የወሊድ እና የስነ - ወሊድ መጠይቅ		
201	ስንት ልጆች አለዎት?	----------	
202	የእርግዝና፡ክትትል ነበረዎት?	1. አዎ ------- አይ-------- 2. 1-3 ጊዜ 3. 4 እና ከዛ በላይ	
203	በወሊድ፡ጊዜ ምጡ የፈጀው ሰዓት	---------- ሰዓት	
204	ህፃኑ የተወለደበት ቦታ	1. ቤት ውስጥ 2. ጤና ጣቢያ 3. ሆስፒታል 4. ሌላ ይጥቀሱ_____._	
205	የህፃኑ የአወላለድ ሁኔታ	1. በማህፀን 2. በመሳሪያ ድጋፍ 3. በቀዶጥገና	
	ክፍል 3፡ ህፃኑን፡የሚ መለከቱ፡መጠይቆች		
301	ጾታ	1. ወንድ 2. . ሴት	
302	ህጻኑ፡ሲወለድ፡የነበረው የእግርዝና፡እድሜ	---------ሳምንት-------ቀን	
303	ህፃኑ፡ሲወለድ፡የነበረው የክብደት መጠን	--------ግራም	

304	አፕጋር ስኮር	1ኛ ደቂቃ 5ኛ ደቂቃ	

305	ሆስፒታል ሲገባ የነበረው እድሜ	----------	
306	የህፃኑ የሰውነት የሙቀት መጠን (ከብብት የተወሰደ)	----------	
307	ህፃኑ ለመጀመሪያ ጊዜ ጡት የጠባበት ሰዓት	1. በ1 ሰዓት፡ውስጥ 2. ከ1 ሰዓት፡በኋላ	
ክፍል 4፡ ከእናት ጤና ጋር የተያያዙ ፡አጋላ ጭ ፡ሁኔታዎችን ፡የሚመለክቱ ፡ መጠይቆች			
401	የስኳር፡ህመም አለብዎ ?	ከእርግዝናው፡በፊት የተከሰተ	1.አዎ 2.አይ
		ከእርግዝናው፡ጋር፡ተያይዞ የመጣ	1.አዎ 2.አይ
402	ከእርግዝናው፡ጋርተያይዞ፡የመጣ የደም፡ግፊት	አደጋኛ	1.አዎ 2.አይ
		መካከለኛ	1.አዎ 2.አይ
403	በምጥ፡ጊዜ፡እና፡በወሊድ፡ሰዓት የተወሰደ፡መድኃኒት	ለደምግፊት፡ወይም፡ለስኳር የተሰጡ	1.የለም 2.አለ
ክፍል 5፡ የደም፡ውስጥ፡የስ ኳር፡መጠን፡በተመለከተ			
501	የህፃኑ፡የደም-ውስጥ፡የስኳር፡መጠን	----------ሚ.ግ/ዴሲ ሊትር	