



**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF HEALTH SCIENCE**  
**SCHOOL OF PUBLIC HEALTH**

**Department of Nutrition and Dietetics**

EXCLUSIVE BREAST MILK FEEDING AT DISCHARGE AND ASSOCIATED  
FACTORS AMONG PRETERM NEONATES IN PUBLIC HOSPITAL  
NEONATAL INTENSIVE CARE UNITS IN ADDIS ABABA, ETHIOPIA.

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## MASTER OF PUBLIC HEALTH

### THESIS SUBMISSION FORM

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## Abbreviations

|        |                                                        |
|--------|--------------------------------------------------------|
| AACAHB | Addis Ababa City of Administration Health Bureau       |
| BFHI   | Baby Friendly Hospital Initiative                      |
| CI     | Confidence interval                                    |
| EBF    | Exclusive Breastfeeding                                |
| GA     | Gestational age                                        |
| KMC    | Kangaroo Mother Care                                   |
| NICU   | Neonatal Intensive Care Unit                           |
| ODK    | Open Data Kit                                          |
| OR     | Odds Ratio                                             |
| PMA    | Postmenstrual Age                                      |
| SD     | Standard Deviation                                     |
| SPHMMC | St. Paul Hospital Millennium Medical College           |
| TASH   | Tikur Anbessa Specialized hospital                     |
| UN     | United Nations                                         |
| UNICEF | United Nations International Children's Emergency Fund |
| WHO    | World Health Organization                              |
| Y12MH  | Yekatit 12 Memorial Hospital                           |
| ZMH    | Zewditu Memorial Hospital                              |

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## Abstract

**Background:** Globally, there are about 15 million preterm babies, born before 37 weeks of gestation. It is recommended that term babies be breastfed within the first hour. Unfortunately, preterm infants have lower proportions of breastfeeding, especially in low resource settings. Despite these recommendations, evidence on the determinants of this gap, particularly in low resource settings, is lacking. The objective of this study was to explore the factors that affect preterm infants breast milk feeding in Addis Ababa.

**Objective:** This study aimed to investigate exclusive breast milk feeding at discharge and the factors influencing it among mothers of preterm infants in neonatal intensive care units of public hospitals in Addis Ababa.

**Methods and Materials:** Institution based cross sectional study was carried out in Addis Ababa public hospitals. Data collection was carried out from November 15, 2024, to January 15, 2025. Data were collected using a pretested structured questionnaire through the Open Data Kit (ODK) and later exported to Stata version 17 to be analyzed. Bivariate analysis was carried out to identify the association of each independent variable with the exclusive breast milk feeding at discharge. Variables with p-values  $< 0.2$  were included in the multivariable logistic regression model for final analysis, and those with p-value  $< 0.05$  were considered statistically significant.

**Results:** In 341 preterm neonates, exclusive breast milk feeding at discharge from NICU was 82.99%. Lower exclusive breastfeeding factors were late initiation after 48 hours (AOR = 5.19, 95% CI: 2.11–12.77), no rooming-in (AOR = 4.34, 95% CI: 1.86–10.13), Cesarean section (AOR = 2.99, 95% CI: 1.43–6.25), and lack of prior breastfeeding experience (AOR = 2.96, 95% CI: 1.41–6.23).

**Conclusion:** The rate of exclusive breastfeeding among preterm infants at NICU discharge was favorable. However, late initiation of breastfeeding, lack of rooming-in, no prior maternal breastfeeding experience, and cesarean section delivery were significant factors reducing the likelihood of exclusive breastfeeding.

**Keywords:** Initiation, Exclusive Breast Milk Feeding, preterm, Neonatal Intensive Care

# 1. Introduction

## 1.1 Background

Human milk is the ideal feeding choice for both preterm and term infants due to its broad spectrum of health benefits. Besides providing essential nutrition, human milk contains bioactive components that enhance normal growth and brain development in infants(1).

The nutritional value of human milk compared to formula, along with its crucial role in safeguarding both the infant and the mother from infections and other illnesses and has been consistently highlighted in global literature and remains relevant to this day(2). Breast milk offers optimal nutrition for infants, helps prevent infection, and aids in long term health. It is most important for preterm babies (gestational age of less than 37 weeks) and is a key element of public health(3). Second, NICU acquired infection is a common and lethal complication, leading to death in millions of preterm infants worldwide(4). Breast milk was shown to establish an immune protective barrier against neonatal infection and is linked with higher survival. In particular, breastfed newborns have lower rates of neonatal sepsis and necrotizing enterocolitis(5).

Preterm birth is the main cause of neonatal death and the second major cause of death among children less than five years old after pneumonia. In addition, survivors of preterm birth have a strong likelihood of developing disabilities(6). They also experience increased rates of poor health results in early adulthood compared to those who were born at term(7). Preterm infants often experience difficulties in establishing and maintaining effective breastfeeding since their physiological systems (respiratory, nervous, and gastrointestinal) are immature. Although preterm neonates require higher amounts of energy and nutrients(8), they typically have pronounced feeding problems by mouth due to immature suck-swallow-breathe coordination, slow intestinal motility, and immature digestive and intestinal function(9). The World Health Organization advises that these babies start to feed as soon as possible, ideally on the first day of life. If they cannot be directly breastfed, the mother's expressed milk should be given to them as soon as it can be produced(10). Preterm babies, however, might have some complications that prevent them from being directly breastfed. Because of their immature neurological and physiological systems, they may have a weak sucking reflex and cannot coordinate breathing with swallowing. Consequently, these babies usually must be fed by alternative methods, such as tube feeding or expressed breast milk, until they possess the strength and coordination to feed directly by breastfeeding(11,12).

## 1.2 Statement of the Problem

Exclusive breastfeeding is understood all over as the most appropriate method of infant feeding, providing essential nutrients and protective agents that are crucial for infant growth, development, and well-being (12). Preterm infants benefit especially by breast milk as it offers protection against infection, maximal growth promotion, and neurodevelopmental support (13). Yet, preterm babies, especially those in the NICU, are challenged with special difficulties that can prevent exclusive breastfeeding from being achieved. In spite of the established benefit of exclusive breast milk feeding for preterm babies like reduced risk of necrotizing enterocolitis and sepsis and improved neurodevelopmental outcomes, numerous obstacles still prevent its universal application (14), exclusive breastfeeding rates among this high-risk group are still insufficient.

A study in Australia found that late-preterm babies were 60% less likely to be exclusively breastfed at discharge compared with babies born at 37 weeks gestation (15). In Denmark, 68% of infants were exclusively breastfed and 17% partially breastfed when the research was conducted (16). In Morocco, only 12.4% of preterm infants were exclusively breastfed at discharge, whereas 80% were partially breast milk fed (17).

As per the Ethiopian profile on preterm and low birth weight prevention and care, Ethiopia has around 320,000 premature births each year, and 24,000 children under the age of five years old die every year from complications that are directly linked to prematurity(13). Suboptimal breastfeeding, particularly when it comes to not exclusively feeding, is one of the major causes of infants and child mortality. It accounts for 18% of deaths due to acute respiratory infections, 30% of deaths due to diarrhea, and 45% of neonatal deaths due to infections(14). The majority of the research in Ethiopia, however, has focused on breastfeeding practice among term infants or at the community level, with limited evidence on the coverage and determinants of exclusive breastfeeding in the setting of preterm infants in the NICU environment.

Exclusive feeding with the infant's own mother's own breast milk (OMM) is essential in the neonatal intensive care unit (NICU) as pasteurized donor milk lacks bioactive anti-infective factors like secretory immunoglobulin A and lactoferrin (20). Exclusive breast milk feeding in recent studies has been found to reduce the risk of several metabolic disorders, with strong protection against obesity and type 2 diabetes (21). In addition, consumption of breast milk is also linked with the prevention of long-term neurodevelopmental impairment and mortality in premature infants (22).

Breast milk is not consumed by infants; thus, they are more susceptible to infections such as gastroenteritis, respiratory infections, and otitis infections, resulting in higher hospitalization rates, illnesses, and deaths. Children who do not receive breast milk are also more likely to develop diseases such as childhood diabetes, obesity, and dental illness (23). Additionally, there is evidence that not breastfeeding can have negative effects on the intelligence quotient (19), as well as educational and behavioral status of the child. For preterm infants, an exclusive diet of breast milk has been found to decrease the rate of necrotizing enterocolitis, a potentially life-threatening gastrointestinal infection characterized by inflammation and bacterial infection of the intestinal wall.

This study will fill the knowledge gap through assessment of the prevalence of exclusive breastfeeding at hospital discharge in preterm infants in Addis Ababa's public hospital neonatal intensive care units and predictors of that. Findings will influence hospital policy and clinical practice, provide for improved neonatal outcomes, and support national efforts in achieving optimal levels of breastfeeding in all infants especially the most vulnerable.

### 1.3 Rationale and Significance of the Study

Identification of determinants of Exclusive breastfeeding in preterm infants helps develop interventions aimed at specific determinants that can enhance neonatal health outcomes. Exclusive breastfeeding supplies the necessary nutrients and antibodies essential in promoting preterm infant development and the immune system. Breastfeeding also enhances a healthy attachment between preterm infants and their mothers. Studies of factors of Exclusive breastfeeding among preterm can offer guidance on how to optimize this attachment to achieve emotional well-being for the both mother and infant. Breastfeeding has a lower risk of illness and complication for preterm babies. The research can include practices enhancing the effectiveness of breastfeeding, possibly Reducing rate of illness and mortality in preterm neonates.

The results of this study can also be applied to effective interventions that increase breastfeeding in preterm infants. The evidence can guide the development of evidence informed guidelines and protocols, which can improve practice in neonatal intensive care. Supporting breastfeeding in preterm infants furthers broader public health goals. It has the potential to reduce healthcare costs for complications of the neonatal period and ensuing chronic disease, thus promoting the health of society at large. Breastfeeding challenges determinants identification is beneficial in guiding the design of focused psychosocial interventions among mothers of preterm infants, which are needed in addressing complications arising during the neonatal period that can be expected to be faced. To Hospitals, findings of this research shall be a basis for standards and interventions towards the support of breastfeeding among premature neonates.

## **2. Literature Review**

### **2.1 Preterm Birth Burden**

Globally, 15 million premature infants are born annually, with 12 million (81.1%) of these in sub-Saharan Africa and Asia(15). Premature birth accounts for the death of more than one million neonates annually(16). It is 10.6% prevalent amongst all newborns in North America and 6.2% amongst those in Europe, but most prevalent in Africa at 11.9% (17). The frequency of preterm birth among developing countries is estimated at 12%, being much higher than the 9% in developed countries(17,18). Heterogeneity among countries in the prevalence of preterm births has been observed in studies. Prevalence in Iran stands at 5.1%(19) whereas Sweden's is slightly lower at 5%(20). Nigeria and Algeria have a high prevalence of 12% and 9.6%, respectively(21)((22). In Ethiopia, the prevalence was tremendously diverse ranging from 4.4% to 25.9%(23).

#### **2.2.1 Exclusive Breastfeeding among Preterm Infants**

A Greek study assessing the prevalence and duration of breastfeeding in premature neonates in Greece found 12% exclusive breastfeeding while in the NICU, 17% at discharge from hospital, and 24% on the first day after discharge home(24). A Danish prospective national cohort study of 1,221 mothers and 1,488 preterm infants had 68% exclusive breastfeeding at discharge with an additional 17% having been partially breastfed. The study further went on to demonstrate that clinical practices of test-weighing the infant and minimizing pacifier use were significantly linked with increased levels of exclusive breastfeeding(25).

A Moroccan study measuring breastfeeding rates in preterm infants at discharge from hospital and then at 3 and 6 months, found that 80% were partially breastfed and 12.4% exclusively breastfed at discharge. Exclusive breastfeeding had dropped to 8.8%, partial breastfeeding to 32.4%, and 58.8% of mothers had ceased breastfeeding entirely at 6 months(26). A recent one conducted in Ethiopia to establish prevalence exclusive breastfeeding at discharge indicated that 71.9% of the preterm were exclusively breast fed and 20.9% of infants were given mixed milk (a combination of formula and the mother's own milk) during discharge, 7.2% were exclusively formula milk (27). A Portuguese study on extremely preterm infants reported that 91.0% received some breastfeeding, though only 65.3% were exclusively breastfed and had a two-month median duration of exclusive breastfeeding. Remarkably, only 9.9% were able to maintain EBF for six months or longer, bringing concerns to continuing such habits in this subgroup(28).

In Sweden, a register-based study over a decade observed a decline in EBF rates among preterm infants at discharge, from 59% in 2004 to 45% in 2013. The decrease was most pronounced among extremely preterm infants, with EBF rates dropping from 55% to 16% during the same period(28).

## **2.3 Factors affecting Exclusive Breastfeeding among Preterm Infants in NICU.**

Investigating the factors for exclusive breastfeeding of preterm babies in the Neonatal Intensive Care Unit (NICU) is of utmost relevance in promoting the health and overall outcome of such fragile babies. Exclusive breastfeeding, where preterm babies are exclusively fed on breast milk without adding them to any other foods, is central to their best growth and developmental outcomes. There are some factors influencing exclusive breastfeeding of preterm babies. Therefore, the sole breastfeeding decision must be valued and understood in this risk population.

### **2.3.1 Maternal factors**

Maternal-related variables are pivotal in determining sole breastfeeding achievement, particularly for preterm infant mothers. These variables include physiological, psychological, and social variables that can interact with the status of the neonate to either enhance or complicate breastfeeding practices.

Mothers of preterm infants take longer to develop sufficient milk production (24). It is also not as easy for the mother to adapt to her premature child's demands if she herself experiences early birth stress and lack of privacy (25). Stress has been shown to hinder lactation by inhibiting the release of oxytocin, which is necessary for milk let-down. Stress can also stem from lack of privacy in the NICU, where mothers may feel uncomfortable expressing milk in open wards and avoid feeding times due to perceived judgment or fear of interruption(29).

Maternal age has also been associated with breastfeeding outcomes, with ambiguous results. Some studies show that older mothers are more likely to initiate and continue breastfeeding as a consequence of greater maturity and life experience, while others report that younger mothers breastfeed for longer durations since they have fewer work and social obligations. However, among the preterm infant mothers, younger maternal age has been identified as a risk factor for both decreased duration and lower exclusivity of breastfeeding, perhaps due to fewer breastfeeding knowledge and support systems(30).

Both the maternal and infant hospitalization lengths are predictors of failure to establish exclusive breastfeeding among preterm infants. In a study in Ethiopia, longer postdelivery maternal hospital stay was significantly associated with increased odds of preterm infant failure to exclusively breastfeed at NICU discharge(27).

Pregnancy complications such as preeclampsia, gestational diabetes, or infection can hamper lactation by delaying the onset of milk production and maternal physical readiness for breastfeeding. Such complications typically lead to medical intervention that exacerbates maternal stress and delays initial mother-infant contact, thus hampering breastfeeding initiation. A study reported that hypertensive disorder women were at risk of delayed lactogenesis and had more breastfeeding problems compared to normotensive women. Similarly, gestational diabetes mellitus also alters maternal metabolism and endocrine environment, perhaps interfering with milk synthesis and restructuring milk composition(31). GDM has also been linked to reduced duration of breastfeeding and exclusive breastfeeding rates because of retarded onset of milk supply and neonatal complications such as hypoglycemia requiring NICU admission(32). Infections in the mother (e.g., chorioamnionitis) may result in early birth, further complicating breastfeeding initiation because of neonatal stability of health(33).

Previous breastfeeding experience is also proven to be a significant predictor of breastfeeding success. Mothers who have received successful previous breastfeeding experience are more confident and persistent in establishing and sustaining exclusive breastfeeding for preterm infants. A Chinese hospital-based longitudinal observational study concluded that previous breastfeeding experience is an important factor related to exclusive breastfeeding behavior among mothers of preterm baby(34).

Mode of delivery is also an important maternal variable. Cesarean delivery, in particular, is related to delayed initiation of breastfeeding due to postoperative pain, delayed recovery, and reduced early skin-to-skin contact. An Indian study revealed a direct correlation between cesarean delivery and exclusive breastfeeding for less than four months(35). In India, there is one study which depicted that cesarean delivery has a direct relationship with exclusive breastfeeding of less than four months' duration(36).

### **2.3.2 Neonatal factors**

The gestational age at term is an important determinant of the potential and feasibility of breastfeeding preterm infants. Extremely preterm infants are generally disadvantaged in relation to those born close to

term due to immature neurophysiological mechanisms required for feeding. Infants with lower gestational age usually have immature sucking and swallowing reflexes that make breastfeeding more difficult and, in most instances, necessitate specialized feeding support and treatments(37). One Greek study showed that gestational age had a strong correlation with breastfeeding at home following NICU discharge(25), Australian study showed that preterm infants with gestational age less than 33 weeks experience shorter durations of breastfeeding compared to infants born at higher gestational ages (38). A Danish study also revealed that small for gestational age was significantly associated with the delay in initiating exclusive breastfeeding (39).

The overall health condition of the baby is most important in determining breast feeding feasibility. Premature infants often have many medical conditions like respiratory distress, infection, neurological impairment, or congenital abnormalities that immediately hinder their success at latching and coordinating the complex suck-swallow-breathe pattern needed for breast feeding(40). Infants experiencing such comorbidities frequently require alternative feeding methods (e.g., tube feeding) until their condition stabilizes, delaying the establishment of exclusive breastfeeding.

Length of NICU hospitalization is also an important determinant of breastfeeding outcomes. Longer hospitalization has a two-edged effect: although longer NICU hospitalizations provide intense monitoring and one-on-one feeding assistance, they also lead to late initiation and decreased duration of breastfeeding through separation from the mother and increased exposure to formula supplementation. Studies have shown that prolonged NICU hospitalization is linked with greater breastfeeding challenges, particularly where there is sleep dependency for a long time and tube feeding(41). Early initiation of breastfeeding and skin-to-skin contact, when medically feasible, can mitigate some of these adverse effects and promote successful breastfeeding after discharge.

Low birth weight infants may have developmental delay, immature sucking reflex, and sucking, swallowing, and breathing coordination problem(42). WHO Suggests LBW infants who are clinically fit to be breastfed must be put to the breast as soon as they are clinically stable at birth, and exclusively breastfed for six months of age(43).

### 2.3.3 Hospital facility related factors

The degree of support from healthcare providers and the hospital environment also dictates if preterm babies' mothers opt and succeed in breastfeeding. An Ethiopian study revealed that where there was ongoing hospital support, mothers were nearly 39 times more likely to exclusively breastfeed their infants compared to where they had no support from hospitals. Some of the hospital care that may be provided to preterm infants and their mothers are skin to skin kangaroo position practice, rooming in mother with preterm infants, initiation of breastmilk expression and use of pacifier.

Studies indicate that initiation period of expression of breast milk is associated with exclusive breast milk feeding (27,44). A study conducted in Ethiopia revealed that delayed initiation of expression of breast milk was independently associated with higher odds of preterm infants not exclusively breastfeeding at discharge. Additionally, one study prospectively surveyed a Danish cohort of preterm infants and discovered that initiation more than 24 hours after birth was strongly associated with delayed exclusive breastfeeding initiation(45).

One Danish study had been documented that exclusive breastfeeding was strongly associated with the mother's admission to NICU along with the baby within hours of delivery(45). Even the other study in USA has evidence that shows that mothers rooming with preterm infant is correlated with the prior practice of exclusive breastfeeding(46). The probable explanation is that rooming-in allows mothers to more closely observe and respond to their infant's first feeding cues, allows for more extended sessions with less interruption, and reduces stress in mother and infant because it makes parents feel less like guests and more like family members(47).

Skin-to-skin contact is also recognized as an important promoter of preterm breastfeeds; it stimulates the baby's own reflex feeding patterns and creates an emotional connection between parent and child. A prospective cohort study of a national Danish cohort found that greater skin-to-skin contact preterm infants had exclusive breastfeeding at an earlier postmenstrual age(39). Infants who had longer daily durations of skin-to-skin contact were also found in a Swedish study to have attained exclusive breastfeeding at a younger postmenstrual age (48).

## 2.4 Conceptual Framework

This theoretical model depicts the association of exclusive breast milk feeding practices to an interaction between related variables hospital support, maternal variables, and neonatal variables. These interact to promote or hinder the practice of exclusive breastfeeding at discharge in preterm neonates who are being discharged to neonatal intensive care units (NICUs).

Early milk expression is also having a positive effect on exclusive milk feeding behavior in case of NICU admission of preterm infants just like kangaroo mother care that will strengthen infant to mother skin to skin contact bonding and strengthen temperature regulation and breastfeeding also.

Pregnancy complication affects the initiation of Breast milk feeding that affect the exclusive breast milk feeding. History of past breastfeeding is connected with mother confidence to breastfeed and affects exclusive breastfeeding. Cesarean delivery has been connected with a delayed onset of milk increase distress to breastfeed. Hospital stay length may reflect problems that delay exclusive breastfeeding, or it offers a prolonged opportunity for breastfeeding.

Infant's health condition defines the feeding capacity and the presence of comorbidities, may influence their exclusive breastfeeding ability. NICU stay duration may influence the development of standard feeding patterns and may be representative of the disease severity. A newborn's breastfeeding ability is predicated mostly on gestational age and birth weight. Low birth weight or preterm babies can possess poorly developed suckling reflexes and must be fed expressed breast milk or supplements before nursing is fully established. This procedure was developed after going through different literatures(23,41,49–53).

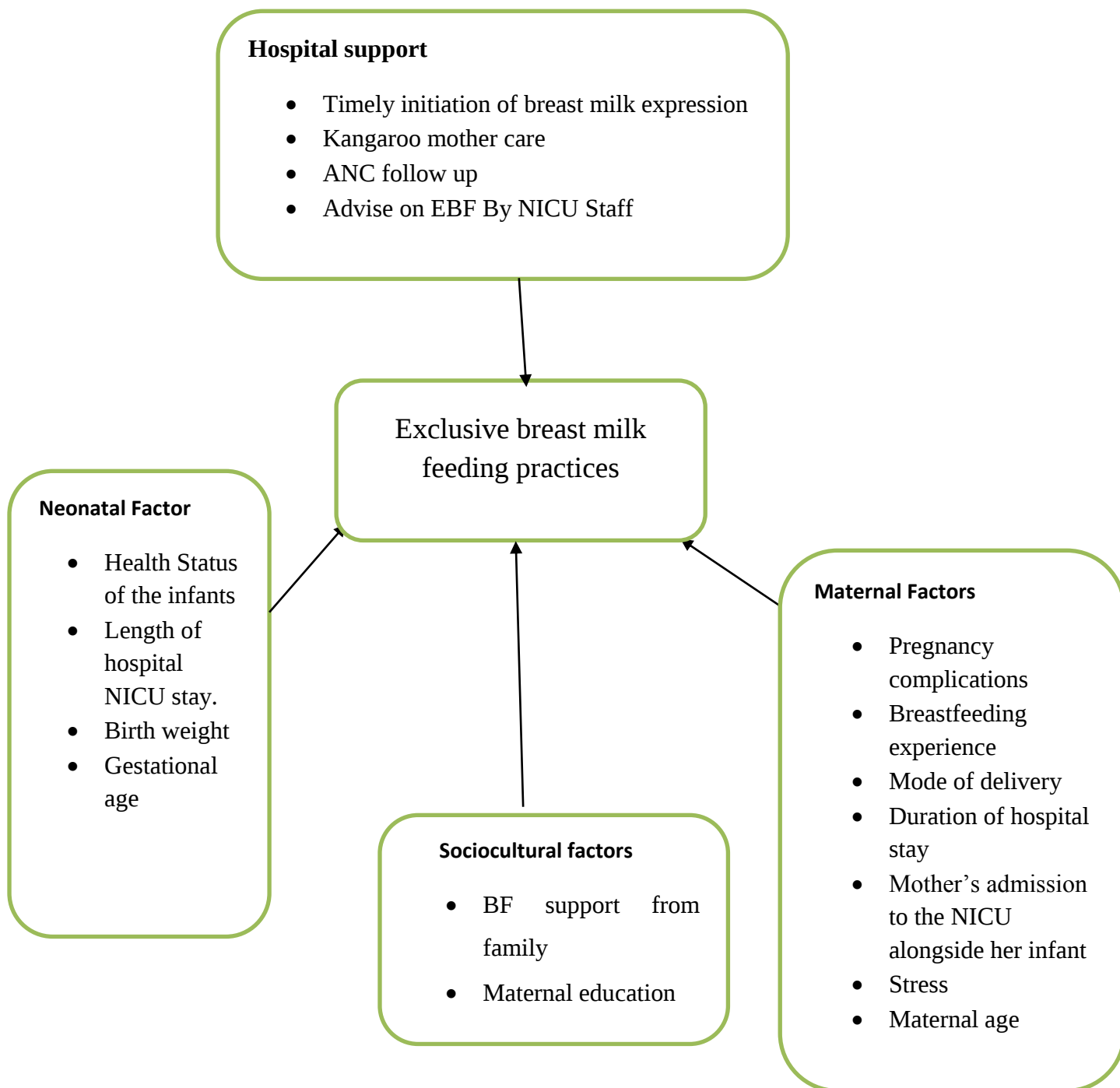


Figure 1: Conceptual framework

### **3. Objectives**

#### **3.1 General Objective**

- To assess exclusive breast milk feeding practices at discharge and identify associated factors among preterm infants in neonatal intensive care units of selected public hospitals in Addis Ababa, Ethiopia in 2025

#### **3.2 Specific Objectives**

The study had two specific objectives;

- To determine the prevalence of exclusive breast milk feeding at discharge among preterm infants admitted to neonatal intensive care units in selected public hospitals in Addis Ababa, Ethiopia
- To identify factors associated with exclusive breast milk feeding at discharge among mothers of preterm infants admitted to NICUs in public hospitals in Addis Ababa, Ethiopia

## **4. Methods**

### **4.1 Study Setting and Period**

The study was conducted in Addis Ababa, the capital city of Ethiopia, which is administratively structured into three levels: the city administration, twelve sub-cities, and 117 woreda. Addis Ababa had a population of approximately 3.6 million in 2020, according to the Central Statistics Agency(54). There are now thirteen hospitals in Addis Ababa: five administered by the Federal Ministry of Health, six by the Addis Ababa City Health Bureau, one by the Ministry of Defense, and one by the Federal Police Commission. NICU services are available in ten of the hospitals. Six hospitals with basic neonatal intensive care units (NICU) were selected randomly for the study, based on their patient flow to ensure adequate representation. Zewditu Memorial Hospital, Tikur Anbessa Specialized Hospital, St. Paul Hospital Millennium Medical College, Yekatit 12 Hospital Medical College, Gandhi Memorial Hospital, and Ras Desta Damitew General Hospital were selected based on the availability of basic NICU services and high patient flow.

### **4.2 Study Design**

A facility-based cross-sectional study was conducted in selected public hospitals in Addis Ababa from November 15, 2024 to January 15, 2025.

### **4.3 Source and Study Population**

#### **4.3.1 Source population**

The Source population included all mothers of preterm infants admitted to the NICUs of selected public hospitals in Addis Ababa, Ethiopia.

#### **4.3.2 Study population**

The Study population comprised mothers of preterm infants admitted to the NICUs of selected public hospitals in Addis Ababa, Ethiopia, during the study period.

#### 4.4 Sample Size Determination

The sample size was determined using a single population proportion formula, based on a prevalence of exclusive breast milk feeding at discharge of 71.9% ( $p = 0.719$ )(55), with a 5% margin of error, a 95% confidence level, and an additional 10% added to account for potential non-response.

$$n = \frac{(z)^2 P (1-p)}{d^2} \quad n = \frac{(1.96)^2 \times 0.719(1-0.719)}{(0.05)^2}$$

$$n = \frac{(3.84) \times (0.202)}{0.0025}$$

$$n = 310$$

After accounting for a 10% non-response rate, the final sample size was adjusted to 341 participants.

Sample size calculation for the second objective.

The sample size for the second objective was calculated using Epi Info version 7.2.3.1 with the double population proportion formula, based on a 95% confidence level, 80% statistical power, and an equal case-to-control ratio (1:1). The odds ratio and predictor variable proportions were obtained from a previous study conducted in Addis Ababa, Ethiopia(41).

Table 1: sample size calculation for second objective

| Variables                                                          | Percent of outcome in unexposed group | AOR  | Assumptions |    |                       | Final sample size with 10% non-response rate |
|--------------------------------------------------------------------|---------------------------------------|------|-------------|----|-----------------------|----------------------------------------------|
|                                                                    |                                       |      | power       | CI | Case to control ratio |                                              |
| Duration of hospital stays                                         | 31.89                                 | 0.19 | 80          | 95 | 1                     | 99                                           |
| Initiation of breast milk expression later than 48 hrs. postpartum | 63.3                                  | 0.11 | 80          | 95 | 1                     | 39                                           |
| mode of delivery                                                   | 51.2                                  | 0.42 | 80          | 95 | 1                     | 198                                          |

The final sample size was determined to be 341, as the calculation for the first objective yielded a larger number than that for the second objective.

## 4.5 Sampling Procedure

Addis Ababa has 13 government hospitals, out of which six of them (Black Lion, Ras Desta, Gandhi, Zewditu, Yukata12, and St. Paul) were randomly picked. Each hospital's monthly mean number of mothers with preterm deliveries admitted was calculated. Participants were then recruited using population proportion sampling and assigning an appropriate number to each hospital. Participants were then picked from the selected intensive care units using systematic random sampling.

Formula for population allocation

$$n_i = (N_i/N) \times n$$

Where:

- $n_i$  = sample size allocated to hospital  $i$ .
- $N_i$  = average preterm flow in hospital  $i$ .
- $N$  = total preterm flow across all hospitals
- $n$  = total sample size for the study

Formula for calculating systematic random sampling for selecting mother of infants

$$K = N/n$$

Where:

- $N$  = Total number of the population (e.g. total preterm neonates in a hospital during the study period)
- $n$  = Desired sample size from that hospital (population allocation)
- $k$  = Sampling interval (i.e., select every  $k$ -th subject)

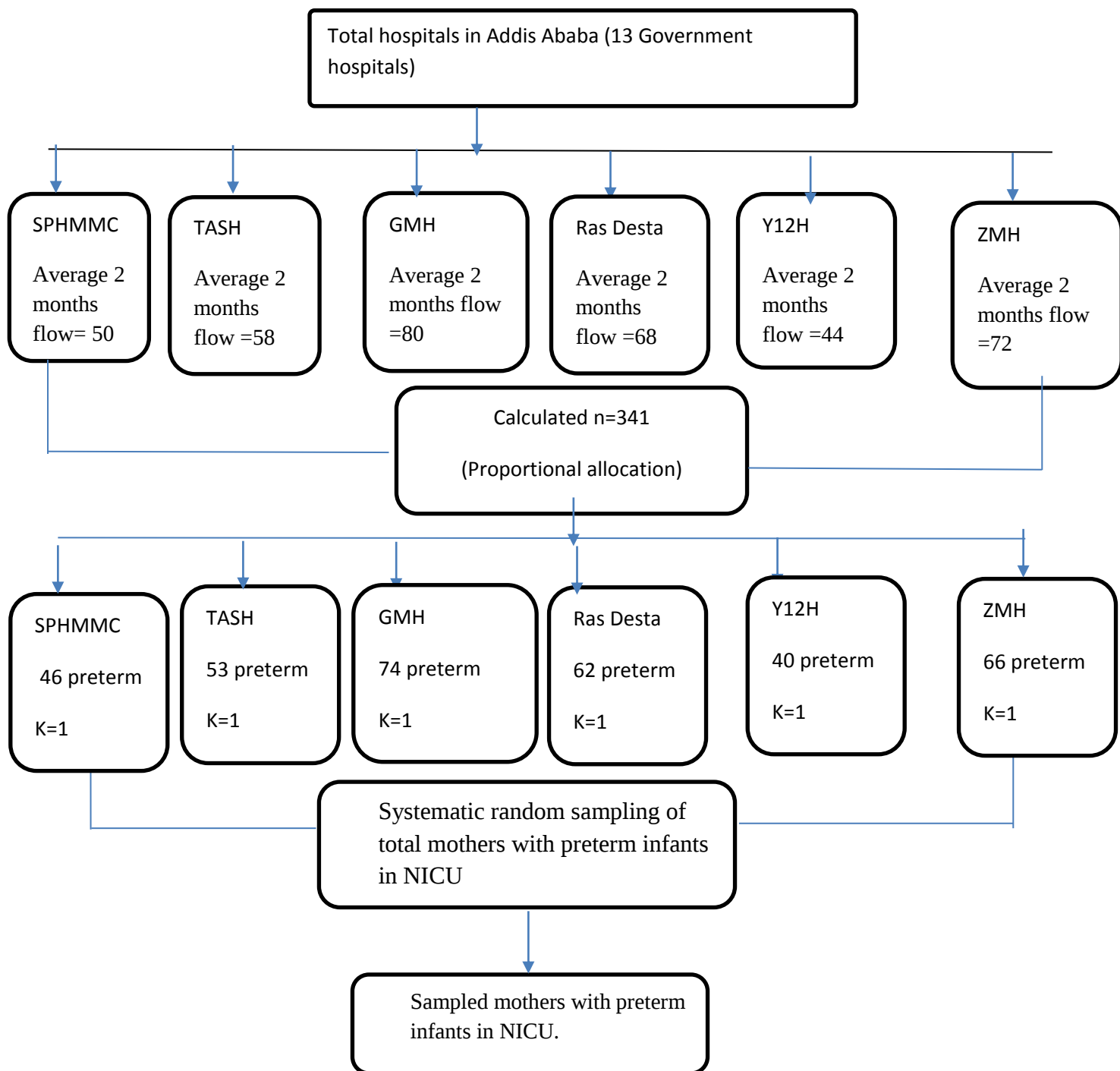


Figure 2: A schematic diagram illustrating the sampling procedure

## 4.6 Inclusion and Exclusion Criteria

### 4.6.1 Inclusion criteria

- All mothers of preterm infants (gestational age less than 37 weeks) admitted to the NICU during the study period were included.

### 4.6.2 Exclusion criteria

- Neonates with severe medical conditions that affected their ability to exclusively receive breast milk, including congenital anomalies, genetic disorders, or serious medical complications, were excluded.
- Mothers of preterm infants who were unwilling or unable to provide informed consent for participation in the study were excluded.
- Mothers who were unable to communicate effectively due to severe mental illness, hearing or speech impairments.

## 4.7. Study Variables

### 4.7.1 Outcome variable

- **Exclusive breast milk feeding**

In this study exclusive breastfeeding is refer to feeding the infant only breastmilk, direct breastfeeding and milk expression with sold or liquid with exceptional of oral rehydration salts, drops, or syrups (vitamins, minerals, or medicines), from birth until discharge from the NICU.

Measurement: Exclusive Breastfeeding was obtained from retrospectively from a mother at the time of discharge using interview. Mother where asked if her child received only breastmilk or other food or liquid.

### 4.7.2. Explanatory variables

- **Hospital support:** Includes supports that are consistent with baby friendly initiative ten steps of successful breast feeding, timing of initiation of breast milk expression, kangaroo mother care:

skin-to-skin care in Kangaroo position practiced as continuous and intermittent skin-to-skin contact

- **Timing of initiation of breast milk expression** was assessed based on the mother's self-reported interval between delivery and first expression, and categorized as <24 hours, 24–48 hours, or >48 hours postpartum.
- **Kangaroo Mother Care:** was assessed based on the WHO definition, involving early, continuous, and prolonged skin-to-skin contact (SSC) between the mother and preterm infant.
- **Neonatal Factors**
  - **Birth weight** was categorized as <1499 g, 1500–2499 g, or >2500 g based on measurements recorded at birth.
  - **Health status the neonate:** Neonatal health status was assessed based on clinical diagnosis at discharge, categorized as stable or with ongoing medical complications, was assessed by maternal report using the following categories: stable, fair and critical
  - **Gestational age:** In this study, gestational age was determined using documented obstetric ultrasound performed in the first trimester or as recorded in the hospital medical record at the time of admission or delivery. Categorized as <32 weeks, 32-34 weeks and 35-36weeks
- **Maternal factor**
  - **Marital Status:** was categorized as married, divorced/separated, or widowed based on maternal self-report
  - **Mode of Delivery** was classified as vaginal delivery or cesarean section according to medical records.
  - **Breastfeeding experience:** was determined through maternal self-report and categorized as having prior breastfeeding experience or none.
  - **Length of hospital stay:** Hospital stay length was categorized as <7 days, 7–14 days, or >14 days postpartum
  - **Maternal occupational status:** was self-reported and was coded as housewife, government worker, private sector worker, merchant, or daily laborer.

- **Educational status:** Women reported their highest level of education attained, which was categorized in this study as: No formal education, Primary education (1-8), Secondary education (9-12), College and above
- **Age:** maternal age was measured in complete years and categorized as 20-24, 25-29, 30-34 & 35-39; age of the child was measured in complete months

#### 4.8. Operational Definitions

**Breastfeeding Experience:** is defined as a mother's previous practice of breastfeeding any of her children prior to the current preterm infant.

**Kangaroo Mother Care:** The World Health Organization (WHO) defines Kangaroo Mother Care (KMC) as the early, continuous, and extended practice of skin-to-skin contact between a mother and her preterm infant(56).

**Breast milk expression:** is the process of extracting milk from the breast using either manual expression (by hand) or mechanical expression (using a breast pump) (10).

#### 4.9 Data Collection

A pre-tested and organized questionnaire was utilized, which was designed after a thorough review of the literature. Initially, Nurses working in the Neonatal Intensive Care Unit (NICU) wards of the selected health facilities were employed to carry out interviews since it is restricted for other researcher team to collect the data. Open data kit (ODK) software was employed for collecting and managing data in an improved manner. The interviewers were trained for two days on questionnaire content, general interviewing skills, use of the ODK data collection tool, interviewing skills, and ethical issues with emphasis on participant and interviewer safety, reducing underreporting, and confidentiality. Tool pre-testing was conducted among non-sampled mothers with preterm infants. Data were gathered through face-to-face interviews of the mothers of preterm infants in a private setting to ensure confidentiality and comfort.

#### 4.10 Data Management

Data were collected using Open Data Kit (ODK), and analysis was carried out using Stata version 17. Descriptive statistics were presented in tables and figures. Bivariate analysis and chi-square tests were

conducted to examine the association between each explanatory variable and exclusive breastfeeding of preterm infants.

#### **4.11 Data Quality Assurance**

Data quality was maintained by using a well-designed and pre-tested questionnaire, along with a standardized data collection procedure. Prior to data collection, data collectors received training on effective interviewing techniques and accurate data recording procedures. The questionnaire was pretested to assess its clarity and comprehensibility by administering it to 5% of the sample (n = 17) volunteer mothers at Menelik II Referral Hospital. During data collection, supervisors and the principal investigator thoroughly reviewed all gathered data to ensure completeness and consistency. Following collection, the data were cleaned and coded to reduce errors prior to analysis.

#### **4.12 Data Processing and Analysis**

The collected data were verified for consistency and completeness before being exported to STATA version 17 for analysis. Descriptive statistics was employed to describe the socio-demographic profile of study participants and exclusive breastfeeding prevalence. Binary logistic regression analysis was carried out in two phases with a view to identifying factors associated with exclusive breastfeeding practices. First, bivariate logistic regression was conducted for each independent variable in relation to the outcome variable. Variables with a p-value less than 0.2 were then included in the final multivariable logistic regression model. The strength of associations was measured using odds ratios with 95% confidence intervals, and statistical significance was determined at a p-value less than 0.05.

#### **4.13 Ethical Consideration**

Ethical approval was secured from the Research Ethics Committee of the School of Public Health and the Institutional Review Board of the College of Health Sciences at Addis Ababa University (Ref No. SPH/239/2024, Date: September 3, 2024), as well as from the Research Ethics Committee of the Addis Ababa Public Health Research and Emergency Management Directorate. All study participants were given detailed information about the aims and methods of the study prior to the interview and informed verbal consent to participate in the current study was obtained. The information obtained from the study was used only for the purpose of study and the recorded data weren't accessed by a third party except the principal investigator, and confidentiality was kept.

#### **4.13 Dissemination of Findings**

The research findings will be shared with and utilized by the study population, local authorities, and the community to raise awareness about exclusive breastfeeding practices and the associated factors among preterm infants in neonatal intensive care units at selected public hospitals in Addis Ababa, Ethiopia. A copy of the results will also be provided to (Addis Ababa City of Administration Health Bureau) AACAHB. Additionally, the study findings will be shared with the hospitals involved in the research and disseminated widely through publications and seminars.

## 5. Results

### 5.1 Neonatal and Maternal Characteristics

A total of 341 postnatal mothers participated in the study, resulting in a 100% response rate. The mean maternal age was 28.7 years (mean +SD =  $28.7 \pm 4.71$ ), with half of the mothers falling within the 25–29-year age group. The majority (98.24%), were married and a significant proportion, 242 (75.4%), were multiparous. Regarding gravidity, 218 (63.9%) of the mothers had experienced multiple pregnancies. In terms of education, 64 (18.77%) had attained college-level education or higher. Regarding occupational status, 135 (39.59%) were housewives.

Among the preterm infants, 127 (48.3%) were female and 136 (51.7%) were male. Single births accounted for the majority, representing 95.01% of the babies in this cohort. The mean birth weight was 1933.36 grams (SD  $\pm 720.72$  g), with weights ranging from 1000 g to 3700 g (Table 1)

Table 2: Neonatal and Maternal Characteristics in Public Hospitals, Addis Ababa, Ethiopia, April 2025.

| Variables                  | Frequency | Percentage |
|----------------------------|-----------|------------|
| Maternal age               |           |            |
| 20-24                      | 74        | 21.70      |
| 25-29                      | 142       | 41.64      |
| 30-34                      | 76        | 22.29      |
| 35-39                      | 49        | 14.37      |
| Educational status         |           |            |
| No formal education        | 33        | 9.68       |
| Primary education (1-8)    | 118       | 34.60      |
| Secondary education (9-12) | 123       | 36.07      |
| College and above          | 67        | 19.65      |
| Occupational status        |           |            |
| Housewives                 | 135       | 39.59      |
| Government employee        | 58        | 17.01      |
| Private                    | 71        | 20.82      |
| Merchant                   | 57        | 16.72      |
| Daily labor                | 18        | 5.28       |
| Others                     | 2         | 0.59       |

|                                        |     |       |
|----------------------------------------|-----|-------|
| Marital status                         |     |       |
| Married                                | 335 | 98.24 |
| Divorced /separated.                   | 4   | 1.17  |
| Widowed                                | 2   | 0.59  |
| Has previous breastfeeding experience. |     |       |
| Yes                                    | 249 | 73.02 |
| No                                     | 92  | 26.98 |
| Mode of delivery                       |     |       |
| Vaginal delivery                       | 193 | 57.60 |
| Cesarian section                       | 148 | 43.40 |
| Duration of hospital stay.             |     |       |
| < 7 days                               | 133 | 39.30 |
| 7-14 days                              | 126 | 36.95 |
| >14 days                               | 82  | 23.75 |
| Gender                                 |     |       |
| Female                                 | 148 | 43.40 |
| Male                                   | 193 | 56.60 |
| Birthweight                            |     |       |
| <1499                                  | 125 | 36.66 |
| 1500-2499                              | 159 | 46.63 |
| >2500                                  | 57  | 16.72 |
| Gestational weeks                      |     |       |
| <32 weeks                              | 103 | 30.21 |
| 32-34 weeks                            | 144 | 42.23 |
| 35-36weeks                             | 94  | 27.57 |

## 5.2 Components of Support Provided by Hospital NICU Regarding Breastfeeding Preterm Neonates

The majority of the mothers (86.5%) said that they received assistance from hospital staff in initiating breastfeeding, and 88.6% were given information on breastfeeding habits. More than 80% of the study participants received baby-friendly care, such as the offering of early skin-to-skin contact, rooming-in, and encouragement of breastfeeding. However, only two-thirds of the mothers received being held by the

babies in the first hour after birth, pointing to a deficiency in the provision of early postnatal bonding mother-infant care. In addition, the initiation of breast milk expression was found to be 63.4% of mothers initiate breast milk expression at any point between the first 24 postpartum hours.

Table 3: Components of Support Provided by Hospital NICU Regarding Breastfeeding Preterm Neonates in Public Hospitals, Addis Ababa, Ethiopia, 2025.

| Hospital Breastfeeding Support Measures                                      | Frequency<br>(n=341) | Percent |
|------------------------------------------------------------------------------|----------------------|---------|
| Hospital staff assisted mothers in initiating breastfeeding                  |                      |         |
| Yes                                                                          | 295                  | 86.51   |
| No                                                                           | 46                   | 13.49   |
| Hospital staff demonstrated proper positioning of the baby for breastfeeding |                      |         |
| Yes                                                                          | 286                  | 83.87   |
| No                                                                           | 55                   | 16.13   |
| Hospital encouraged breastfeeding on demand                                  |                      |         |
| Yes                                                                          | 289                  | 75.95   |
| No                                                                           | 82                   | 24.05   |
| Hospital staff did not offer water or formula supplements to the infants     |                      |         |
| Yes                                                                          | 270                  | 79.18   |
| No                                                                           | 71                   | 20.82   |
| Hospital staff provided information about breastfeeding                      |                      |         |
| Yes                                                                          | 302                  | 88.56   |
| No                                                                           | 39                   | 11.44   |
| The baby was held in the mother's arms during the first hour after birth     |                      |         |
| Yes                                                                          | 234                  | 68.62   |
| No                                                                           | 107                  | 31.38   |
| The baby was held skin-to-skin for the first time immediately after birth    |                      |         |
| Yes                                                                          | 276                  | 80.94   |

|                                        |     |       |
|----------------------------------------|-----|-------|
| No                                     | 65  | 19.06 |
| The baby roomed in with mother.        |     |       |
| Yes                                    | 279 | 81.82 |
| No                                     | 62  | 18.18 |
| Use kangaroo mother care.              |     |       |
| Yes                                    | 255 | 74.78 |
| No                                     | 86  | 25.22 |
| Timing of first breast milk expression |     |       |
| < 24 hrs.                              | 216 | 63.34 |
| 24-48 hrs.                             | 72  | 22.1  |
| > 48 hrs.                              | 53  | 15.54 |
| Advice on EBF by NICU Staff            |     |       |
| Yes                                    | 226 | 66.28 |
| No                                     | 115 | 33.72 |
| ANC follow up                          |     |       |
| Yes                                    | 283 | 82.99 |
| No                                     | 58  | 17.0  |

### 5.3 Prevalence of Exclusive Breast Milk Feeding

At discharge, 82.99% (95% CI: 78.6%, 86.6%) of the infants were exclusively fed breast milk, 14.08% received a combination of breast milk and formula, and just 2.93% were exclusively fed with formula milk. (Figure 3).

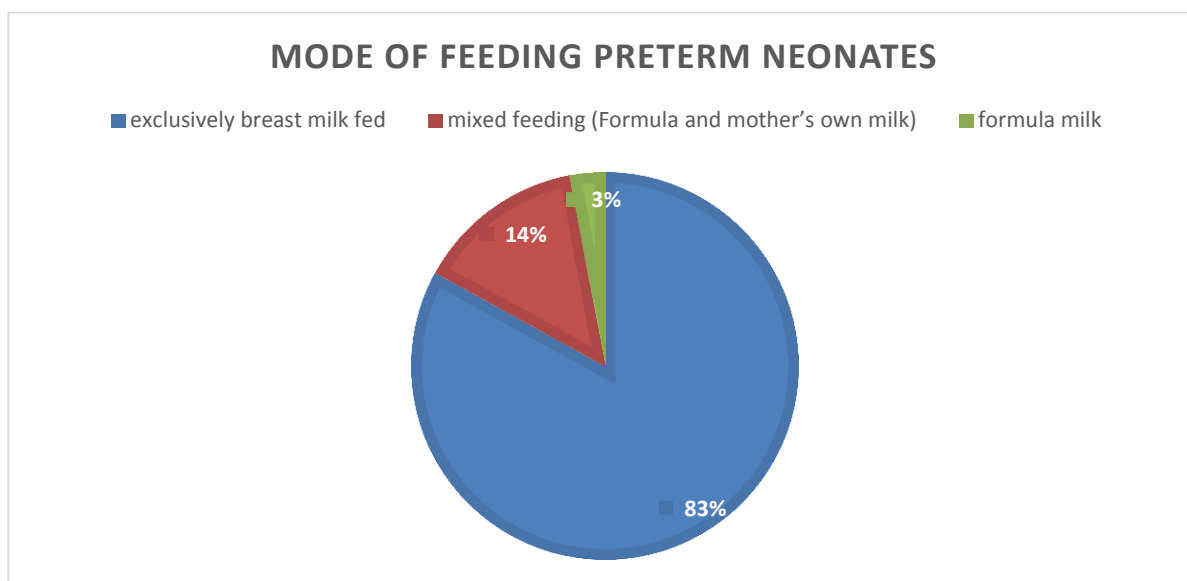


Figure 3: Feeding methods of preterm neonates at discharge from the neonatal intensive care unit in public hospitals, Addis Ababa, Ethiopia, 2025.

#### 5.4 Factors Associated with Exclusive Breast Milk Feeding at NICU Discharge

Among the mothers who participated in this study, 26.98% did not have any prior experience with breastfeeding, while 73.02% had experience with breastfeeding, either from older children or from past experiences. With regard to the time they started breastfeeding, 63.34% of the mothers started milk expression within the initial 24 hours of birth, while 21.1% milk expression after more than 24 hours, and 15.54% milk expression after 48 hours postpartum. Regarding mother-infant contact, 81.82% of the infants were roomed-in with their mothers during the whole stay in the hospital and the remaining 18.18% were given individual treatment. Considering the mode of delivery, 57.6% of neonates were delivered through natural delivery.

Exclusive breast feeding at NICU discharge is influenced by heterogeneous maternal, neonatal, and health care characteristics. Prior experience of breast feeding, delayed initiation of breast feeding, absence of rooming-in, and mode of delivery were significantly associated with EBF in the current study.

Mothers with no prior experience of breastfeeding were less likely to exclusively breastfeed (AOR = 2.96, 95% CI: 1.41, 6.23), which indicates that prior exposure to breastfeeding is a significant factor in the development of successful feeding habits.

Delayed on First milk expression of breastfeeding beyond 48 hours was statistically linked to decreased odds of exclusive breastfeeding (AOR = 5.19, 95% CI: 2.11, 12.77). Early breastfeeding initiation is now a universal principle to establish milk production, stimulate neonatal immunity. This finding is in

| Variable                    | Exclusive breastfeeding |    | COR (95% CI)      | AOR (95% CI)     | P value |
|-----------------------------|-------------------------|----|-------------------|------------------|---------|
|                             | Yes                     | No |                   |                  |         |
| Gestational age             |                         |    |                   |                  |         |
| < 31 weeks                  | 81                      | 22 | 1.69(0.798-3.59)  | 1..54-3.34)      | 0.520   |
| 32-34 weeks                 | 121                     | 23 | 1.18(0.567-2.47)  | 0.90(0.37-2.23)  | 0.828   |
| 35-36 weeks                 | 81                      | 13 | 1                 | 1                |         |
| Hospital stays              |                         |    |                   |                  |         |
| <7 days                     | 106                     | 27 | 1                 | 1                |         |
| 7-14 days                   | 110                     | 16 | 0.57(0.29-1.12)   | 0.72(0.314-1.64) | 0.430   |
| >14 days                    | 67                      | 15 | 0.878(0.435-1.77) | 0.46(0.18-1.19)  | 0.109   |
| Advice on EBF NICU Staff    |                         |    |                   |                  |         |
| Yes                         | 197                     | 29 | 1                 | 1                |         |
| No                          | 86                      | 29 | 2.29(1.29-4.06)   | 1.18(0.55-2.495) | 0.674   |
| ANC follow up               |                         |    |                   |                  |         |
| Yes                         | 230                     | 53 | 1                 | 1                |         |
| No                          | 53                      | 5  | 0.41(0.156-1.07)  | 0.36(0.12-1.14)  | 0.082   |
| Prior experience of BF      |                         |    |                   |                  |         |
| Yes                         | 221                     | 28 | 1                 | 1                |         |
| No                          | 62                      | 30 | 3.82(2.12-6.87)   | 2.96(1.41-6.23)  | 0.004   |
| Place on mother's arm       |                         |    |                   |                  |         |
| Yes                         | 214                     | 20 | 1                 | 1                |         |
| No                          | 69                      | 38 | 5.89(3.22-10.79)  | 1.36(0.62-2.97)  | 0.438   |
| Kangaroo mother care        |                         |    |                   |                  |         |
| Yes                         | 77                      | 9  | 1                 | 1                |         |
| No                          | 206                     | 49 | 2.04(0.95-4.34)   | 1.57(0.63-3.92)  | 0.337   |
| First breastmilk Expression |                         |    |                   |                  |         |
| < 24 hours                  | 192                     | 24 | 1                 | 1                |         |
| 24-48 hours                 | 61                      | 11 | 1.44(0.668-3.11)  | 0.65(0.25-1.73)  | 0.391   |
| >48 hours                   | 30                      | 23 | 6.13(3.07-12.22)  | 5.19(2.11-12.77) | 0.000** |
| Baby room with the mother   |                         |    |                   |                  |         |
| Yes                         | 248                     | 31 | 1                 | 1                |         |
| No                          | 35                      | 27 | 6.17(3.3-11.54)   | 4.34(1.86-10.13) | 0.000** |
| Type of birth               |                         |    |                   |                  |         |
| Single                      | 269                     | 55 | 1                 | 1                |         |
| Multiple births             | 14                      | 3  | 1.05(0.29-3.77)   | 0.40(0.077-2.09) | 0.280   |
| Mode of delivery            |                         |    |                   |                  |         |
| Vaginal                     | 176                     | 17 | 1                 | 1                |         |
| Cesarean section            | 107                     | 41 | 3.97(2.15-7.33)   | 2.99(1.43-6.25)  | 0.004*  |

consensus with international recommendations that advocate for initiation of breastfeeding within the first hour following delivery whenever possible.

Similarly, infants who were not roomed-in with their mothers have considerably lower odds of exclusive breastfeeding (AOR = 4.34, 95% CI: 1.86, 10.13). Rooming-in has a significant practice of enabling early and frequent breastfeeding, improving the mother-infant attachment, and allowing for development of a proper milk supply.

In addition, mode of delivery was found to be a significant predictor of exclusive breastfeeding at discharge. Neonates born via cesarean section had lower rates of exclusive breastfeeding compared to neonates born via vaginal delivery (AOR = 2.99, 95% CI: 1.43, 6.25). Delayed lactogenesis onset, maternal post cesarean pain, and restricted early skin-to-skin contact after cesarean birth which can hinder successful breastfeeding initiation. These findings support the role of intentional lactation care in women delivered by cesarean for promoting exclusive breastfeeding success (Table 4).

Table 4: Multivariable Logistic Regression Analysis of Factors Influencing Exclusive Breastfeeding Among Preterm Neonates at Discharge from the Neonatal Intensive Care Unit in Public Hospitals, Addis Ababa, Ethiopia, 2025

## 6. Discussion

This study aimed to establish the proportion of exclusive breastfeeding at discharge among preterm babies admitted to neonatal intensive care units of public hospitals in Addis Ababa and the determinants of EBF among them. The study revealed that 82.99% (95% CI: 78.6%, 86.6%) of the infants were being exclusively breastfed at discharge, which is far better compared to rates previously described under the same conditions. For instance, a previous study conducted in Addis Ababa reported an exclusive breastfeeding rate of 71.9% at discharge, indicating a substantial improvement over time(46). The difference in findings may be due to variations in progress made in breastfeeding support at health facilities over time.

When compared to global studies, the exclusive breastfeeding prevalence found in this study is considerably higher. Research conducted across Europe, reported prevalence's have ranged from 6% to 29%, while in the United States, the rate was as low as 6%. Likewise, studies from Japan and Morocco reported prevalence's of 22.6% and 12.4%, respectively(53–55). Additionally, a Danish study examining a larger cohort of preterm infants reported an exclusive breastfeeding proportion of 68%(56). Disparities in exclusive breastfeeding prevalence's across regions may be attributed to variations in hospital policies, the accessibility and quality of breastfeeding support programs, maternal educational attainment, and culturally rooted perceptions of infant feeding practices.

This rise may be attributed to strengthened hospital-based breastfeeding interventions, increased awareness among healthcare providers, and expanded implementation of the Baby-Friendly Hospital Initiative (BFHI) guidelines, as supported by UNICEF and WHO(10). In addition, unavailability of infant formula due to its high cost may have strengthened the practice of exclusive breastfeeding in preterm further. Promote practices such as rooming-in and early initiation of breastfeeding likely created a supportive environment for successful breastfeeding. The study is enhanced through the use of representative data drawn from a number of public hospitals, standardized data collection tools, and trained data collectors, which provide consistency and minimized bias.

Other nations have performed much better. The EBF rate of 92.3%, (57) from the Georgian Birth Registry was due to terrific postnatal care and support of vaginal delivery, which has a more favorable connotation with successful breastfeeding.

A Chinese study found that while 96.9% of mothers initially started lactating, at discharge from the hospital, only 50.3% exclusively breastfed their babies. Exclusive breastfeeding was positively associated with vaginal delivery, the infant's first feed being breast milk, mothers residing in suburban or rural areas, younger maternal age, lower levels of maternal education, and lower family income(58). On another hand, a population-based study conducted in Ontario, Canada, found that 61.6% of term newborns were exclusively breastfed at the time of discharge(59).

In the present study, maternal and clinical factors were identified as significantly associated with exclusive breastfeeding. Mothers without previous breastfeeding experience were significantly less likely to exclusively breastfeed their infants at NICU discharge (AOR = 2.96, 95% CI: 1.41–6.23). This result aligns with findings from a Canadian study, which emphasized that maternal experience and confidence play crucial roles in successful breastfeeding initiation and continuation(59). Similarly, in 2019, another systematic review revealed that there was a clear correlation between prior breastfeeding experience and the onset and duration of subsequent breastfeeding (69). Additionally, a study conducted in the Danish cohort study has demonstrated a negative correlation between breastfeeding and prior breastfeeding experience. (70).

Hence, the absence of experience in breastfeeding prior can bring about uncertainty and low self-efficacy, which can interfere with a mother's ability to establish a good breastfeeding habit. The value of providing the first-time mothers with education is crucial in overcoming these barriers and improving EBF rates.

First breast milk expression more than 48 hours postpartum was strongly linked to having reduced chances of exclusive breastfeeding (AOR = 5.19, 95% CI: 2.11–12.77). This is in agreement with other studies emphasizing the positive association initiating expressing breast milk early during the postpartum period with high chances of practicing exclusive breastfeeding (60–62). Consistently, a cross-sectional study done in Ethiopia agree found that the later the initiation of breast milk expression (> 48-hrs postpartum), the higher the odds for breastfeeding failure at discharge (46). Likewise, a study done in Danish align with this finding concluding Early initiation of breast milk pumping before 12 hours postpartum may increase breastfeeding rates.(70).Moreover, this finding is consistent with studies conducted in the United States(63) and Europe that similarly had a high correlation between early initiation of breastfeeding within the first hour of birth and rates of exclusive breastfeeding. This

subsequently supports global recommendations that advocate for early initiation of breastfeeding to maximize neonatal health benefits.

The practice of rooming-in, where infants remain in the same room as their mothers throughout their hospital stay, was another important factor influencing exclusive breastfeeding. In this study, infants who were not roomed-in with mothers had a much lower chance of exclusive breastfeeding (AOR = 4.34, 95% CI: 1.86, 10.13). This is in line with evidence from a systematic review by Jaafar et al. (2016) that rooming-in facilitates maternal-infant interaction, skin-to-skin contact, and responsive feeding opportunities, all of which are primary determinants of breastfeeding success(64). The study found that on the fourth postpartum day before to hospital discharge, the rooming-in group's exclusive breastfeeding proportion was 86% (99 of 115) compared to 45% (17 of 38) in the separate care group. (64)

Rooming-in is reinforced by the World Health Organization, who advise the incorporation of rooming-in in neonatal intensive care units (NICUs) under family-centered care to promote breastfeeding outcomes and neonatal health(65). Rooming-in maximizes skin-to-skin contact and encourages responsive, on-demand feeding, both of which are especially beneficial for lactation establishment in preterm neonate mothers(66). In contrast, mother-infant separation often routine in conventional NICU care can lead to delayed initiation, reduced milk production, and lower exclusive breastfeeding rates. The benefits of rooming-in include more on-demand breastfeeding, increased confidence of mothers, and increased emotional attachment, all resulting in improved exclusive breastfeeding rates(67).

Additionally, Mode of delivery impacted exclusive discharge breastfeeding, and the infants born through cesarean had lower odds of exclusive breastfeeding in comparison to the ones delivered vaginally (AOR = 2.99, 95% CI: 1.43–6.25). This was consistent with a cohort study done in China (58) which reported that exclusive breastfeeding was more common following vaginal births, while infants delivered by cesarean section had lower rates of exclusive breastfeeding. Several factors may contribute to this association like delayed lactogenesis, postoperative pain in mothers, and reduced early skin-to-skin contact following cesarean delivery, all of which may act to delay the start of effective breastfeeding(68). To address this, hospitals should ensure that mothers who have had cesarean sections receive proper lactation support and are encouraged to begin breastfeeding as soon as possible, despite the challenges of surgical recovery.

In this study, factors such as gestational age, duration of hospital stay, type of birth, kangaroo mother care (KMC), being placed on the mother's hands after birth, antenatal care (ANC) follow-up, and advice on exclusive breastfeeding (EBF) provided by NICU staff did not show a statistically significant association with exclusive breastfeeding at discharge in the multivariable analysis. While these factors have been emphasized in other studies as potential contributors to breastfeeding outcomes, their lack of association in this context may be due to the uniform provision of care across the study setting or the influence of other dominant factors such as early initiation of breastfeeding and previous breastfeeding experience. This finding underscores the complexity of breastfeeding practices and the need for further research to explore the contextual and individual level dynamics that may influence exclusive breastfeeding among preterm infants.

### **Strength and Limitations of the study**

#### **Strength**

- The study included data from several public hospitals in Addis Ababa, which works to enable the findings to be more generalizable to the region. By way of exploration of several practices and statuses within the hospitals, the study offers a greater sense of exclusive breastfeeding rates and the factors there of in the NICU.
- Data were collected by trained NICU nurses working in their respective hospitals, ensuring accuracy and reliability. Being clinically experienced and acquainted with the setting minimized bias, improved the quality of data, and provided easy access to patients' records.

#### **Limitations**

- As it is a cross-sectional study, it provides a snapshot of data at one point in time, and therefore, it is not feasible to evaluate long-term breastfeeding outcomes or to trace changes over time.
- The study relied on maternal self-reporting of breastfeeding initiation and practices, and this can be subject to recall bias or erroneous reporting

## 7. Conclusion

In this study, among 341 preterm infant 283 of the premature neonatal intensive care unit (NICU) population were exclusively breastfed at discharge. This finding refers to the successful establishment of exclusive breastfeeding in the majority of the preterm infants in this population. The study determined that no prior breastfeeding experience, delayed initiation of breast milk expression, and cesarean section were significantly associated with decreased exclusive breastfeeding at NICU discharge. Those mothers who had no previous experience of breastfeeding found exclusive breastfeeding more difficult. When breastfeeding was started more than 48 hours after birth, the chances of exclusive breastfeeding were reduced, emphasizing the benefit of early initiation. Mothers who gave birth by cesarean section faced challenges such as delayed milk production and limited skin-to-skin contact, both of which affected breastfeeding. These findings point to the need for timely support and practical help with breastfeeding to encourage exclusive feeding.

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## **8. Recommendation**

For hospitals to have more preterm babies being discharged from the NICU being exclusively breastfed, they need to provide consistent and reliable breastfeeding support. The support is most useful to especially mothers who stay in the hospital for extended durations, as it provides them with reassurance and guidance that they require to establish breastfeeding early enough and maintain throughout their baby's NICU stay. More emphasis needs to be laid on the early initiation of breastfeeding within the first hour of life and on frequent expression of breast milk, particularly in mothers of preterm babies. First time mothers should also receive especial breastfeeding education and counseling to build up their confidence and raise their knowledge of how to breastfeed. Mothers who undergo cesarean delivery can have additional problems like postoperative pain and delayed lactogenesis, and therefore need to be given individual care like early skin-to-skin contact support. More mothers will be able to exclusively breastfeed their babies at discharge from the NICU if they are given proper care and attention.

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## 1 Annexes

Annex I: English version of participant's information sheet

Introduction: - My name is \_\_\_\_\_. I am working as a data collector in the research conducted by Hanna Shimelis, who is conducting this research entitled: "Exclusive breast milk feeding practice at discharge and associated factors among preterm neonates admitted to a neonatal intensive care unit in public hospitals Addis Ababa, Ethiopia." in the partial fulfillment of the requirements for the degree of Master of Public Health in Human Nutrition in Addis Ababa University.

For this study you are selected as a participant and before getting your consent or permission for your participation you need to know all necessary information related to the study. Thus, this, information will be detailed as

Objective: - Name of advisor(s): - Bilal Shikur (MD, PhD)

Yalemwork Getenet (MPH, PhD candidate)

Name of the organization: Addis Ababa University, College of Health Sciences, School of Public Health, Department of Human nutrition.

Name of the Sponsor: - Addis Ababa University.

Participants: -.

Confidentiality: - All information you give will be kept confidential and will not be accessible to any third party. No personal identifiers will have been used on the data collection form.

Risks: - I may ask you about your disease which may be personal information and may not be comfortable. However, the information you provide will have paramount importance to conduct this research.

Procedures: - If you agree to participate in the study, you will be asked to answer some questions about research related questions and yourself. The interview will take 15-20 minutes.

Benefits: - No compensation will be given for your participation in this study. However, participating in the study and answering the questions will be very helpful in identifying the extent of early initiation of breastfeeding among preterm infants and associated factors among mothers and infants.

Right to refuse or withdraw: Your decision to participate in this study is entirely up to you. You are not required to answer any questions you feel uncomfortable answering, and you are free to stop at any moment. If you want more information or want to know the results when the study's done, just get in touch with the main researcher or advisor.

Person to contact:

If you have any questions to ask, please contact me

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Once again, thank you!

Annex II: Consent form

I understand the purpose of the study. The study has been explained to me in the language that I understand. I have had the opportunity to ask questions and the questions I asked have been answered to my satisfaction. I consent voluntarily to be part of the study and understand that I have the right to withdraw from the study at any time.

Participant

Signature\_\_\_\_\_ Date\_\_\_\_\_

Interviewer

Name\_\_\_\_\_ Signature\_\_\_\_\_

Questionnaires number\_\_\_\_\_

Date of interview\_\_\_\_\_ Starting time\_\_\_\_\_ Completed\_\_\_\_\_

# ANNEX III English version of questionnaire

| Part I: Socio demographic characteristics |                                                                                                  |                                                                                                              |      |
|-------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|------|
| S.N                                       | Questions                                                                                        | Alternative choices                                                                                          | Skip |
| 1.                                        | Maternal age                                                                                     | -----years                                                                                                   |      |
| 2.                                        | Parity                                                                                           | -----                                                                                                        |      |
| 3.                                        | Mother Educational level                                                                         | 1. Has no formal education<br>2. 1-8 grade<br>3. 9-12 grade<br>4. College and above                          |      |
| 4.                                        | Mother occupation                                                                                | 1.Merchant<br>2.Government employer<br>3.Private<br>4.Daily laborer<br>5. Jobless<br>6. Other(specify) ----- |      |
| 5.                                        | Marital status                                                                                   | 1. Single<br>2. Married<br>3. Divorced<br>4. Widowed                                                         |      |
| Part II: Hospital support factors         |                                                                                                  |                                                                                                              |      |
| 6.                                        | Did you have ANC follow up?                                                                      | 1. Yes<br>2. NO                                                                                              |      |
| 7.                                        | Did you get advice on BF during ANC follow up?                                                   | 1.yes<br>2.No                                                                                                |      |
| 8.                                        | Did your baby receive formula, sugar water, or any food other than breast milk during NICU stay? | 1.yes<br>2. NO                                                                                               |      |
| 9.                                        | Did you get advice on exclusive breastfeeding during ANC follow up?                              | 1. Yes<br>2. No                                                                                              |      |
| 10.                                       | Did you get advice on exclusive                                                                  | 1. Yes                                                                                                       |      |

|     |                                                                                                |                                                    |  |
|-----|------------------------------------------------------------------------------------------------|----------------------------------------------------|--|
|     | breastfeeding from NICU staff?                                                                 | 2. No                                              |  |
| 11. | Do you know that breast milk important than other milk (formula milk, cow milk) for your baby? | 1. Yes<br>2. No                                    |  |
| 12. | If yes to above question, where do you get the information?                                    | 1. Media<br>2. health care workers<br>3. community |  |
| 14. | Mother admitted together with infant to the NICU                                               | 1.Yes<br>2.No                                      |  |
| 15. | First breast milk Expression                                                                   | 1.< 24 hr.<br>2.24-48 hrs.<br>3. > 48 hrs.         |  |

|     |                                                            |                                                      |  |
|-----|------------------------------------------------------------|------------------------------------------------------|--|
| 16. | Been skin-to-skin with mother within 6 hours pp your baby? | 1.yes<br>2.No                                        |  |
|     |                                                            |                                                      |  |
| III | Neonatal factors                                           |                                                      |  |
| 17. | Gender                                                     | 1. Male<br>2.Female                                  |  |
| 18. | Type of birth                                              | 1. Single<br>2.multiple births                       |  |
| 19. | Birth weights                                              | -----gm                                              |  |
| 20. | Do your baby able to suck?                                 | 1.yes<br>2.No                                        |  |
| 21. | Gestational age                                            | ----- weeks                                          |  |
| IV  | Maternal factors                                           |                                                      |  |
| 22. | Mode of delivery                                           | 1. SVD<br>2. C/S<br>3. Forceps delivery<br>4. Vacuum |  |

|     |                                 |               |  |
|-----|---------------------------------|---------------|--|
| 23. | Breastfeeding experience Before | 1.yes<br>2.No |  |
|-----|---------------------------------|---------------|--|

#### ANNEX IV: Assurance of principal investigator

I, the undersigned senior MPH candidate, agree to accept responsibility for the scientific, ethical, and technical conduct of the research project as well as the provision of required progress reports to my advisors and seek the necessary advice approval from my advisors during the research by the terms and conditions of Addis Ababa University's research and publications office.

Name of the principal investigator: Hanna Shimelis

Signature: \_\_\_\_\_

Date \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Approval of the Advisor

Name of primary advisor

Signature \_\_\_\_\_

Date \_\_\_\_ / \_\_\_\_ / \_\_\_\_

አባሪ II፡ የተሳታፊ መረጃ ወረቀት የአማርኛ ቅጂ

መግቢያ፡- ስሜ \_\_\_\_\_ ነው። ህገ መንግሥት በምታካሄደው ጥናት ላይ መረጃ ሰብሳቢ ሆኜ እየሠራሁ ነው። “የጡት ወተትን የመመገብ ልምድ እና ተደያዥነት ያሳቸውን በቅድመ ወሲድ ሕፃናት ላይ አዲስ አበባ፣ ኢትዮጵያ አዲስ አበባ ውስጥ በሚገኙ ሕፃን የፅኑ ሕክምና ክፍል ውስጥ ላይ” ነው። በአዲስ አበባ ዩኒቨርሲቲ የፕብሊክ ሄልዝ ማስተር ሾፍ ፕብሊክ ሄልዝ በሰብአዊ ስነ-ምግብ ውስጥ የሚያስፈልጉትን ነገሮች በክፍል በማሟላት.

ስዚህ ጥናት እንደ ተሳታፊ ሆነው ተመርጠዋል እና ስተሳትፎዎ ፈቃድ ወይም ፍቃድ ከማግኘትዎ በፊት ከጥናቱ ጋር የተደያዙ ሁሉንም አስፈላጊ መረጃዎች ማወቅ ያስፈልገዎታል. ስስዚህ, ደህ, መረጃ እንደ ዝርዝር ይሆናል

ዓላማ፡ - የአማካሪ(ዎች) ስም፡ - ቢሳል ሸኩር (ኤምዲ፣ ፒኤችዲ) ፣

ያስምወርቅ ጌቴነት (MPH፣ ፒኤችዲ እጩ)

የድርጅቱ ስም፡- አዲስ አበባ ዩኒቨርሲቲ፣ የጤና ሳይንስ ኮሌጅ፣ የህብረተሰብ ጤና ትምህርት ቤት፣ የሰው አመጋገብ ክፍል።

የስፖንሰሩ ስም፡ - አዲስ አበባ ዩኒቨርሲቲ።

ተሳታፊዎች፡ -.

ምስጢራዊነት፡ - ሁሉም የሚሰጡት መረጃ በሚስጥር ይጠበቃል እና ለማንኛውም ሶስተኛ ወገን ተደራሽ አይሆንም። በመረጃ መሰብሰቢያ ቅጹ ላይ ምንም የግል መሰደዎች ጥቅም ላይ አይውሉም።

ስጋቶች፡ - የግል መረጃ ሲሆን ስለሚችል እና ምሽት ሳይኖረው ስለሚችለው በሽታህ ልጠይቅህ እችላለሁ። ነገር ግን፣ ያቀረቡት መረጃ ደህንን ጥናት ለማካሄድ ከፍተኛ ጠቀሜታ ይኖረዋል።

ሂደቶች፡ - በጥናቱ ለመሳተፍ ከተስማሙ፣ ከጥናትና ምርምር ጋር የተደያዙ ጥያቄዎችን እና አራስዎን በተመለከተ አንዳንድ ጥያቄዎችን እንዲመልሱ ይጠየቃሉ። ቃሉ መጠይቁ ከ15-20 ደቂቃ ይወስዳል።

ጥቅማ ጥቅሞች፡ - በዚህ ጥናት ላይ ስተሳትፍዎት ማካካሻ አይሰጥም። ደህን እንጂ በጥናቱ ላይ መሳተፍ እና ለጥያቄዎች መልስ መስጠት በቅድመ ወሲድ ህፃናት ላይ ጡት ማጥባት ምን ያህል እንደሆነ እና በእናቶች እና በጨቅላ ህፃናት ላይ ተደያዥነት ያሳቸውን ምክንያቶች ለመለየት በጣም ይረዳል.

እምቢ የማለት ወይም የመውጣት መብት፡ - በዚህ ጥናት ለመሳተፍ ያቀረቡት ውሳኔ ሙሉ በሙሉ በእርስዎ ላይ የተመሰረተ ነው። መልስ ለመስጠት ምሽት የሚሰማዎትን ማንኛውንም ጥያቄ መመለስ አይጠበቅብዎትም እና በማንኛውም ጊዜ ለማቅም ነፃ ነዎት። ተጨማሪ መረጃ ከፈለጉ ወይም ጥናቱ ሲጠናቀቅ ውጤቱን ማወቅ ከፈለጉ ከዋናው ተመራማሪ ወይም አማካሪ ጋር ብቻ ያግኙ።

የሚያነጋግረው ሰው፡-

የምትጠይቁት ማንኛውም አይነት ጥያቄ ካሎት አባኮትን አግኝኝ።

ዋና መርማሪ

ስም፡ ሃና ሸመልስ

ስልክ ቁጥር፡ +251921735179

ኢሜል፡-

ዋና አማካሪ

ስም፡

ስልክ ቁጥር

ኢሜል፡-

ተባባሪ አማካሪ

ስም

ስልክ ቁጥር

ኢሜል፡-

አሁንም በድጋሚ አመሰግናለሁ!

### አባሪ III: የስምምነት ቅጽ

የጥናቱ ዓላማ ተረድቻለሁ። ጥናቱ በምረዳው ቋንቋ ተብራርቶታል። ጥያቄዎችን የመጠየቅ እድል አግኝቻለሁ እናም ያቀረብኳቸው ጥያቄዎች አጥጋቢ ምሳሌ አግኝተዋል። የጥናቱ አካል ለመሆን በፈቃደኝነት ተስማምቻለሁ እናም በማንኛውም ጊዜ ከጥናቱ የመውጣት መብት እንዳለኝ ተረድቻለሁ።

ተሳታፊ

ፊርማ\_\_\_\_\_ ቀን

ጠያቂ

ስም \_\_\_\_\_ ፊርማ

መጠይቆች ቁጥር \_\_\_\_\_

የቃለ መጠይቁ ቀን \_\_\_\_\_ የመነሻ ሰዓቱ \_\_\_\_\_ ተጠናቀቀ\_\_\_\_\_

አባሪ አንግሊዘኛ የጥያቄ መግለጫ

ክፍል 1 :- ማህበራዊ-ባህሳዊ ባህሪዎች

| ኢስ. አይ | ተለዋዋጮች                              | አማራጭ ምርጫዎች                                                                                | ኮድ | ዝስል |
|--------|-------------------------------------|-------------------------------------------------------------------------------------------|----|-----|
| 1.     | የእናቶች ዕድሜ                           | _____                                                                                     |    |     |
| 2.     | አኩልነት                               | _____                                                                                     |    |     |
| 3.     | የእናት የትምህርት ደረጃ                     | 1. መደበኛ የስውም ትምህርት<br>2. 1-8 ደረጃ<br>3. 9-12 ደረጃ<br>4. ኮሌጅ እና ከዚያ በላይ                      |    |     |
| 4.     | የእናት ሥራ                             | 1. ነጋዴ<br>2. መንግስት ቀጣሪ<br>3. የግል<br>4. በየቀኑ የጉልበት ሰራተኛ<br>5. ስራ አልባ<br>6. ሌላ (ይግለጹ) ----- |    |     |
| 5.     | ልጅዎን ጡት በሚያጠቡበት ጊዜ ከቤተሰብዎ ድጋፍ ያገኛሉ? | 1. አዎ<br>2. አይ                                                                            |    |     |
| 6.     | የኢኢንሲ ክትትል ነበረሸ?                    | 1. አዎ<br>2. አይ                                                                            |    |     |
| 7.     | በANC ክትትል ወቅት ስለ BF ምክር             | 1. አዎ                                                                                     |    |     |

|                                 |                                                   |                                            |  |  |
|---------------------------------|---------------------------------------------------|--------------------------------------------|--|--|
|                                 | አግኝተዋል?                                           | 2. አይ                                      |  |  |
| 8.                              | ከጡት ወተት ውጪ ስጽ formula ሆነ ውህ ወይም ሴቶች ነገሮች ወስደዋል?   | 1. አዎ<br>2. አይ                             |  |  |
| 9.                              | በANC ክትትል ወቅት ልዩ ጡት በማጥገት ላይ ምክር አግኝተዋል?          | 1. አዎ<br>2. አይ                             |  |  |
| 10.                             | ልዩ ጡት በማጥገት ላይ ከNICU ሰራተኞች ምክር አግኝተዋል?            | 1. አዎ<br>2. አይ                             |  |  |
| 11.                             | የጡት ወተት ከሌላው ወተት (የፎርሙላ ወተት፣ ሳም ወተት) ስልጅዎ ጠቃሚ ነው? | 1. አዎ<br>2. አይ                             |  |  |
| 12.                             | ከላይ ላለው ጥያቄ አዎ ከሆነ፣ መረጃውን ከየት አገኙት?               | 1. ሚዲያ<br>2. የጤና አንቀጠካቤ ሠራተኞች<br>3. ማህበረሰብ |  |  |
| <b>ክፍል II. አዲስ የተወለዱ ምክንያቶች</b> |                                                   |                                            |  |  |
| 13.                             | ጾታ                                                | 1. ወንድ<br>2. ሴት                            |  |  |
| 14.                             | የትውልድ ዓይነት                                        | 1. ነጠላ<br>2. ብዙ ልደቶች                       |  |  |

|     |                                |                                                                                           |  |  |
|-----|--------------------------------|-------------------------------------------------------------------------------------------|--|--|
| 15. | የልደት ክብደት                      |                                                                                           |  |  |
| 16. | የወሰዱበት መንገድ                    | 1. ሴስቪዲ<br>2. ሲ/ሴስ<br>3. ማስረከብን ያስገድዳል<br>4. ቫክሮም                                         |  |  |
| 17. | የድህረ-ወሲድ እድሜ                   | (በሰዓት $\leq 3$ ቀናት ፣ በቀን ውስጥ $> 3$ ቀናት ከሆነ)                                               |  |  |
| 18. | የልጅዎ የጤና ሁኔታ ምን ያህል ነው?        | 1. የተረጋጋ<br>2. ፍትሃዊ<br>3. ወሳኝ                                                             |  |  |
| 19. | ልጅዎ ሲጠባ ይችላል?                  | 1. አዎ<br>2. አይ                                                                            |  |  |
| 20. | የጡት ማጥባት ልምድ, የ excl ርዝመት, ቢሴፍ | 1. $< 1$ ወር<br>2. <u>1-4</u> ወራት<br>3. 4 ወራት<br>4. የቀድሞ ሕፃናትን ጡት አታጥቡ<br>5. ስመጅመሪያ ጊዜ እናት |  |  |
|     | እናት ከህፃን ጋር ወደ NICU ገብታለች።     | 1. አዎ                                                                                     |  |  |

|                                 |                                       |                                                                                        |  |  |
|---------------------------------|---------------------------------------|----------------------------------------------------------------------------------------|--|--|
| 21                              |                                       | 1. አይ                                                                                  |  |  |
| 22                              | የመጀመሪያው የጡት ወተት መግለጫ                  | 1. <6 ሰአታት ፒ<br>2. 6-12 ሰዓታት ፒ<br>3. 12-24 ሰዓታት ፒ<br>4. 24-48 ሰዓታት ፒ<br>5. > 48 ሰዓታት ፒ |  |  |
| 23                              | መጀመሪያ የጡት ወተት መጀመር                    | 1. <6 ሰአታት ፒ<br>2. 6-12 ሰዓታት ፒ<br>3. 12-24 ሰዓታት ፒ<br>4. 24-48 ሰዓታት ፒ<br>5. > 48 ሰዓታት ፒ |  |  |
| 24.                             | ከእናት ጋር በ6 ሰአታት ውስጥ ቅዳ-ሰ-ቅዳ ሆነች<br>pp | 1. አዎ<br>2. አይ                                                                         |  |  |
| ክፍል III. ከእርግዝና ጋር የተያያዙ ምክንያቶች |                                       |                                                                                        |  |  |
| 25.                             | የእርግዝና ጊዜ                             | (በሳምንታት ውስጥ)                                                                           |  |  |

አባሪ፡ የዋና መርማሪ ዋስትና

እኔ፣ ከታች የተፈረመኩት ከፍተኛ MPH እጩ ሰምርምር ፕሮጀክቱ ሳይንሳዊ፣ ስነ-ምግባር እና ቴክኒካል ምግባር እንዲሁም አስፈላጊ የአድገት ሪፖርቶችን ለአማካሪዎቼ ለማቅረብ ተስማምቻለሁ እናም በጥናቱ ወቅት ከአማካሪዎቼ አስፈላጊውን ምክር ለማግኘት ተስማምቻለሁ። የአዲስ አበባ ዩኒቨርሲቲ የምርምርና ሕትመት መሥሪያ ቤት ውሎችና ሁኔታዎች።

የዋና መርማሪው ስም፡- ሃና አመልሰ

ፊርማ፡ \_\_\_\_\_

ቀን \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

የአማካሪውን ማፅደቅ

ዋና አማካሪ ስም

ፊርማ \_\_\_\_\_

ቀን \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_