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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEATH SCIENCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF PEDIATRICS AND CHILD HEALTH NURSING

PERINATAL ASPHYXIA AND ASSOCIATED FACTORS AMONG NEONATES ADMITTED AT NEONATAL INTENSIVE CARE UNIT OF SHEIK HASSAN YABARE JIGJIGA UNIVERSITY REFERRAL HOSPITAL, EASTERN ETHIOPIA, 2022.

BY: YAHYE MAHAMED (BSc, MSc Candidate)

A THESIS REPORT SUBMITTED TO THE DEPARTMENT OF PEDIATRICS AND CHILD HEALTH NURSING FOR THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING.

AUGUST, 2022

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY

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DEPARTMENT OF PEDIATRICS AND CHILD HEALTH NURSING

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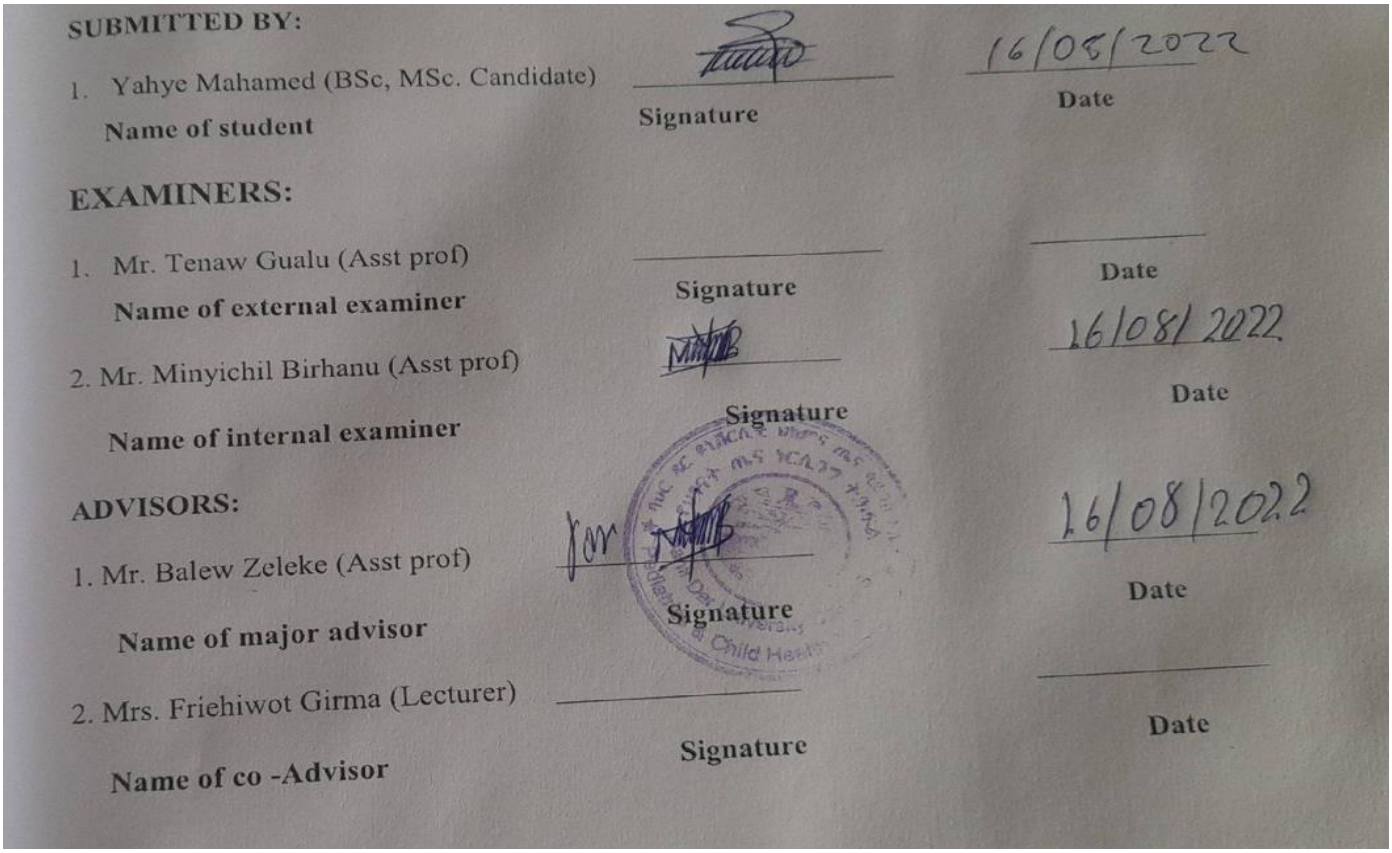
Title of the research	**Perinatal asphyxia and associated factors among neonates admitted at neonatal intensive care unit of Sheik Hassan Yabare Jigjiga University referral hospital, Eastern Ethiopia, 2022.**
Duration of the study	**From May 1/2022 to June 1/2022.**
Study area	**Sheik Hassan Yabare Jigjiga University referral hospital.**
Total cost	**25065.00 ETB.**

APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Yahye Mahamed is accepted in its form by the board of examiners as it fulfills the thesis requirements for the Degree of Masters of Science in Pediatrics and Child Health Nursing.



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ABSTRACT

Background: Globally, perinatal asphyxia is one of the leading causes of neonatal death, and this problem is high in low- and middle-income countries. Perinatal asphyxia accounts about 28% of neonatal deaths/year around the world. In Ethiopia, nearly one third (32%) of the neonatal deaths is caused by perinatal asphyxia. However, there is paucity of data on magnitude of perinatal asphyxia and associated factors in this study area.

Objectives: To assess magnitude of perinatal asphyxia and associated factors among neonates admitted at neonatal intensive care unit of Sheik Hassan Yabare Jigjiga University referral hospital, Eastern Ethiopia, 2022.

Methods: An institutional based cross- sectional study was conducted on a total of 364 samples from May 1, to June 1/2022 in sheikh Hassan Yabare Jigjiga University referral hospital. Data were collected through record review using pre-tested structured check lists. The collected data was entered into Epi-Data version 3.1, and then it was exported to SPSS version 25 for analysis. Descriptive statistics was used to provide an overall and coherent presentation of the data. Hosmer and Lemeshow goodness of fit test were done to test the fitness of the logistic regression. Variables with p-value less than or equal to 0.25 in bivariate analysis was entered to multivariate logistic regression analysis. Odd ratio with 95% Confidence Interval was conducted on variables to determine the strength of association and p-value less than 0.05 was taken as the cut off value to be significant.

Result: In this study the magnitude of perinatal asphyxia was found to be 34.3%. Anemia during pregnancy (AOR: 3.37, 95%CI: 1.80 – 6.29), premature rapture of membrane (AOR: 2.00, 95%CI: 1.07 – 3.74), meconium-stained amniotic fluid (AOR: 6.85, 95%CI: 3.31 – 14.1), and fetal distress (AOR: 2.93, 95%CI: 1.47 – 5.83) were the factors associated with perinatal asphyxia.

Conclusion and Recommendation: The magnitude of perinatal asphyxia in this study was high. The finding of this study also identifies anemia during pregnancy, premature rapture of membrane, meconium-stained amniotic fluid, and fetal distress were predictors of perinatal asphyxia. Therefore, during labor and delivery, for the fetus who is at risk for perinatal asphyxia, the health care providers better to improve their strict follow-up and be ready for neonatal resuscitation.

Key words: Perinatal asphyxia, Magnitude, Associated factor, Jigjiga.

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ABBREVIATIONS AND ACRONYMS

ANC	Antenatal Care
AOR	Adjusted Odds Ratio
APGAR	Appearance, Pulse, Grimace, Activity, Respiratory
APH	Antepartum Hemorrhage
CI	Confidence Interval
C/S	Cesarean Section
EDHS	Ethiopia Demographic Health Survey
HIE	Hypoxic Ischemic Encephalopathy
LBW	Low birth Weight
MSAF	Meconium Stained Amniotic Fluid
MUAC	Mid-Upper Arm Circumference
NGOs	Non-Governmental Organization
NICU	Neonatal Intensive Care Unit
NMR	Neonatal Mortality Rate
PNA	Perinatal Asphyxia
PROM	Premature Rupture of Membrane
SDG	Sustainable Developmental Goal
SPSS	Statistical Package for Social Science
SVD	Spontaneous Vaginal Delivery

1. INTRODUCTION

1.1 Background

Perinatal asphyxia is the failure of the newborn to initiate and sustain adequate breathing immediately after delivery, which is characterized by a marked impairment of gas exchange; if this condition is prolonged, it can lead to progressive hypoxemia, hypercapnia, and significant metabolic acidosis. Severe hypoxia can injure the brain cells and cause potentially fatal conditions, including encephalopathy, mental retardation, seizure, attention deficit hyper sensitivity disorder, epilepsy and cerebral palsy that leads to detrimental long term consequent for both child and family (1). A newborn is asphyxiated, if there are signs of impaired respiration (not breathing or not crying, gasping, and respiratory rate of < 30 breaths per minute) with an APGAR score of less than 7 at the first 5 minutes, also the newborn can be diagnosed as asphyxia, if umbilical cord arterial PH is <7, or there are neurological manifestations (seizure, comma or hypotonic) and multisystem organ dysfunction (cardiovascular, gastrointestinal, hematological, pulmonary or renal system) (2, 3).

Globally, perinatal asphyxia is one of the primary causes of early neonatal mortality, which accounts an estimated 600.000 (24%) neonatal deaths each year (4). Worldwide 2 to 10 per 1000 term newborns develop perinatal asphyxia, and in developed countries the incidence rate of perinatal asphyxia was 2 per 1000 live births, however it is ten times higher in developing countries where there may be insufficient access of maternal and neonatal care (5). According to the World Health Organization report, birth asphyxia is the third leading cause of under-five mortality (11%) after preterm birth (17%) and pneumonia (15%) (6). In low and middle income countries, 53% of all under-five mortality in Latin America, 52% in south Asia and 34% in sub-Saharan Africa are due to preventable causes including birth asphyxia (7). In 2014 less than 0.1% of neonatal mortality were due to prenatal asphyxia in high income countries, where as in low income countries neonatal deaths due to perinatal asphyxia ranged from 4.6/1000 to 26/1000 live births (8). In Africa, 24% of neonatal death were attributed to perinatal asphyxia and in sub-Saharan Africa 280.000 of neonatal deaths are caused by birth asphyxia in the first day of life (9).

Worldwide 3–6% of newborns require bag ventilation to breath at birth, 5–10% needs simple stimulation and <1% of them breath with chest compression, endotracheal intubation, and drugs each year. In Ethiopia perinatal asphyxia is the cause of more than one third of neonatal death (10,11) and nearly 32% of the neonatal deaths in Ethiopia is still accounted for birth asphyxia (12).

Moreover, the effect of PNA is not limited to cause only neonatal death but also has short and long term neurodevelopment sequalae, which are mostly untreatable (13). So, in order to prevent it, training about management of birth asphyxia were established for health care professionals attending labor wards, and also essential equipment and materials are provided to health facilities. Although such strategies were applied by Ethiopia ministry of health, the problem of neonatal death is still high in the country (11).

1.2 Statement of the problem

Globally, 2.4 million children are estimated to die in the first month of life, annually, from these, about one third and around three quarter of neonates die on the day of birth and within the first week of life respectively (14). According to global report, there are around 7000 newborn deaths every day, death of neonates has higher rates when compared to children aged 1-59 months and those who die within the first 28 days of life suffer from problems associated with lack of adequate and quality care at birth and immediately after delivery (14).

Globally, perinatal asphyxia is one of the leading causes of neonatal death particularly in the first week of life, and this problem is high in low- and middle-income countries, 28% of neonatal death is due to prenatal asphyxia each year around the world (15). In the last two decades, the global neonatal death has shown steady decline, but in sub-Saharan Africa (SSA) this decline has been slowest (16). In developing countries, the majority of neonatal deaths are caused by preventable causes such as birth asphyxia and this is associated with significant disabling morbidities among survivors (17).

Perinatal asphyxia has global significance of causing most of the neonatal mortality, in 2015 around 637,000 (23.8%) of neonatal deaths were attributed to perinatal asphyxia globally (18). where as in 2009 more than one million neonatal deaths were caused by asphyxia (19). As of 2014 in developed countries, neonatal mortality attributed to birth asphyxia was less than 0.1% however in developing countries the contribution ranged from 4.6/1000 to 26/1000 live births (8). In Africa, perinatal asphyxia accounts for 24% of the neonatal mortality; and in sub-Saharan Africa, 280,000 of neonatal deaths are caused by birth asphyxia in the first day of life (9).

In Ethiopia, perinatal asphyxia is the cause of more than one third of neonatal death, according to the 2019 Mini-Ethiopian Demographic and Health survey report, the neonatal mortality rate was 30/1000 live births (20), and more than 50% of these deaths occurred in the first day of birth (21). The number of neonatal mortality caused by perinatal asphyxia and birth trauma in Ethiopia decline from 45,965 in 2000 to 28,139 in 2017 (6). However, nearly 32% of the neonatal deaths in Ethiopia are still caused by perinatal asphyxia (12). Studies conducted in different parts of Ethiopia stated that antepartum hemorrhage (22), parity (23), prolonged labor

(24), anemia (25), meconium-stained amniotic fluid (MSAF), preterm birth (22), mode of delivery (26), and pregnancy induced hypertension are factors related to perinatal asphyxia (24).

There are many challenges in Ethiopia that increases the burden of neonatal morbidity and mortality due to perinatal asphyxia including; health care inaccessibility, health worker shortage, lack of knowledge and skill on the management of birth asphyxia, lack of basic pediatric critical care training, low antenatal coverage (30% in Ethiopia), home deliveries and lack of transfer service (27).

Children who survive from Perinatal asphyxia may develop short- or long-term neurological problem which are difficult to treat, studies shows that survivors may develop complications like low cognitive functioning 34.9 %, multi organ failure, neurological disability 28% and hypoxic ischemic encephalopathy (HIE) (28, 29, 30). An experimental study conducted revealed that nearly 25% of the neonates who survived from prenatal asphyxia develop cerebral palsy, neurodevelopment and learning disabilities (31).

Globally, various strategies and intervention have been implemented to decrease the neonatal mortality rates attributed to perinatal asphyxia (32), For instance, the sustainable developmental goal (SDG) planned that all nations in the world targeting to reduce under five mortalities as low as 25 deaths per 1000 live birth and neonatal mortality rate (NMR) at least 12 deaths per 1000 live births (33). This problem could be overcome through better prevention and timely intervention of the three leading causes, prematurity, severe neonatal sepsis, and perinatal asphyxia (34). So, in Ethiopia different strategies and interventions are designed and applied to improve problems of children morbidity and mortality (35). Also, in order to prevent perinatal asphyxia, training about management of birth asphyxia were established for health care professionals attending labor wards, and all the essential equipment and materials are provided to health facilities, however, the burden of perinatal asphyxia is still unacceptably high in the country (11).

Although there are some studies conducted in Ethiopia on the magnitude and associated factors of perinatal asphyxia, it was limited for not including all variables like malaria during pregnancy, which was found to be one of predictors of perinatal asphyxia in other countries, and there are some inconsistent findings on some risk factors of PNA, like prematurity, low birth weight and fetal distress. Moreover there is no report on the magnitude and associated factors of perinatal

asphyxia in the study area, therefore the aim of this study was to identify the magnitude and associated factors of perinatal asphyxia among neonates admitted at neonatal intensive care unit of Sheikh Hassan Yabare Jigjiga University referral hospital.

1.3 Significant of the study

This study is important in adding the wealth of information regarding the magnitude of perinatal asphyxia and it is also important to identify factors predisposing to this condition.

The findings of this study will also give an insight to policy makers on disease patterns among neonates and it will create awareness for the health institutions, NGOs, and as a whole the society to understand about the magnitude perinatal asphyxia and action to be taken to prevent morbidity and mortality due to asphyxia.

Furthermore, since there is no study conducted in this particular area about the magnitude and associated factors of perinatal asphyxia, this study will be used as baseline information for other researchers who might want to conduct a study on related topics.

2. LITRATURE REVIEW

2.1 Magnitude of Perinatal Asphyxia

According to world health organization (WHO), nearly four to nine million neonates develop perinatal asphyxia, annually (36). The magnitude of perinatal asphyxia varies across the world, and countries in Africa, contributes around 50% of total prevalence of perinatal asphyxia (37). Globally, there are studies conducted on the magnitude and determinants of perinatal asphyxia, according to prospective study conducted in southern India stated that from 3130 term babies, 84 of them had perinatal asphyxia; this study also indicated that the incidence of birth asphyxia in term babies was 2.7 % (38). Another retrospective study conducted in Canada revealed that among 698004 live births, 1588 babies develop perinatal asphyxia (39).

A study conducted in Bangladesh reported that 56.9% of overall the magnitude of perinatal asphyxia and 35% of newborn deaths are caused by asphyxia (40). A study conducted in Iran the magnitude of prenatal asphyxia was 1%, according to this study 22% of neonatal deaths are due to asphyxia (41). A study conducted at Dares salaam, Tanzania reported that the overall prevalence of perinatal asphyxia was 21.1 % (42), whereas another study done in Gusau, Nigeria Show the same prevalence of 21.1% (43).

According to a study done on the adherence to guideline on the management of birth asphyxia in Malawi, showed that a magnitude of 6.1% (44). Another retrospective study done in children's clinic of Warri Niger Delta, revealed out of 26,000 neonates, 864of them had birth asphyxia (45). A cross sectional study done at special care baby unit of the specialist hospital in port Harcourt, Nigeria Showed that neonates admitted to the hospital over period of Ten months 29.4% was diagnosed as perinatal asphyxia (46). A related study from Ghana Showed among 468 term neonates, 283 of them was admitted to the neonatal intensive care unit for the sake of perinatal asphyxia (47). Another study done in suburban hospitals of Cameroon stated that from 332 of neonates admitted to the NICU, 14.5% of neonates were diagnosed as perinatal asphyxia from these 47% of them were female and 53 were male neonates (48).

A cross sectional study conducted in Debre-tabor general hospital reported that from 582 newborns, 165 (28.3%) were develop perinatal asphyxia based on this study most of the asphyxiated newborns 130 (78.8%) had moderate asphyxia and 35 (21.2%) newborn had severe

perinatal asphyxia, according to this study 60% of neonates delivered at night time (26). Another study conducted in Tigray region Showed that from 421 neonates, 93 (22%) of them develop perinatal asphyxia based on the APGAR score of less than seven at the first five minute of delivery and among these neonates male to female ratio was 1.07:1 (49).

Institution based cross sectional study done at tertiary level hospital in Harari regional state expressed that the magnitude of perinatal asphyxia was 32.8% among these 109 (42.58%) were male and 147 (57.42%) were female, 23 (8.98%) of neonates were delivered with very low birth weight whereas 97 (37.89%) and 136 (53.13%) were delivered low birth weight and normal birth weight respectively (50). A Study conducted in Jimma medical center on the prevalence of perinatal mortality and associated factors showed 55 deaths per 1000 total deliveries, among these neonates 67.7%, 20.75%, 5.66% and 3.77% of deaths were due prematurity, neonatal sepsis, perinatal asphyxia and congenital malformation respectively (51). A cross sectional study done in Dilla referral hospital, stated that the prevalence rate of perinatal asphyxia was 32.8% from this 48 % of neonates were Male and52% were female (24).

2.2 Associated factors of perinatal asphyxia

2.2.1 Socio-demographic risk factors

Many studies had revealed that perinatal asphyxia is influenced by multiple factors from socio-demographic characteristics of mother, in different studies, educational status of the mother; maternal age and maternal height were significantly associated with perinatal asphyxia (52, 53). A study conducted in Colombia hospital of Universitario, revealed that age of the mother, rural origin, and No education were risk factors of perinatal asphyxia (54). Another study from Naivasha district hospital of Kenya identified that educational level and maternal age has no significant association to develop perinatal asphyxia (55).

A study conducted in Dessie town hospitals on the determinants of birth asphyxia among newborns identified that maternal height ≤153cm (short in stature) and MUAC <23cm were risk factors to develop perinatal asphyxia (56). Another study done in Dire-Dawa showed that maternal age group 15-20 years and illiterate mother are at higher risk of getting asphyxiated

newborn (52). However, a study conducted at Tigray could not find a significant difference in maternal age with asphyxiated newborns (22).

2.2.2 Ante-partum Risk Factors

A case control study conducted in India Stated that ANC follow up visit less than 3 visits, gestational DM, gestational age and hypertension were significant maternal risk factors associated with perinatal asphyxia (57). A study from Bangalore Showed that multiple births, non-attendant for antenatal care, antepartum hemorrhage and vaginal bleeding was associated with higher incidence of prenatal asphyxia (58). Another study on the prevalence and associated factors of birth asphyxia conducted in Bangkok revealed that gestational age ≥ 37 weeks, placenta previa, number of ANC visit < 4 visits, hypertension, were the common maternal risk factors associated with birth asphyxia (59). A study conducted in Indonesia revealed that there was an association between ante partum hemorrhage (APH) and prenatal asphyxia (60).

A study conducted in sub-urban hospitals of Cameroon Showed that 39.5% of mothers with asphyxiated babies did not get ANC flow up and mothers who develop hypertension during pregnancy were common antenatal risk factor associated with this condition (61). Another study from Cameroon stated that preeclampsia, malaria during pregnancy and place of antenatal care, was significant maternal risk factors associated perinatal asphyxia (62).

A cross sectional study conducted in Jimma revealed that newborn whose mothers had no ANC follow up were at increased risk to deliver asphyxiated newborn (63). Another study conducted in Tigray region Showed that antenatal care follow-up, preeclampsia, and anemia, were antenatal risk factors for birth asphyxia (49). However studies conducted in Gondar and Colombia revealed that HIV/AIDS, diabetes Miletus, pregnancy induced hypertension, preeclampsia, and history of abortion had no significant association for prenatal asphyxia (13, 54).

2.2.3 Intra-partum risk factors

Intra-partum related factors are the most predominant factors associated to perinatal asphyxia, accounting for 91% of perinatal asphyxia cases (64). A study conducted in Colombia showed that cesarean section, newborns delivered other health institutions, labor with a prolonged expulsive phase, were associated factors for the development of birth asphyxia (54). Another study from Pakistan revealed that instrumental delivery, vertex delivery, cesarean section (CS),

and premature rupture of membrane were intra-partum risk factors associated with prenatal asphyxia (65).

According a study conducted in India Stated that newborn who delivered by instrumental delivery were six times more to cause perinatal asphyxia and newborn from anemic mother is four times more to develop perinatal asphyxia than newborns from non-anemic mothers (57). A retrospective study conducted in Indonesia showed that preeclampsia and caesarian section were significant risk factors of perinatal asphyxia (60). Another study conducted in civil hospitals of Karachi revealed that breach presentation, prolonged labor, premature rupture of membrane (PROM) and neonates delivered at home had significant association with birth asphyxia (66).

A study conducted in Debre tabor general hospital on the prevalence and determinants of asphyxia neonatorum reported that fetal mal-presentation, premature rupture of membranes, and meconium stained amniotic fluid, were significantly associated with perinatal asphyxia (26). Another study done in Dessie town hospitals revealed that prolonged labor, instrumental delivery and complications during labor were determinants of perinatal asphyxia (56).

2.2.4 Neonatal risk factors

A study done in Bangalore Showed that gestational age of 34 to 37wks, premature delivery, fetal distress and Intra uterine meconium release were significant risk factors of perinatal asphyxia (66). Another study from India revealed that small for gestational age and post maturity were significant risk factors of perinatal asphyxia (67).

A study from Indonesia stated that prematurity, low birth weight (LBW), and post-date delivery were significant fetal factors contributing to perinatal asphyxia (60). A cross sectional study from Malawi identified fetal distress as a significant factor for perinatal asphyxia, according to this study birth weight, gestational age, mal-presentation, and mode of delivery were not significantly associated with perinatal asphyxia% (44).

A cross sectional study conducted in India indicated that male neonates were more likely to develop perinatal asphyxia when compared to female neonates; according to this study newborns who delivered post maturely were less likely to develop perinatal asphyxia (67). A study from Tigray region, gestational age had a significant association and neonates born in gestation age of <37 weeks had 2.2times more to develop perinatal asphyxia when compared to those born in

gestational age ≥37 weeks (22). Another study conducted in Gondar indicated that neonates who had intra-partum fetal distress and low birth weight were at higher risk to develop perinatal asphyxia (13).

2.3 Conceptual Frame Work

This conceptual framework was developed after reviewing different related literatures (13, 22, 52, 56, 59, and 63), the flowing diagram illustrates association between perinatal asphyxia and socio-demographic characteristics of mother, ante-partum related factors, intra-partum related factors and neonatal related factors.

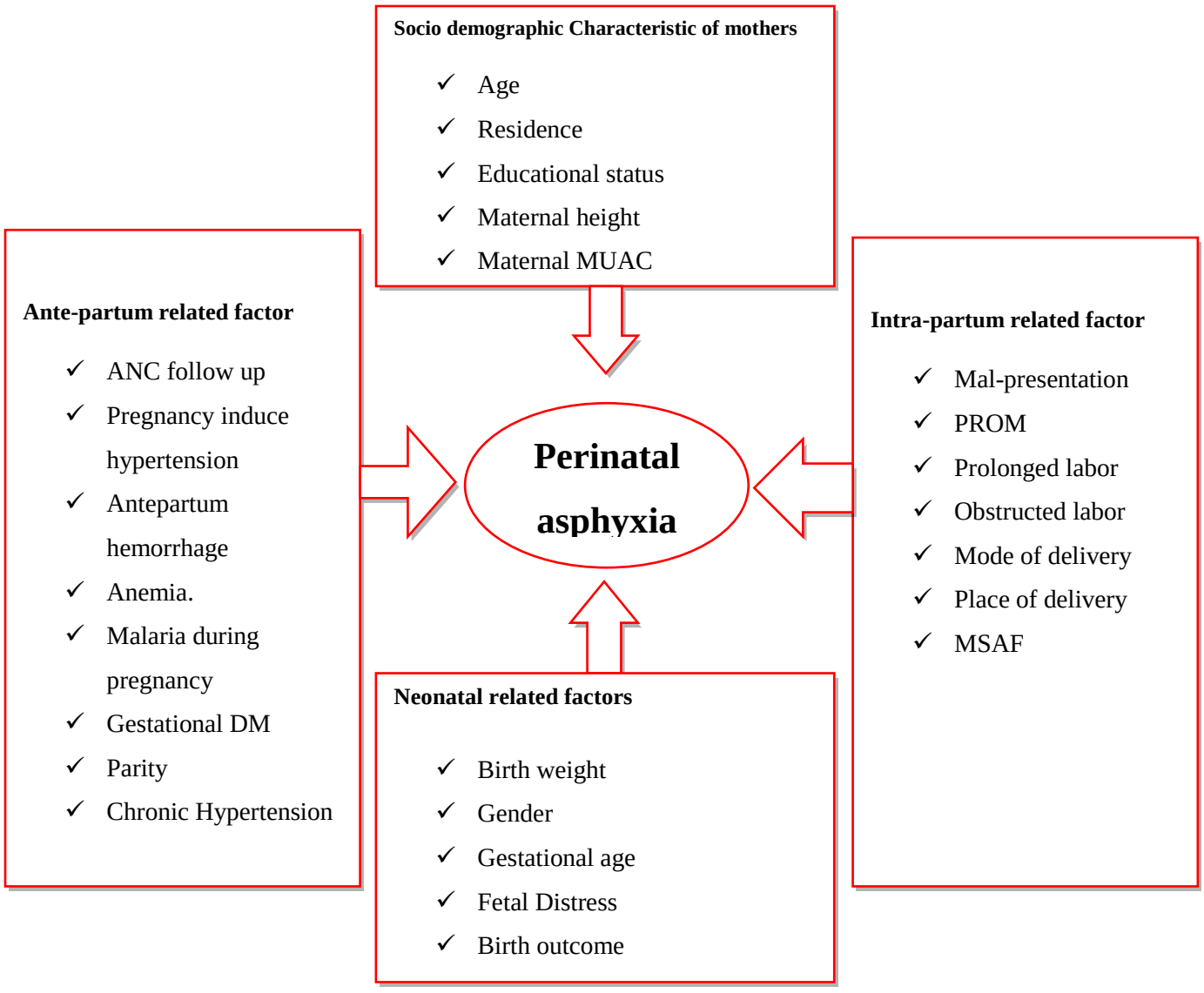

Figure 1: Conceptual framework of perinatal asphyxia and associated factors in Sheik Hassan Yabare Jigjiga University referral hospital, Eastern Ethiopia, 2022 (Source: 13, 22, 52, 56, 59, and 63).

3. OBJECTIVES

3.1 General objective

- ✓ To assess magnitude of perinatal asphyxia and associated factors among neonates admitted at neonatal intensive care unit of Sheik Hassan Yabare Jigjiga University referral hospital, Eastern Ethiopia, 2022.

3.2 Specific objectives

- ✓ To determine magnitude of perinatal asphyxia among neonates admitted at neonatal intensive care unit of Sheik Hassan Yabare Jigjiga University referral hospital.
- ✓ To identify associated factors of perinatal asphyxia among neonates admitted at neonatal intensive care unit of Sheik Hassan Yabare Jigjiga University referral hospital, Eastern Ethiopia.

4. METHODS AND MATERIALS

4.1 Study setting, design, and period

This study is conducted at Sheik Hassan Yabare Jigjiga University Referral Hospital which is located at Jigjiga, the capital city of Somali region and it is found at the distance of 626km away from Addis Ababa, the capital city of Ethiopia. According to 2015 central statistics agency, it is estimated that the total populations of Jigjiga city administration are 426,122 out of which 85,650 are in reproductive age group. The city has 20 Kebeles, constituting 17,001 households, in the city there are one regional and one referral hospitals, also there are three health centers, and eight clinics.

Sheik Hassan Yabare Jigjiga University Referral Hospital (SHYRH), the teaching hospital of Jigjiga University was established in 2017, it's the only referral hospital in Somali region, it offers services at general and specialty levels, the hospital has a total of 342 beds and it gives services to over 7690 hospitalized patients, 38,523 outpatients' 3434 delivery, and nearly 9270 emergency cases each year. The neonatal intensive care unit of the Hospital has 13 beds and it offers diagnostic and treatment service for approximately 1100 babies per year.

An institution based cross- sectional study design was conducted at Sheik Hassan Yabare Jigjiga University referral hospital and the study was conducted from May 1, to June 1/2022.

4.2 Source of Population and Study Population

4.2.1 Source populations

All neonates admitted at NICU of sheik Hassan Yabare Jigjiga University referral hospital.

4.2.2 Study populations

The populations used for this study was records of all selected neonates admitted at NICU of Sheik Hassan Yabare Jigjiga University referral hospital from January1/2018 to January1/2022.

4.3 Eligibility criteria

4.3.1 Inclusion criteria

Records of all neonates admitted at NICU of Sheik Hassan Yabare Jigjiga University referral hospital from January1/2018 to January1/2022.

4.3.2 Exclusion criteria

Chart with Incomplete documentation (no maternal or fetal measurement parameters).

4.4 Sample size determination

The sample size was determined by using single population proportion formula with the following assumptions; prevalence of perinatal asphyxia (32.8%) (50), margin of error between the sample and population=5%, standard normal distribution value at 95% CI, and Z α/2=1.96.

$$n = \frac{(Z\alpha/2)2 \times p(1 - \mathrm{P})}{d2}$$

$$n = \frac{1.96 \times 1.96 \times 0.328 \times 0.672}{0.0025} = 339$$

With a contingency rate of 10%, the final sample size was determined to be 373.

Whereas, n= the required sample size

d=margin of error between the sample and population=5%=0.05

Z=standard normal distribution value at 95% confidence level

Z α/2=1.96 for 95% confidence interval

p=Prevalence perinatal asphyxia

4.5 Sampling procedures

Systematic random sampling method was used to obtain charts of neonates, the "K^{th}" value was calculated by dividing the total number of neonates admitted to NICU within the last four years, to the required sample size (i.e. K=N/n=3810/373=10). The first chart was selected by lottery

method. The data was collected from first chart selected by lottery method and continue in similar pattern until the desired number of samples was obtained.

4.6 Study Variable

4.6.1 Dependent variable

Perinatal asphyxia

4.6.2 Independent variable

Socio demographic variable: Age, residency.

Antepartum related variable: chronic hypertension, Anemia during Pregnancy, gestational diabetes Miletus, Pregnancy induces hypertension, malaria during pregnancy, ANC follow up, Antepartum hemorrhage, and parity.

Intra partum related variable: Obstructed labor, premature rupture of membrane, prolonged labor, place of delivery, Mal-presentation, MSAF, duration of labor, and mode of delivery.

Neonatal related variable: gestational age, birth weight, gender of neonate, fetal distress, and birth outcome.

4.7 Operational definition

Perinatal asphyxia: a neonate in whom his/her condition was declared by the clinicians as perinatal asphyxia.

Meconium-stained amniotic fluid: if the amniotic fluid was green/brown in color or mixed with meconium, or appears meconium stained on the baby,

Mal-presentation: defined as all non-vertex fetal presentation,

Preterm birth: infant born before 37 weeks of gestational age (2).

4.8 Data collection tool and procedures

The data collection instrument of this study was adapted and modified from different literatures (13), (22), (52), (56), and (59). The data were collected through record review using pre-tested structured checklist, which consists of four parts; socio demographic characteristics, antepartum, intra-partum, and neonatal factors.

Medical registration number (MRN) of all admitted neonates to the NICU from January January1/2018 to January1/2022.was sorted then Systematic random sampling was applied to select the charts of neonates. Finally, necessary information of neonates was collected by reviewing from their medical records. In order to get maternal variables; maternal record chart was traced.

Two health professionals with BSc degree nurse and one supervisor with MSc degree nurse who have experience in data collection was recruited and trained for data collection and supervision.

4.9 Data Quality control

To keep data quality, supervisor and data collectors were trained on how and what information they should collect from the targeted data sources. Data extraction form was checked prior to data collection and Pretest was done on 5% of the study samples at Sheik Hassan Yabare Jigjiga University referral hospital. After the pretest necessary corrections was done on the check list. During data collection period, Completeness of the collected data was checked on daily basis and prompt feedback was given by the supervisors and principle investigator. Besides this, the principal investigator was carefully enter and thoroughly cleaned the data before the commencement of the analysis.

4.10 Data processing and analysis

The collected data were checked for its completeness, and the responses were entered and coded into Epi-Data version 3.1. Then, data was exported to SPSS version 25 for analysis. Descriptive statistics was used to provide an overall and coherent presentation of the data. Hosmer and Lemeshow goodness of fit test were done to test the fitness of the logistic regression in the final model. Variables with 95% confidence interval and P- value less than or equal to 0.25 in bivariable analysis was entered to multivariable logistic regression analysis to see the relative

effect of confounding variables and interaction of variables. Odd ratio with 95% CI was conducted on variables to determine the strength of association. P -value less than 0.05 was taken as the cut off value to be significant. Finally, findings of the study were presented on tables, charts, and graphs.

4.11 Ethical Considerations

Ethical clearance was obtained from, the institutional review board of Bahir Dar university with the protocol number of 400/2022. After the approval of the proposal the permission letter was written to sheik Hassan Yabare Jigjiga University referral hospital for data collection. To keep the confidentiality all collected data was coded and locked in a separate room before entered in to the computer. After entered to the computer the data was locked by password, names and unique card numbers was not include in data collection format and the data was not have disclosed to any person other than principal investigator. All information collected from patients' cards was kept strictly confidential.

4.12 Dissemination plan

The results of the study will be submitted to Department of Pediatrics and child Health Nursing, college of Medicine and Health Science, Bahir Dar University. The findings will also be submitted to Sheik Hassan Yabare Jigjiga University referral hospital, and other organizations working on this area to be used as a baseline for intervention. The study abstract will be submitted to associations like Ethiopian Public Health Association and other international associations to present the results of the research during continuous medical education events or conferences organized by those associations. And if possible the result of this study will be published to the international and national peer reviewed journal.

5. RESULT

5.1 Socio-demography Risk Factors

A total of 373 neonate's medical records were collected using systematic random sampling technique and 364 (97.6%) neonate's medical records had complete data whereas 9 (2.4%) charts were omitted due to incomplete data. More than half of the respondents, 252 (69.2%) were urban residents. The mean maternal age was 28.10 (SD: ± 5.98) years of whom about one third, 124 (34.1%) were in the age group of 25 – 29 (Table 1).

Table 1: Socio-demographic characteristics of the mothers of the neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

Variable	Category	Frequency	Percentage
Age	≤19	20	5.5
	20 - 24	82	22.5
	25 - 29	124	34.1
	30 - 34	92	25.3
	≥35	46	12.6
Residence	Rural	112	30.8
	Urban	252	69.2

5.2 Ante-partum Risk Factors

Most of the mothers 252(69.2%) were multiparous, and the mean parity of the mothers was 3.35 (SD: ±2.36). Regarding the antenatal care visits, more than half of the mothers 224(61.5%) had antenatal care visits at public hospitals 137(61.2) and health centers 66(29.4%). However, only less than half of these mothers (43.3%) had four antenatal care visits, moreover the mean number of ANC visits were 3 (SD: ±1.03) times. the medical illness that occurs during pregnancy, anemia accounted for the highest proportion 131(36%) followed by antepartum hemorrhage 95(26.1%), preeclampsia/eclampsia 88(24.2%), malaria 70(19.2%), chronic hypertension 43(11.8%) and gestational diabetes mellitus 30(8.2%) (Table 2).

Table 2: Ante-partum related characteristics of the mothers of the neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

Variable	Category	Frequency	Percentage
Parity	Primipara	112	30.8
	Multipara	252	69.2
ANC visit	No	140	38.5
	Yes	224	61.5
Number of ANC visit	<4 Times	127	56.7
	4 Times	97	43.3
Place of ANC visits	Health center	66	29.4
	Private clinic	21	9.4
	Hospital	137	61.2
Anemia	No	233	64.0
	yes	131	36.0
Preeclampsia/eclamsia	No	276	75.8
	yes	88	24.2
Chronic Hypertension	No	321	88.2
	yes	43	11.8
APH	No	269	73.9
	yes	95	26.1
Gestational DM	No	334	91.8
	yes	30	8.2
Malaria during pregnancy	No	294	80.8
	yes	70	19.2

Abbreviations: ANC= antenatal care, APH= ante-partum hemorrhage, DM= diabetes mellitus.

On the other hand the proportion of anemia among mothers with asphyxiated neonates was higher than those mothers with not asphyxiated babies (figure 2).

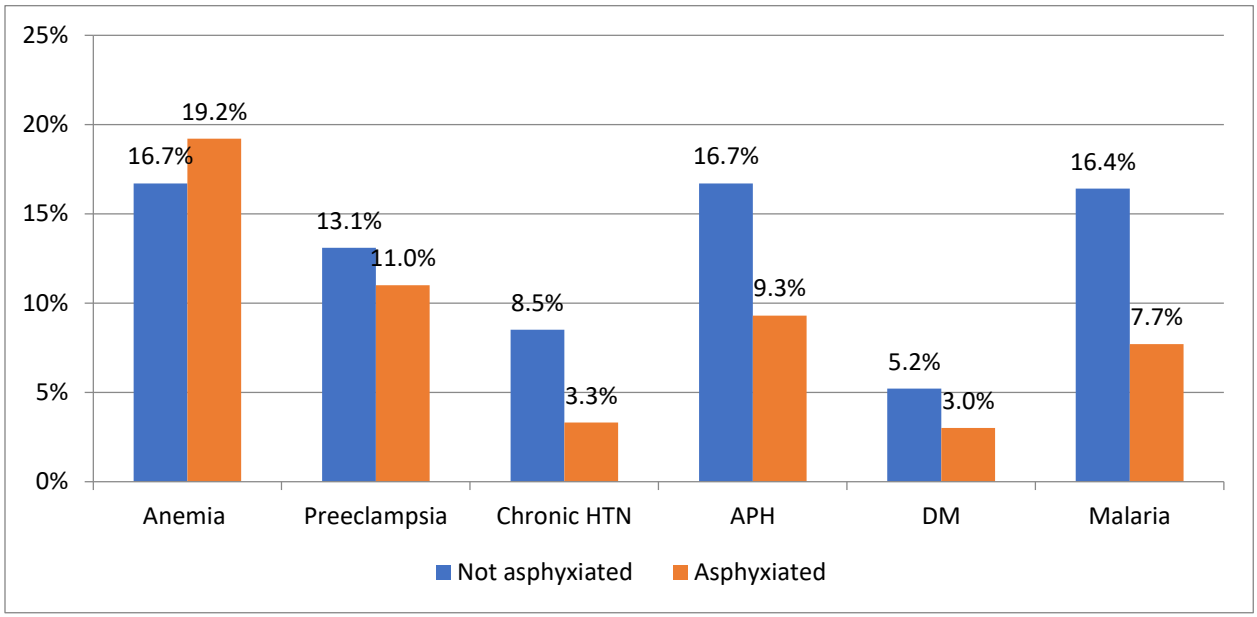

Figure 2: Distribution with history of medical illness during pregnancy among mothers of the neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

5.3 Intra-partum risk factors

Most of the mothers 230 (63.2%) were delivered through spontaneous vaginal delivery, regarding presentation of the fetus, 302 (83%) their presentation were vertex, and 282 (77.5%) of the mothers delivered at public hospitals. With respect to membrane status 215 (59%) mothers had intra-partum rapture of membrane, while the remaining 149 (40.9%) mothers developed premature rapture of membrane (PROM). About ninth (24.7%) of the mothers had developed obstructed labor and nearly half of the mothers 170 (46.7%) was obtained to the presence of prolonged labor, whereas meconium stained amniotic fluid was observed about one third of the mothers 136(37.4%) (Table 3).

Table 3: Intra-partum related characteristics of the mothers of the neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

Variable	Category	Frequency	Percentage
Mode of Delivery	SVD	230	63.2
	C/S	85	23.4
	Instrumental	49	13.5
Presentation	Vertex	302	83.0
	Mal-presentation	62	17.0
Place of Delivery	Home	25	6.9
	Health center	29	8.0
	Private clinic	28	7.7
	Hospital	282	77.5
PROM	No	215	59.1
	yes	149	40.9
Obstructed Labor	No	274	75.3
	yes	90	24.7
MSAF	No	228	62.6
	yes	136	37.4
Prolonged Labor	No	194	53.3
	yes	170	46.7

Abbreviations: C/S= cesarean section, MSAF= meconium stained amniotic fluid, PROM= premature rapture of membrane, SVD= spontaneous vaginal delivery.

5.4 Neonatal risk factors

Out of the total newborn babies, more than half 196(53.8%) of the neonates were males. The mean gestational age of the neonates was 37.7(SD: ±1.61) weeks and more than three quarters of the neonates 285(78.3%) were term. Moreover the mean birth weight were 2.81 (SD: ±0.64) kilograms and about one quarter 89(24.5%) had low birth weight. Regarding pregnancy type, there were 37(10.2) twin newborns (Table 4).

Table 4: Neonatal related characteristics of neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

Variable	Category	Frequency	Percentage
Sex of the neonate	Male	196	53.8
	Female	168	46.2
Gestational Age	<37 weeks	79	21.7
	≥37 weeks	285	78.3
Birth Weight	<2.5kg	89	24.5
	>=2.5kg	275	75.5
Fetal Distress During Labor	No	215	59.1
	yes	149	40.9
Pregnancy Type	Single	327	89.8
	Twin	37	10.2

5.5 Clinical status of neonates

According to the 5^{th} minute APGAR score 123(33.8) of neonates had less than seven, whereas 218(59.9%) and 23(6.3%) had greater than seven and unknown APGAR score respectively (Table 5).

Table 5: Clinical status of neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

Variable	Category	Frequency	Percentage
APGAR score at 1st Minute	≥7	159	43.7
	<7	182	50.0
	Unknown	23	6.3
APGAR score at 5th Minute	≥7	218	59.9
	<7	123	33.8
	Unknown	23	6.3

5.6 The magnitude of perinatal asphyxia

The magnitude of perinatal asphyxia among neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital was found to be 34.3% (95% CI 29.5% - 39.5%) (Figure 3).

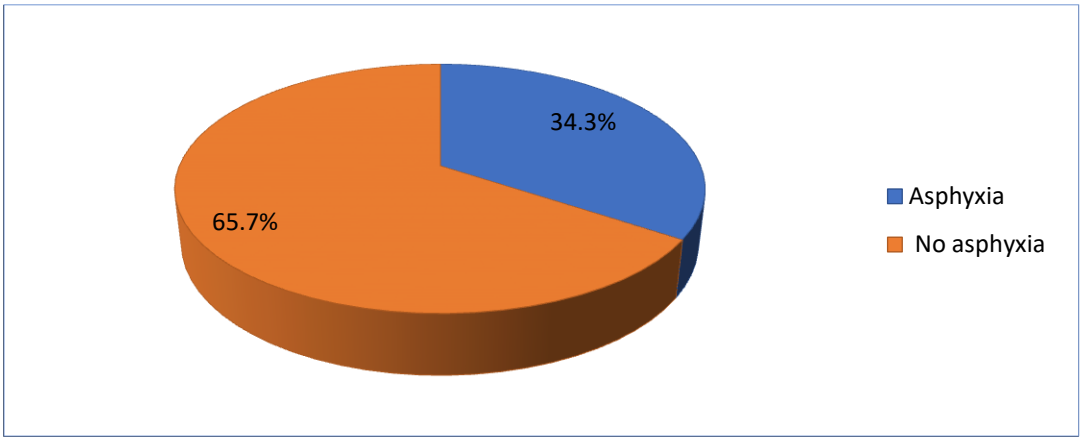

Figure 3: Magnitude of perinatal asphyxia among neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

5.7 Factors associated with perinatal asphyxia

Bivariable analysis was done to select the possible risk factors of perinatal asphyxia and variables with p-value less than 0.25 were included in multivariable analysis. In bivariable analysis, place of resident, antenatal care, anemia during pregnancy, preeclampsia/eclampsia, mode of delivery place of delivery, premature rapture of membrane, obstructed labor, meconium-stained amniotic fluid, prolonged labor, gestational age, birth weight, and fetal distress during labor were selected to enter in the multivariable logistic regression. After an adjusted for possible effect of confounded variable, anemia during pregnancy (AOR: 3.37, 95%CI: 1.80 – 6.29), premature rapture of membrane (AOR: 2.00, 95%CI: 1.07 – 3.74), meconium-stained amniotic fluid (AOR: 6.85, 95%CI: 3.31 – 14.1), and fetal distress (AOR: 2.93, 95%CI: 1.47 – 5.83) were the factors associated with perinatal asphyxia.

Neonates born to mothers who had anemia during pregnancy were 3 times more likely to develop perinatal asphyxia as compared to neonates from mothers without anemia (AOR: 3.37, 95%CI: 1.80 – 6.29). Newborns from mothers with premature rapture of membrane were 2 times more likely to suffer from perinatal asphyxia as compared to those with intra-partum rapture of membrane (AOR: 2.00, 95%CI: 1.07 – 3.74). Neonates delivered with meconium-stained amniotic fluid were nearly 7 times (AOR: 6.85, 95%CI: 3.31 – 14.1) more likely to develop perinatal asphyxia than those delivered with clear amniotic fluid. Neonates who had fetal distress during labor were 2.93 times more likely to have perinatal asphyxia when compared with their counterparts (AOR: 2.93, 95%CI: 1.47 – 5.83) (Table 6).

Table 6: Factors associated with perinatal asphyxia among neonates admitted at NICU of Sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia, 2022.

Variables	Perinatal Asphyxia		COR (95% CI)	AOR (95% CI)	P-value
	No	Yes			
Resident					
Rural	83	29	0.57 (0.35, 0.93)	0.63 (0.31, 1.27)	0.201
Urban	156	96	1	1	
ANC visit					
No	104	36	0.52 (0.33, 0.83)	0. 63 (0.32, 1.25)	0.186
yes	135	89	1	1	
Anemia					
No	178	55	1	1	
Yes	61	70	3.71 (2.35, 5.87)	3.37 (1.80, 6.29)	**0.000**
Preeclampsia/eclamsia					
No	191	85	1	1	
Yes	48	40	0.53 (0.33, 0.87)	1.08 (0.52, 2.21)	0.834
Mode of delivery					
SVD	162	68	1	1	
C/S	46	39	2.02 (1.21, 3.37)	2.01 (0.95, 4.22)	0.067
Instrumental	31	18	1.39 (0.72, 2.64)	1.33 (0.53, 3.32)	0.534
Place of Delivery					
Home	21	4	0.32 (0.11, 0.97)	0.61 (0.13, 2.84)	0.527
Health center	22	7	0.52 (0.21, 1.25)	0.75 (0.21, 2.62)	0.656
Private clinic	22	6	0.44 (0.17, 1.12)	0.52 (0.16, 1.68)	0. 278
Hospital	174	108	1	1	
PROM					
No	164	51	1	1	
Yes	75	74	3.17 (2.02, 4.97)	2.00 (1.07, 3.74)	**0.029**

Table 6: Continued.

Obstructed labor					
No	198	76	1	1	
Yes	41	49	3.11 (1.90, 5.09)	1.12 (0.51, 2.48)	0.775
MSAF					
No	199	29	1	1	
Yes	40	96	16.4 (9.63, 28.1)	6.85 (3.31, 14.1)	**0.000**
Prolonged labor					
No	162	32	1	1	
Yes	77	93	6.11 (3.76, 9.92)	1.57 (0.78, 3.16)	0.204
Gestational Age					
<37 weeks	63	16	0.41 (0.22, 0.75)	0.33 (0.09, 1.13)	0.078
≥37 weeks	176	109	1	1	
Birth Weight					
<2.5kg	69	20	0.47 (0.27, 0.82)	1.77 (0.54, 5.78)	0.343
≥2.5kg	170	105	1	1	
Fetal Distress					
No	182	33	1	1	
Yes	57	92	8,90 (5.41, 14.6)	2.93 (1.47, 5.83)	**0.002**

Abbreviations: ANC= antenatal care, AOR= Adjusted Odds Ratio, CI= Confidence Interval, COR= crude odds Ratio, C/S= cesarean section, MSAF= meconium stained amniotic fluid, PROM= premature rapture of membrane, SVD= spontaneous vaginal delivery.

6. DISCUSSION

The magnitude of perinatal asphyxia in the current study was 34.3% (95%CI 29.5% - 39.5%). This study is consistent with studies conducted in Dilla (32.8%) (24), Harar (32.8%) (50), and Jimma (32.9%) (63).

The finding of this study is higher than studies conducted in Dire Dawa (2.5%) (52), Iran (1%) (41), Tanzania (21.1%) (42), Nigeria (21.1%) (43), and Malawi (6.1%) (44). This high rate of PNA could be explained by the fact that this hospital is the only referral hospital located in Somali region where complicated cases are referred from different health institutions of the catchment area. However, this study found a lower prevalence of perinatal asphyxia as compared to studies conducted in Bangladesh and Ghana which were prevalence of 56.9% and 61.8% respectively (40, 47). This discrepancy might be due to the difference in the study population, different geographical regions, as well as different context in different countries.

The finding of this study revealed that Neonates born to mothers who had anemia during pregnancy were 3 times more likely to develop perinatal asphyxia as compared to neonates from mothers without anemia; this finding is consistent with other study conducted in Tertiary Care Level Hospital of Harar and rural district of Pakistan (50, 65). Anemia during pregnancy has adverse effect in fetal development and complicates the birth, thus proper antenatal care follow up of mothers and prompt treatment after diagnosis of anemia will improve this condition (68).

Newborns from mothers with premature rapture of membrane were two times more likely to suffer from perinatal asphyxia as compared to those with intra-partum rapture of membrane.

A similar result was obtained in a previous study conducted in Ethiopia (26), Tanzania (42), Ghana (47), and Pakistan (65). The possible explanation of this is when premature rapture of membrane occurred, spontaneous gush of amniotic fluid happens along with umbilical cord prolapse which is accompanied with cord compression. Moreover, if premature rupture of membranes prolonged, it usually facilitates maternal systemic infections and neonatal sepsis, which often ensued by subsequent perinatal asphyxia (68). Thus, mothers with premature rupture of membranes should be provided with emergency obstetric care and they should be given prophylactic antibiotics to prevent maternal and neonatal infections. Digital vaginal examinations should also be kept as minimal as possible to reduce the risk of ascending genital infections.

This study showed that meconium stained amniotic fluid was statistically significant associated factor with perinatal asphyxia. Neonates delivered with meconium-stained amniotic fluid were nearly 7 times more likely to develop perinatal asphyxia than those delivered with clear amniotic fluid. This finding is in line with other studies that reported meconium stained amniotic fluid was found to be a risk factors for perinatal asphyxia in Dilla (24), India (38), Ghana (47) and Pakistan (65). This could be explained by the fact that meconium stained amniotic fluid results intra-partum inhalation of meconium, which could fill smaller airways and leads to mechanical obstruction of airways, surfactant inactivation, lung inflammation and limited lung movement, then as a result of limited gas exchange perinatal asphyxia could occur (69), hence to minimize the incidence of perinatal asphyxia, if meconium stained amniotic fluid is observed during delivery, immediate endotracheal meconium suction could reduce the risk of perinatal asphyxia.

In this study fetal distress during labor was other significant factor associated with perinatal asphyxia, neonates who had fetal distress during labor was found to be asphyxiated when compared to their counterparts. This finding was compatible with other studies from Bangkok (66), Malawi (44), and Gondar (13). The possible explanation of this is fetal distress occurs when the fetus does not get enough amount of oxygen during pregnancy or labor, so this can lead to difficult to initiate and sustain breathing after birth (69).

7. STRENGTH AND LIMITATION OF THE STUDY

7.1 Strength of the study

- Medical records of neonates and their mothers were properly handled and most of the information related to perinatal asphyxia was obtained.
- This is the first perinatal asphyxia study in this hospital and it was able to show the magnitude and associated factors of perinatal asphyxia.

7.2 Limitations of the study

- Despite, the above mentioned strengths this study has some limitations, the study conducted retrospectively and it was relied on medical records of the neonates, hence, recorded data on some socio-demographic characteristics (educational status of mothers, maternal height and maternal MUAC) were not recorded in the charts and these variables were not integrated in this study.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

The magnitude of perinatal asphyxia in this study was high. The finding of this study also identifies, anemia during pregnancy, premature rapture of membrane, presence of meconium-stained amniotic fluid, and fetal distress were associated factors of perinatal asphyxia.

8.2 Recommendations

According to the findings from this study, the following important recommendations are forwarded to different stakeholders;

For health institution:

- ✓ Health care providers who are working at antenatal care service would have better to increase their attention and their advice for the pregnancy mothers regarding the prevention and signs of anemia and the necessity of immediate treatment to prevent perinatal asphyxia and other complications.
- ✓ During labor and delivery, for the fetus whose at risk for perinatal asphyxia (delivered from anemic mothers, mothers with premature rapture of membrane, meconium stained amniotic fluid and fetal distress), the health care providers better to improve their strict follow-up and be ready for neonatal resuscitation, also mothers should be monitored with partograph during labor.
- ✓ The health care providers would have to increase the monitoring of fetal heart rate and make an early decision while the fetus is in distress and they should provide follow up during labor and delivery.

Ministry of health and regional health Bureau:

- ✓ The ministry of health and regional health bureau should ensure continues and timely supply of iron and folic acid to prevent anemia during pregnancy.

For researchers:

- ✓ Researchers who are interested to conduct research on perinatal asphyxia should include qualitative approach to investigate in detail on extra determinant factors of perinatal asphyxia.

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ANNEXES

ANNEXES 1: Information Sheet

Bahir Dar University, College of Medicine and Health Sciences.

Here, I the undersigned, at Bahir Dar University, College of Medicine and Health Sciences, currently I am undertaking research on the topic entitled with prenatal asphyxia and associated factors among neonates admitted at neonatal intensive care unit of sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia. The aim of the study is to identify the magnitude and associated factors of perinatal asphyxia among neonates admitted at neonatal intensive care unit of Sheikh Hassan Yabare Jigjiga University referral hospital. So this form is prepared to make the concerned body clear about the purpose of the research, data collection procedure and get permission to conduct the research.

Purpose of the study: To assess magnitude of prenatal asphyxia and associated factors among neonates admitted at neonatal intensive care unit of sheik Hassan Yabare Jigjiga university referral hospital, Eastern Ethiopia

Benefits and risk of the study:

Benefits: this research has no direct benefit for patients whose record number include in the study but mostly has benefit for care planer, manager and for hospital community. If program planner preparing predicted plan, there is indirect benefit for clients in the program of getting appropriate care and treatment service for newly admitted neonates.

Risks: As the study will conduct through review of medical records, the individual patients will not be subjected to any harm, the name and any identifying information of the patient will not be recorded on the checklist and all the information is collected from chart of the patient.

Confidentiality: All information taken by the chart is strictly confidential and kept in safe place. Its confidentiality reassured by the data on the chart will be collected without the name of the client. All information collected for this research will be kept confidentially and will not be revealed to anyone except for investigators.

Address of the principal investigator:

Name: Yahye Mahamed (BSc, MSc. Candidate)

Phone number: +251943009932

E-mail: yahyemahamed86@gmail.com

ANNEXES 2: Hospital Consent Form

This study will be conducted at Sheikh Hassan Yabare Jigjiga University referral hospital. The objective of this study is to evaluate magnitude of prenatal asphyxia and associated factors among neonates admitted to neonatal intensive care unit. Such type of study expected to have good feedback for future patient care. This study will not be done without cooperation of the hospital. Therefore, the hospital's participation and collaboration is very much helpful in generating the required information and will be very much appreciated.

In this study data will be collected from the patient's chart retrospectively. Information regarding any specific personal identifiers like the name of the clients will not be collected. In addition, confidentiality of any personal information will be maintained throughout the study process and no unauthorized access to the information is allowed, the hospital has all the right to refuse to participate in this study and shall withdraw from the study at any time.

If you would like to participate in this study, would you please confirm it by signing here?

Thank you very much

Participant: _____ Principal investigator: _____

ANNEXES 3: Data collection Checklist

The data will be collected from selected medical cards of neonates admitted at NICU of sheik Hassan Yabare Jigjiga university referral hospital from January 01/2018 to January 01/2022 accordingly. This checklist was adopted and modified from literatures.

Code of neonate: _____/_____

Part I - Socio demographic characteristics of the mother			
No.	Questions	Response	Skipping
101	Age of the mother in years?	_____ (years).	
102	Residence?	1. Rural 2. Urban	
Part II: Antenatal related factor			
201	Parity?	_____ In number.	
202	Did the mother visit health facility for ANC during the current pregnancy?	1. Yes 2. No	If no skip to Q 205.
203	How many times of ANC follow up did the mother has?	_____ In number.	
204	Where did the mother attend for ANC follow up?	1. Health center 2. Private clinic 3. Hospital 4. Others, specify____	
205	Did the mother suffer from any of these Complication/illnesses during the current pregnancy?		
	Anemia?	1. yes 2. No	

	Preeclampsia/eclampsia?	1. yes 2. No	
	Chronic hypertension?	1. yes 2. No	
	Ante partum hemorrhage (APH)?	1. yes 2. No	
	Gestational Diabetes mellitus?	1. yes 2. No	
	Malaria during pregnancy?	1. yes 2. No	
	If other, specify	_____	
Part III: intra partum related factors			
301	Mode of delivery	1. SVD 2. C/S 3. Instrumental 4. Others, specify____	
302	What was presentation of the fetus?	_____	
303	Place of delivery?	5. Home 6. Health center 7. Private clinic 8. Hospital 9. Others, specify____	
304	Was the mother diagnosing for any of the following?		
	PROM?	1. Yes 2. No	

	Obstructed labor?	1. Yes 2. No	
	Meconium stained amniotic fluid?	1. Yes 2. No	
	Prolonged labor?	1. Yes 2. No	
Part IV: variable related with Neonate			
401	Gender?	1. Male 2. Female	
402	Gestational age?	_____ in weeks	
403	Birth weight in kg?	_____Kg	
404	Fetal distress during labor?	1. Yes 2. No	
405	Did the baby asphyxiated?	1. Yes 2. No	
406	APGAR score at one minute?	_____	
407	APGAR score at five minutes?	_____	
408	Birth outcome?	1. Single 2. Twin 3. Triple and above	