

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

**MAGNITUDE OF PERINATAL ASPHYXIA AND
ASSOCIATED FACTOR AMONG NEONATES ADMITTED AT
NEONATAL INTENSIVE CARE UNIT OF WORABE
COMPREHENSIVE SPECIALIZED HOSPITAL SOUTH
ETHIOPIA, 2020.**

BY: SEIFU AWGCHEW MAMO (BSc Nurse)

**A THESIS SUBMITTED TO THE DEPARTMENT OF NURSING,
SCHOOL OF NURSING AND MIDWIFERY, COLLEGE OF HEALTH
SCIENCE ADDIS ABABA UNIVERSITY FOR THE PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER'S OF SCIENCE IN PEDIATRICS AND CHILD HEALTH
NURSING.**

JUNE 2020

ADDIS ABABA, ETHIOPIA

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ADDIS-ABABA ETHIOPIA**

APPROVAL SHEET

ADDIS ABABA UNIVERSITY

COLLEGE HEALTH SCIENCE SCHOOL OF NURSING AND MIDWIFERY

I, the undersigned MSc student, declare that I have submitted my original work on a title Magnitude of Perinatal Asphyxia and Associated Factor among Neonates Admitted at Neonatal Intensive Care Unit of Worabe Comprehensive Specialized Hospital South Ethiopia, 2020.

Submitted by:

Seifu Awgchew Mamo _____ June /2020

Name of investigator Signature Date

This thesis work has been submitted to the school of graduate studies of Addis Ababa University, college of health science, school of nursing and midwifery with my approval as an advisor.

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APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Seifu Awgchew Mamo is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters in pediatrics and child health nursing.

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DECLARATION

I the undersigned declare that, this thesis is my original work, has not been presented for a degree in this or any other University and all sources of materials used for this thesis have been recognized through citation. Every effort has been made to avoid plagiarism in the preparation of this thesis.

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ABBREVIATIONS AND ACRONYMS

ANC	Antenatal care;
APGAR	Appearance, Pulse Rate, Grimace, Activity, Respiration Rate
APH	Antepartum hemorrhage
CBNC	Community Based Newborn Care
C/S	Cesarean section
DM	Diabetic mellitus
EDHS	Ethiopian Demographic and Health Survey
GA	Gestational age
ICCM	Integrated Community Case Management
LBW	Low birth weight
MCH	Maternal and child health
MCHIP	Motheral and chld health integration progarm
MSA	Meconium-stained amniotic fluid
NICU	Neonatal intensive care unit
NMR	Neonatal mortality rate
PMR	Perinatal mortality rate
PROM	Premature rupture of membrane
SDG	Sustainable development goals
SNNPR	South Nations Nationalities Peoples
SVD	Spontaneous vaginal delivery
WCSH	Worabe Comprehensive Specialized Hospital

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ABSTRACT

Back ground: World Health Organization (WHO) defines birth asphyxia as failure to initiate and sustain breathing during birth. Apgar score is 0-3 for longer than 5 minute lead to developing multisystem organ dysfunction including cardiovascular, neurological, gastrointestinal, pulmonary, and renal system. The aim of this study is to Asses magnitude of prenatal asphyxia and associated factors in admitted neonates at NICU of Worabe Comprehensive Specialized Hospital from January 1/2016 to December 31/2019, Silete zone, South Ethiopia 2020. Facility based retrospective cross-sectional study was conducted from March to April 2020 (by reviewing neonates chart from January1/2016 to December 31/2019). Data was collected through record review using pre-tested structured check lists. Systematic sampling technique was used. The data was entered into statistical software Epi-data version 3.1 up on creating the questionnaire template in the QES file of the software Factors associated with perinatal asphyxia among admitted neonates were determined using bivariate and multivariate logistic regression models. Statistically significant associations were declared at $P \leq 0.05$. Permission secured at all level. Pre-test was conducted on 5% of sample before the starting of actual data. The collected data checked daily for completeness and no personal identifiers were used on data collection form. The result of this study shows medical records of 311 neonates were reviewed to give prevalence rate of 41.2%.85 (66.4%) of male and 43 (33.59%) of female were developed perinatal asphyxia. Preeclampsia during pregnancy (AOR= 6.2, 95%CI :3.1- 12.3), antepartum hemorrhage (AOR= 4.5, 95%CI:2.3-8.6), gestational diabetes mellitus (AOR= 4.2, 95%CI:1.9-9.2), premature rapture of membrane (AOR= 2.5, 95%CI:1.33-4.7) fetal distress (AOR= 3,95%CI:1.3-7.0) and meconium stained amniotic fluid(AOR= 7.7, 95%CI : 3.1-19.3) were factor significantly associated with perinatal asphyxia. The study conclude that Preeclampsia, antepartum hemorrhage; Gestational diabetes mellitus, premature rapture of membrane; Intra uterine meconium release and fetal distress during labor were associated factors for perinatal asphyxia. The institution should give emphasis on care of mother and the new born in actively detecting and managing perinatal asphyxia.

Key words: perinatal asphyxia, magnitude, NICU, associated factor, WCSH.

CHAPTER ONE

1. INTRODUCTION

1.1. Background

World Health Organization defines birth asphyxia, failure to initiate and sustain breathing during birth(1).Main characteristics of prenatal asphyxia include marked impairment of gas exchange; if it is not managed early which leading to metabolic acidosis ,hypercapnia and progressive hypoxemia (2).

Apgar score is used to measure and diagnose birth asphyxia which is universally accepted on the basis that low score. One minute Apgar score determines how well the baby tolerated the breathing process and five-minute could predict survival and used to diagnose prenatal asphyxia. Apgar score is 0-3 for longer than 5 minute lead to developing multisystem organ dysfunction including neurological, cardiovascular, pulmonary, and renal system. Prenatal asphyxia cases are more associated with antepartum factors and intrapartum insults, there for the major clinical manifestation of perinatal asphyxia results from a combination of hypoxia and ischemia of the brain and other vital organs(3).

Prenatal asphyxia is the leading cause of neonatal death in the world after infections and prematurity. In developing countries annually 4 million neonatal deaths occur, from these birth asphyxia accounts 23%. According to World health organization statistic in developing country every year 120 million infants born from this 3%develop birth asphyxia, and 900,000 of them die. Risk factor of mortality due to birth asphyxia varies from country to countries, neonates born in country with high neonatal mortality rate have eight times more risk than neonates in low neonatal mortality rate.(4)

According to Antonucci, Porcella, and Pilloni, report estimates of the prevalence of birth asphyxia are different from one study to another. They also justify that incidence of birth asphyxia was 1 to 6 per 1,000 live births. From the common cause of neonatal death asphyxia accounts (23%), preterm birth (28%) and severe infections (26%)(5). Study done in Health Care Facilities in Enugu, South-East Nigeria show that incidence rate of prenatal asphyxia were 12.81 per 1000 birth and mortality rate of 18%(6).

Another study conducted in Pakistan, states that 16.52% of hospital admissions were due to birth asphyxia and 21% of infant deaths. Rest of them who survive may have chance to develop neurological complication including developmental delay, cerebral palsy and epilepsy. The study also identify Common risk factors of birth asphyxia include, low birth weight infants, no antenatal care, ante partum and intrapartum anemia and pregnancy induce hypertension. Child with birth asphyxia depend on risk factors and management of the patient(7). Possible management of prenatal asphyxia more related with severity: for mild asphyxia bag and mask ventilation, for moderate or severe asphyxia bag and mask ventilation with intubation or medication during birth is necessary.

Despite many recommendations and proven effectiveness of early assessment and treatment of prenatal asphyxia the practices were remained low, some of the national measures taken to prevent morbidity and mortality due to birth asphyxia were: federal ministry of health introduced for 116 health facilities about Essential newborn care services ,it give training for health workers about neonatal resuscitation and management of birth asphyxia, and necessary equipment and materials provided for health facilities like: newborn suction and resuscitation devices. MCHIP supported the federal ministry of health and the Ethiopian Pediatric Society to standardize newborn resuscitation. But due to the limitation of the training and support, preventing mortality due to birth asphyxia still challenging(8). The burden of prenatal asphyxia and lack of information on the practice of early assessment initiates the need of this study.

1.2 Statement of the problem

According to global report 2.5 million children died in the first month of life, in addition 2018 statistics approximate that 7 000 newborn deaths every day, from this about one third dying on the day of birth and close to three quarters dying within the first week of life. Death of Neonate has slow progression when compare to children aged 1–59 months. Again the report state that from a total of under five deaths, neonatal mortality has high share which increased from 40% in 1990 to 47% in 2018. So neonatal death still high. Children who die within 28 day of life suffer from conditions and diseases associated with lack of adequate and quality care at birth and immediate treatment after birth(1).

Perinatal asphyxia continues to present a major clinical problem in the world especially in developing country. Because huge number of (Four million) babies were born with asphyxia each year. Statistical report of WHO in developing countries show that 3.6 million of infant suffer from moderate to severe asphyxia, from these 23% (840,000) die which equal to nearly 1 million neonatal deaths(9). Different statistics shows more than 25% of the world's newborn deaths occurs in Africa. From 4 children who die in Africa, one is a newborn. This is why neonatal deaths have remained stagnant globally (10).

Even though some regions of developed country of the world have made good progress of producing neonatal mortality due to birth asphyxia in the past decade. The inequality between rich and poor countries still high which is low NMRs and faster reductions in rich countries. But in developing country there has been no measurable fall of NMRs due to birth asphyxia specially in the region of sub-Saharan Africa(11). In sub-Saharan Africa new born death due to birth asphyxia during the first day of life accounts 280,000, that make the region have a very high risk of birth asphyxia(12). Recent reports show that prenatal asphyxia is the fifth largest cause of under-five mortality. This finding show that birth asphyxia is still a burden of the world(13).

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UNICEF report in 2015 states that 3,200,000 babies were born in Ethiopia, or approximately 8,700 every day and Nearly 240 babies die each day, when compare the major and direct causes of newborn deaths, intra-partum related complications like birth asphyxia accounts 31.6 %. This huge gap due to low coverage of ANC follow up and low coverage of skilled attendant at birth(14). In addition Ethiopian federal ministry of health reported in 2015/16 relies that NMR accounts 29/1000, live birth. From this large proportion death occurs during the first 48 hour, the goal of national new born and child survival (2015-20) is to reduce NMR from 29 to 11/1,000 by 2020, by implement strategy which link with the post millennium developmental goal like elimination of mother to child transmission implement ICCM and CBNC(15).

According to 2016 Ethiopian demographic health survey 28% of births were assisted by a skilled provider, the majority by nurses/midwives. Most births were delivered by unskilled traditional birth attendants (42%), that lead to the increment of birth asphyxia (16). In other way national reviews on SDGs of Ethiopia show that infant mortality increased from 28/1000 in 2014/15 to 29/1000 in 2015/16(17).

Risk of asphyxiated neonates are associated with decreased blood flow and low oxygen supplement to the tissues, it is more of related to substandard care during labor which result severely impaired or even death. To reduce serious mistakes during delivery care health professional knowledge about common risk factors for birth asphyxia related to substandard care is important(18).

In order to decrease birth asphyxia of new born baby determine the validity of FHR during intrapartum is important(19). From the cause of birth asphyxia ante partum origins account 50% intra-partum origin account 40% and postpartum periods or combinations account 10% (20). studies show that, parity, maternal age, gestational age, weight, mode of delivery, presentation, sex, no antenatal care, place of residence, multiparous and severe preeclampsia, are risk factors of prenatal asphyxia that increase early neonatal mortality(21).

In Ethiopia there are so many challenges that increase morbidity and mortality due to prenatal asphyxia like low antenatal coverage(30% in Ethiopia), health facility inaccessibility, home deliveries , health worker shortage and quality gap, lack knowledge and skill on management, lack of basic pediatric critical care training and lack of transport services to facilitate movement are the common one (22).

To overcome these challenges needs ongoing training, this training needs to ultimately include referring, transport and treating teams(23).Despite several efforts to prevent and reduce perinatal asphyxia, its rate appears to have increased over time. To reduce perinatal asphyxia assessing magnitude and identifying risk factors should well addressed(14).Even though some study was conducted in Ethiopia on magnitude and risk factors it was limited for not including all variables like neonatal factor (fetal distress during labor) and obstructed labor which were found to be predictors of perinatal asphyxia birth in other countries.

Also Magnitude and associated factors of prenatal asphyxia in Worabe Comprehensive Specialized Hospital is not known yet. Therefore, determining its magnitude and risk factors is important, to reduce the risk for future babies to develop, hypoxic ischemic encephalopathy, thereby reducing newborn deaths by strengthening newborn care and maternal health programs. Generally the burden of prenatal asphyxia and lack of information on the practice of early assessment and identification of the problem initiates the need of this study. Also this study fulfills this gap by assessing the magnitude of neonatal asphyxia and its predictors among neonates in Worabe Comprehensive Specialized Hospital.

1.3. Significance of the study

Different studies focus and identify the importance perinatal asphyxia assessment for early identification, and create awareness about the problems. Worldwide the practice of early identification of perinatal asphyxia and associated problems is low as seen in the literatures. Improving newborn survival is one of the main issues of the millennium development goal and the second Ethiopian health sector growth and transformation plan. The greatest gap in newborn carries often during the critical time, most neonatal deaths often occur at the first 48hr. Birth asphyxia accounts for a large proportion of death in Africa and globally while we neglect these challenge, 24% of neonatal death reported to be caused by birth asphyxia according to 2015 world bank collection of development indicators. No attempts have been made related to neonatal problem including magnitude and risk factor of perinatal asphyxia in the study area. There for this study topic purposefully chosen to establish information on magnitude of birth asphyxia and associated factor that influence the occurrence of birth asphyxia Worabe comprehensive specialized hospital. Early assessment prenatal asphyxia is a strategy to identify and intervene asphyxia related early neonatal problems before it causes significant morbidity.

The finding will be important for baseline for other researcher to do prospective study for the future study to assess magnitude and risk factor of prenatal asphyxia. To Worabe Comprehensive Specialized Hospital to know magnitude of prenatal asphyxia and to find a gape and to take appropriate measure and Policy maker regarding to plan and deliver necessary training programs for health Professionals to give attention and care for neonates regarding to prenatal asphyxia.

It also help to increase existing knowledge and skill of health professional about risk factor of perinatal asphyxia and how to manage prenatal asphyxia in the study area and to create awareness to the community and based on the result finding, health professionals will give health education to mothers about different associated factors of asphyxia at the time of antenatal clinic follow.

CHAPTER TWO

2. LITRATURE REVIEW

Literature review on the research topic makes the researcher familiar with the existing studies and it gives information which helps to focus on a particular problem, lays a foundation up on which to base new knowledge. It creates accurate picture of the information found on the subjects.

2. 1 magnitude of prenatal asphyxia.

A prospective study done in southern India show that from 3130 term babies, 84 babies had birth asphyxia (Apgar Score <7 at 5 min). With the same study the incidence of birth asphyxia term babies was 2.7% (24). Another analysis on “incidence, clinical course and outcome of prenatal asphyxia” in a Swedish population shows 227 infants were included in the asphyxia group and total of 65 infants classified the Clinical signs of asphyxia. And the incidences of Apgar scores < 7 at five minute, were 5.4 per1,000 live born infants(25).

Related retrospective Study on Hospital-related, maternal, and fetal risk factors birth asphyxia in albert Canada show that among 698004births1588 of theme asphyxiated. Total birth asphyxia from 2002 to 2016 was 2.28 per 1000 births(26).Related 18 years retrospective study a tertiary center in South India states that the total number of deliveries increased from 7946 in the year 2000 to 14 336 in the year 2018.(27).A study from Bangladesh reported 56.9% overall prevalence of prenatal Asphyxia, 35% of neonates death from birth Asphyxia and 1-6 per 1000 births incidence of asphyxia in developed versus 5-10 per 1000 births in developing countries (28). Related study conducted in Iran state that infants born with perinatal asphyxia account 1% and 22% of deaths are due to perinatal asphyxia (29). Another study from South-East Nigeria on “Incidence and Predictors of Mortality with perinatal Asphyxia” verifies that among 161 new born with perinatal asphyxia result incidence rate of 12.81 per 1000 births.(6).

A cross-sectional study done labor ward and new born unit of Naivasha district hospital of Kenya show that a total of 237 mother with their child recruited in the study with prevalence rate of 5.1%.(30). Another retrospective Study in Children's Clinic of Warri Niger Delta on "Incidence of Birth Asphyxia "shows out of 26,000 neonates 864 had birth asphyxia, 525 had mild asphyxia and Severely asphyxiated were 32% (31).

A Cross sectional study of neonates with low Apgar scores admitted over a period of ten months into the Special Care Baby Unit of the specialist hospital in Port Harcourt of Nigeria reported 29.4% prevalence of perinatal asphyxia(32). Related review from Ghana shows among 468 term neonates about 283 were admitted for asphyxia(33).A study from sub-urban hospital of Cameroon found out from 332 neonates admitted to the neonatology unit 14. 5%of neonates were diagnose as birth asphyxia from this 53% were male and 47% were female(34).

A cross sectional study was conducted in Tigray north Ethiopia shows that from 421 neonates included in the study 93(22.1%)were develop perinatal Asphyxia based on the APGAR score of less than seven at first minute of delivery. Among neonates who develop perinatal asphyxia male to female ratio was1.07:1(35).

A cross sectional study done in Dilla referral hospital, show that from total 256 neonates, 123(48 %) Male and 133(52%) female. From this number 84(32.8%) neonates diagnose as perinatal asphyxia (36).

2.2 Associated factor of prenatal asphyxia.

2.2.1 Maternal socio demographic characteristics

Study from Colombia hospital of Universitario ,identify that Maternal age ($p= 0.3237$), Rural origin ($p= 0.2073$), No education ($p=0.5579$) were risk factors for the development of perinatal asphyxia(37).

A cross-sectional study done labor ward and new born unit of Naivasha district hospital of Kenya show that educational level, employment states and age of the mother has no significant association (30).

The result of the study in Dire Dewa East Ethiopia, on prevalence and associated factor of perinatal asphyxia show that a mother whose age was between 15-20yr were four times and age between 26-30year were two times to develop birth asphyxia when camper to a mother age between 26-30 and educational statutes was another risk factor.(38)

2.2.2Antepartum Risk Factors

A literature reviews in India reported that gestational diabetes mellitus(0.29) ,antenatal clinic (ANC) visit less than three(<0.00), gestational age and hypertension were the common maternal facto associated with prenatal asphyxia(39).

A study conducted in maternity hospital of Bangalore reveals that 125 newborns (75 males, 15 females) admitted to the neonatal care unit with birth asphyxia. The study identifies Ante partum risk factors include, non-attendants for antenatal care (64%)Multiple births (4.8%), vaginal bleeding and ante partum hemorrhage, was associated with higher incidence of asphyxia(40).A Retrospective study on prevalence and risk factor of Birth Asphyxia among Elderly Gravidarum in Bangkok show that number of ANC < 4 visits $p(0.001)$, gestational age ≥ 37 weeks $p(0.001)$, hypertensive disorders $p(< 0.001)$,and placenta Previa $p(< 0.001)$ were significantly associated with birth, asphyxia(41).

A study from sub-urban hospital of Cameroon states 39.5% of the mothers whose babies were asphyxiated did not receive any form of ANC, and hypertension which occur during pregnancy p (0.22) were common antenatal risk factor (34). Another study conducted in Tigray North Ethiopia shows, ANC (Antenatal care) follow-up 3.67(1.04-12.96), and maternal anemia 7.11(3.13-16.15), preeclampsia 4.68(2.28-9.60), .were antenatal risk factor for prenatal asphyxia (35).

Systematic review examining prevalence and associated factor of perinatal asphyxia in Dilla Ethiopia notes that Neonates delivered from mothers who had anemia during pregnancy, neonates from mothers who had meconium containing amniotic fluid, chronic and chronic hypertention, were significantly associated factors with perinatal asphyxia among newborns(36).

2.2.3 Intrapartum risk factors

A cross sectional study conducted in military hospital of Multan Pakistan show that prolonged second stage of labor p (0.1), spontaneous vertex delivery p(0.001), cesarean section p (0.002), instrumental delivery p (0.002) premature rupture of membranes p (0.001) and meconium staining, amniotic fluid (0.008) were intrapartum determinant factor of prenatal asphyxia(42).

In addition retrospective study, conducted at NICU of civil hospital Karachi, show that neonates delivered at home and private clinics were more prone to the risk of developing perinatal asphyxia as compare to deliver at hospital. Breech presentation of fetus, cephalo-pelvic disproportion (obstructed labor), premature rupture of membrane, and prolonged labor were significantly associated with perinatal asphyxia(7).

A journal report on Birth asphyxia as the major complication in neonates : Moving towards improved individual outcomes suggested that , intrapartum, or after delivery as postpartum risk factors like pre-mature birth and multiple births were the most frequent risk factors which leading to hypoxic conditions in a fetus (43).

A study in Colombia identified that, labor with a prolonged expulsive Phase, neonates who were delivered by caesarean section and neonates borne other health institution were associated factors for the development of prenatal asphyxia in the study participant (37)

Study from dire Dewa east Ethiopia shows mode of delivery had significant association with birth asphyxia. Vacuum had high risk for perinatal asphyxia when camper to other form of delivery. Also duration of labor was statistically significant factors of birth asphyxia (38).A descriptive cross-sectional study carried out on neonates with perinatal asphyxia at neonatal intensive care Unit (NICU) of Kathmandu medical college teaching hospital of Nepal over six months period (Jan 2019 to June 2019) shows that prolonged and obstructed labor were common associated factor of prenatal asphyxia(44)

2.2.4 Neonatal/ Fetal factor

A review on clinical profile and outcome of prenatal asphyxia in India describe that gender of the neonates, (42 (70%) were found to be males and 18 (30%) were females, Small for gestational age and Post maturity were risk factor for perinatal asphyxia (45).

A study conducted in maternity hospital of Bangalore state that neonates whose birth weight between 1–2 kg ($p < 0.01$) were high for PNA when compeered with neonates weight between 2.5kg to 3.5 kg. Other neonatal risk factor were gestational age of 34 to 37wks, fetal related factors, pre-mature delivery ,fetal distress and Intra uterine meconium release were significantly associated with increment in the risk of developing birth asphyxia(7).

Study conducted in Dr. Soetomo Hospital of Indonesia indicate, prematurity and low birth weight ($p < 0.000$), increasing the risk of asphyxia by 4 and 5.8 times, respectively and postdate delivery as a significant fetal factors contributing to birth Asphyxia(46).descriptive cross sectional Study conducted in Malawi show that from the total of fetal factor fetal distress was the only significant associative factor for birth asphyxia ($p < 0.5$). The remaining mal-presentation, mode of delivery, birth weight, and gestation age and multiple gestations were not significant associative factors for birth asphyxia(47).

Study from Tanzania indicates female gender of a baby was significantly associated with delivery of low birth weight infants. Moreover, in turn, low birth weight infants had increased risk of Apgar score of less than 7 at fifth minute. On the other hand low birth weight increase risk of being delivered preterm PROM (RR 2.5; 95% CI 1.9–3.3) also other associated factor (48).Expert reviews suggested that The short-term consequences of IUGR involve metabolic and hematological disturbances along with disrupted thermoregulation consequently leading to morbidities like respiratory distress syndrome (RDS)(49).

Study from Tigray east Ethiopia shows, prolonged labor ,meconium stained amniotic fluid and neonatal weight had a significant association with prenatal asphyxia the study further indicated that neonates born with cesarean section are seven times more affected by perinatal asphyxia,than,neonates,born,through,vagina(34).

2.3 Conceptual Frame Work

Conceptual frame work of the study show that interaction between dependent variable with independent variable. The arrows in the diagram show the relationship between the variable.

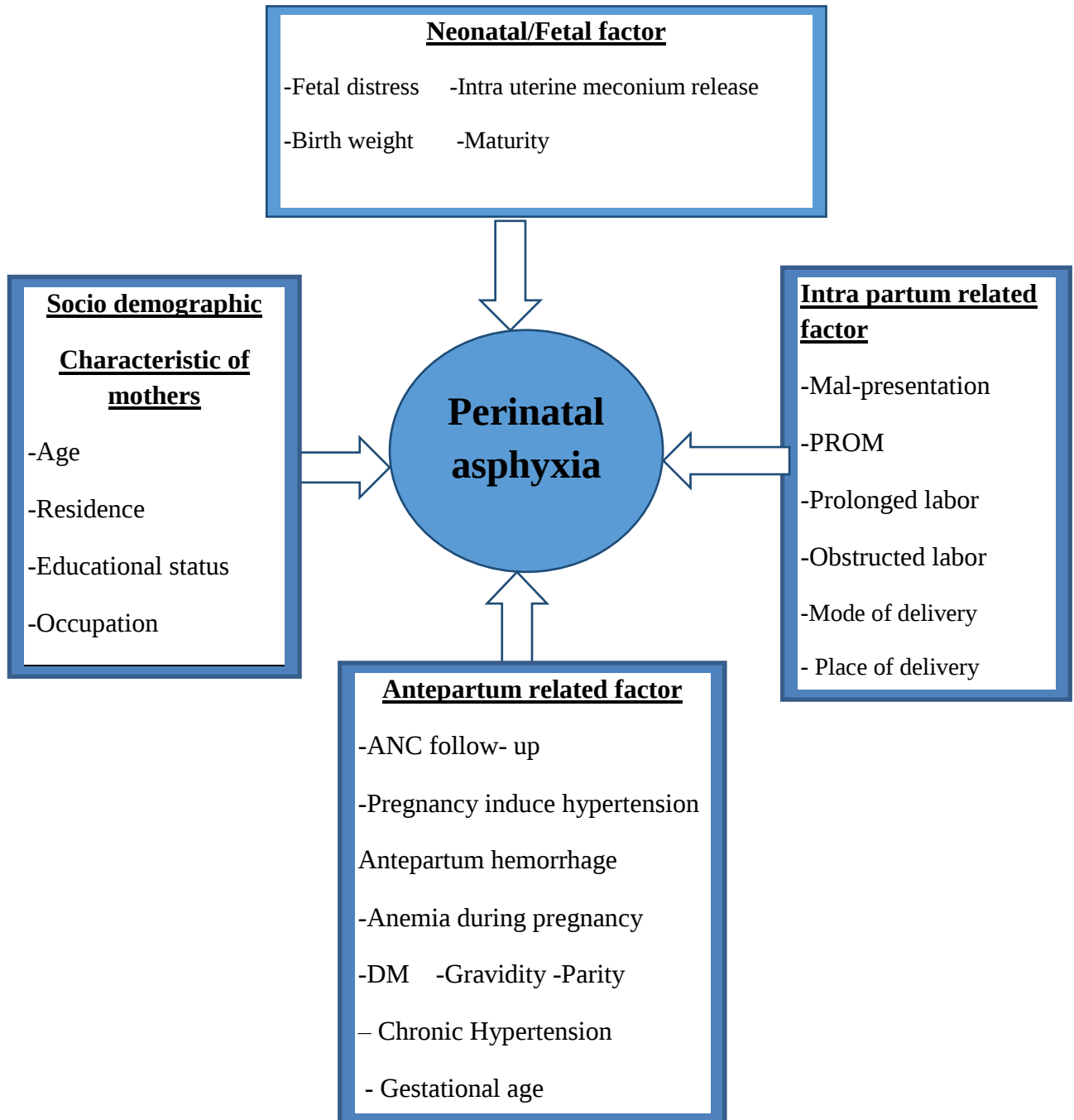


Figure 1. Conceptual framework of prenatal asphyxia in WCSH (Source: 7, 8, 35, 36, 37, 38, 39, 40,).

CHAPTER THREE

3. OBJECTIVE

3.1. General objective:

- ✚ To assess magnitude of perinatal asphyxia and associated factors among neonates admitted at NICU of Worabe Comprehensive Specialized Hospital from January 1/2016 to December 31/2019, Silete zone, South Ethiopia, 2020.

3.2. Specific objectives

- ✚ To determine magnitude of perinatal asphyxia among neonates admitted at NICU of Worabe Comprehensive Specialized Hospital Silete zone, South Ethiopia.
- ✚ To identify associated factors of perinatal asphyxia among neonates admitted at NICU of Worabe Comprehensive Specialized Hospital Silete zone, South Ethiopia.

CHAPTER FOUR

4. METHEDODOLOGY

4.1 Study area and period

The study was conducted in Worabe Comprehensive Specialized Hospital which was established October 2014 in Worabe town administrative center of silte zone, which is found 170 km south west of Addis Ababa. It is the only referral hospital in silte zone. It gives, emergency (adult and pediatric), out-patient (adult OPD, pediatrics OPD and different sub clinics) and in-patient (medical ward, surgical ward, pediatrics ward, gynecology and obstetrics, psychiatry ward, adult ICU and Neonatal ICU) services. The neonatal intensive care unit has 18 beds, 5 incubators, 15 radiant warmers and 23staffs of which 14 BSc and 3 diploma nurses, 2 BSc midwifery 1 general practitioner, 2 senior pediatricians and 1 senior gynecologist. The NICU offers diagnostic and treatment for approximately 1200 babies per year. The study conducted from March to April 2020 (by reviewing neonates chart from January1/2016 to December 31/2019).

4.2. Study design

Institutional based retrospective cross- sectional study design was used to assess magnitude of perinatal asphyxia and associated factor among neonates admitted at neonatal intensive care unit of Worabe Comprehensive Specialized Hospital.

4.3. Source populations

All neonates admitted at NICU of Worabe Comprehensive Specialized Hospital from January 1/2016 to December 31/2019.

4.4. Study populations

The populations used for this study were records of all selected neonates admitted at NICU of Worabe Comprehensive Specialized Hospital.

4.5. Eligibility criteria

4.5.1. Inclusion criteria

- ✚ Records of all neonates admitted at NICU of WCSH from January 1/2016 to December 31/2019.

4.5.2. Exclusion criteria

- ✚ Data with incomplete documentation (which has no maternal or fetal measurement parameters properly).
- ✚ Neonates with major congenital malformation, congenital neuromuscular disorders, cardiovascular, central nervous system and pulmonary congenital disorders.

4.6. Sample size determination

The size of study participants that were recruited in to the research was calculated using the single population proportion formula. Considering the prevalence of perinatal asphyxia to be 32.8%(36). Dilla University referral hospital, Southern Ethiopia– 2017

$$n_i = \frac{(z\alpha/2)^2 * p (1 - p)}{d^2}$$

$$d^2$$

Assumptions: n_i = required sample size, $z \alpha/2$ = critical value for normal distribution at 95% confidence level (1.96), $P=32.8\%$ (proportion of prenatal asphyxia in Dilla University referral hospital, Southern Ethiopia– 2017), $d = 0.05$ (margin of error).

Substituting the values for each of these variables in the above formula, the sample size was estimated to be 339. Because the source population is less than ten thousand which is 3796, we used correction formula.

$$n_f = n_i / (1 + n_i/N)$$

Where n_f = final sample size

n_i = calculated sample size(initial sample size)

N = total number of neonates admitted in NICU of WCSH (3796)

$n_f = 339 / (1 + 339 / 3796) = 311$

4.7. Sampling procedures

Systematic random sampling technique was used to involve study participants. The k^{th} interval for each, i.e. the 12th interval was determined by dividing the total population size by the total sample size, i.e. $K = N / n_f = 3796 / 311 = 12$

(Where, N total population at NICU of WCSH from January /2016 to December 31/2019,

n_f = final sample size of the study).

4.8. Study Variable

4.8.1 Dependent variable

-Perinatal asphyxia

4.8.2 Independent variable

Socio demographic variable: Age in year, educational status, religious, residency, and occupation.

Antepartum related variable: Anemia during Pregnancy, ANC follow up, DM, Pregnancy induce hypertension, Antepartum hemorrhage, chronic hypertension, gravidity, and Parity.

Intra partum related variable: PROM, prolonged labor, obstructed labor, place of delivery and mode of delivery.

Neonatal related variable: - birth weight, fetal distress, gender of neonate and intra uterine meconium release.

4.9. Operational definition

Perinatal asphyxia: is inability of new born to initiate and sustain respiration by scoring an Apgar score less than 7 persistently for more than 5 minute after delivery.

Prolonged labor: duration of first stage of labor exceeds 8hours in multipara mothers and 12 hours in primigravida.

Obstructed labor: considered when the presenting part of the fetus could not progress into the birth canal, despite strong uterine contractions.

Premature rupture of membranes: rupture of the membrane of the amniotic sac and chorion occurred before the onset of labor.

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

Anemia in pregnant women: define as hemoglobin level of the mother less than 10mg/dl in the second and third trimesters.

Birth weight: classified, normal (2,500 gm to 4000 gm), low (<2500 gm) and over weight (> 4000 gm).

4.10. Data collection instrument and procedures

4.10.1 Data collection instrument:

Checklist adopted and modified from literatures: (7), (34), (35), (36), and (38) to collect data and the data was collected through record review using pre-tested structured check lists, checklists have composed of questions on magnitude of perinatal asphyxia and association factor assessment. Questions addressing four sections: socio-demographic, antepartum, intrapartum, and neonatal variables.

4.10.2 Data collection procedure:

This is a retrospective cross-sectional study, newborn babies who fulfilled selection criteria for prenatal asphyxia, from January 1 /2016 to December 31 /2019, were included in the study. Card number of those neonates was put in their order of admission. Necessary information of neonate at every 12th (K-value) in the order was collected and reviewed from their registration and medical records. In order to get maternal variable maternal record chart of the same year was traced. Three health professionals with BSc degree nurse and two supervisors with senior BSc degree nurse who are working out of childcare services and nurses who are experienced in data collection were recruited and trained for data collection and supervision. The data collectors and supervisor were trained for one day on the purpose of the study, how to collect the data, and how to supervise (Annex IV).

4.11. Data Quality control

Training was given to data collectors for one day on such issues as the techniques of data collection. Mechanisms of maintaining the confidentiality of the participants throughout the whole process of data collection and the study was discussed and ascertained during the training. The researcher has checked the completeness and consistencies of questionnaires filled by the data collectors to ensure the quality of the data, and also visited the data collectors twice a day to check whether he/she has collected the data appropriately. The researcher has also appraised the data during the data analysis stage to verify the completeness of the collected data. 5% was conducted at random before the starting of actual data collection.

Hosmer and Lemeshow fitness test was seen to ensure the model fitness on multivariable analysis of the binary logistic regression and it was insignificant at the value of 0.438.

4.12. Data processing and analysis

The data was entered into statistical software Epi-data version 3.1 up on creating the questionnaire template in the QES file of the software. The entered data were subjected to cleaning using simple frequency and tabulation to ensure the validity of the data. Then, the analysis was made with IBM SPSS version 24.0 after exporting the prepared data. Descriptive statistics such as frequency distribution was computed to describe the major variables of the study. Odds ratio and p-value was computed to see whether any relationship exists between the two variables under question. $P \leq 0.05$ was considered as statistically significant for association. Binary logistic regression was conducted to see the effect of each of the independent variables on the outcome variable and variables which showed statically significance at 0.25 levels were put in to the final model (multivariate analysis) to control for confounding.

4.13. Ethical Considerations

Ethical clearance for the start of the study was obtained from review ethics committee (REC) of school of nursing and midwifery, Addis Ababa University. Following the approval official letter of cooperation was written to concerned bodies, written informed consent was obtained from medical director of Worabe Comprehensive Specialized Hospital after a detail explanation on the purpose and benefit of the study right before the data collection. After getting cooperative letter from medical director of Worabe Comprehensive Specialized Hospital the department of neonatal intensive care unit was requested to confirm the applicability of this study. No personal identifiers were used on data collection form. The recorded data will not be accessed by a third person except the principal investigator, and will be kept locked.

4.14. Dissemination plan

The results of the study will be presented and submitted to Addis Ababa University, school of nursing and midwifery. Dissemination of the result will also be made to the hospital (WCSH) and for different seminars. The finding will also be presented in locally or internationally held seminars, workshops, conferences, and meetings. Also, Publication in peer reviewed national and international reputable journals will be attempted.

CHAPTER FIVE

5. RESULT

5.1. Socio-demographic characteristics of the participants

During the study Three Hundred and eleven, 192 male and 119 females neonate, and their mothers were included in the study. Majority of the participants 105(33.8%) were age between 25-29year and, two hundred seven (66.6%) were from rural area. Almost all the participants 297 (95.5%) were Muslim by religious and 120 (38.6%) were house wife by their occupation. Regarding educational status more than half of the mother 163(52.4%) had no formal education. From mothers of asphyxiated neonates 44 (34.37%) of them were age between 25-29year and 93 (72.65%) of participant with perinatal asphyxia were live in rural area. Most of the participants with PNA 123 (96%) were Muslim and 57 (44.53%) of them were house wife.

Table.1 Socio-demographic characteristics of the participant at WCSH, south Ethiopia, January 1/2016 to December 31/2019, (N=311)

Variable	Category	Frequency(311)	Percentage
Age	<=19yr	12	3.9%
	20-24yr	65	20.9%
	25-29yr	105	33.8%
	30-34yr	84	27%
	>=35	45	14.5%
Educational status	No formal education	163	52.4%
	Primary	64	20.6%
	Secondary	45	14.5%
	Higher education	39	12.5%
Residence	Rural	207	66.6%
	Urban	104	33.4%
Religion	Muslim	297	95.5%
	Orthodox	10	3.2%
	Protestant	4	1.3%
	Catholic	0	0%
Occupation status	House wife	120	38.6%
	Private	2	0.6%
	Government	63	20.3%
	merchant	112	36%
	Student	14	4.5%

5.2. Obstetrics history of the mothers at WCSH

Most of the mothers 196(63%) were multiparous and regarding gestational age, most of the participant 250 (80.4%) were between 37wk-42wk. Concerning their antenatal follow up 197(63.3%) of them were attending their follow up and among the participant 129(41.5%) of them had anemia while 86(27.7%) of them were diagnose with preeclampsia and 21(6.8%) were had chronic hypertension. Regarding gestational diabetes mellitus 61(19.6%) of them had the disease and from 311 mothers 92(29.6%) of them had antepartum hemorrhage. Two hundred twenty two (71.4%) mothers of the neonates delivered by SVD the remaining 72(23.2%) and 17(5.5%) of the mother were delivered by caesarian section and instrumental respectively.

With respect to membrane status 211(67.8%) mothers had intrapartum rapture of membrane while the remaining 100(32.2%) mothers developed premature rapture of membrane. Regarding duration of labor 95(30.5%) of the mother had prolonged labor and 216(69.5%) of them had no prolonged labor. Those of the participant who had obstructed labor were 115(37%), generally most of the mothers included in the study 247(79.4%) had pregnancy related complication. From mothers of neonate with PNA 61(47.65%) of them were developed preeclampsia/eclampsia and 44(34.37%) of them had gestational diabetes mellitus. Among mothers of neonates with PNA 61(47.65%) of mothers had antepartum hemorrhage, regarding to status of membrane 58(45.31%) of mothers had premature rapture of membrane.

.

Table-2 Obstetrics history of mothers at WCSH, south Ethiopia, January 1/2016 to December 31/2019. (N=311)

Variable	Category	Frequency(311)	Percentage (%)
Parity	Primipara	115	37%
	Multipara	196	63%
Gestational age	<37wk	43	13.8%
	>42wk	18	5.8%
	37wk-42wk	250	80.4%
ANC follow up	Yes	197	63.3%
	No	114	36.7%
Anemia	Yes	129	41.5%
	No	182	58.5%
Preeclampsia/eclampsia	Yes	86	27.7%
	No	225	72.3%
Chronic hypertension	Yes	21	6.8%
	No	290	93.2%
APH	Yes	92	29.6%
	No	219	70.4%
DM	Yes	24	7.7%
	No	287	92.3%

Gestational DM	Yes	61	19.6%
	No	250	80.4%
No illness	Yes	64	20.6%
	No	247	79.4%
Mode of delivery	SVD	222	71.4%
	C/S	72	23.2%
	Instrumental	17	5.5%
Duration of labor	>12hr(prolong)	95	30.5%
	<12hr	216	69.5%
PROM	Yes	100	32.2%
	No	211	67.8%
Obstructed labor	Yes	115	37%
	No	196	63%

5.3. Clinical characteristics of neonates at WCSH

Among neonates included in this study (311), 128(41.2%) of them developed perinatal asphyxia and APGAR score of the babies less than seven at five minutes was considered. From total of admitted neonates 251(80.7%) of them had vertex presentation and the remaining 60(19.3%) had non vertex presentation. Number of male and female were 192(61.7%) and 119(38.3%) respectively. Regarding place of delivery half of the neonates 157 (50.5%) were delivered at health center and the remaining 141 (45.5 %), 10(3.2%) and 3(1%) were delivered at hospital, home and private clinic respectively.

Most of neonates 240(77.2%) had birth weight between 2.5kg to 4kg and 59(19%) of them < 2.5kg. From the study participants 119 (38.3%) of neonates developed respiratory distress during labor and 84(27%) admitted babies were passed their meconium during labor. Result of this study shows that 85(66.4%) of asphyxiated neonates were male and the remaining 43(33.59%) of them were female. Among asphyxiated neonates 60(46.87%) of neonates developed distress during labor and regarding meconium release, near to half of asphyxiated neonates 61(47.65%) were passed their meconium during labor.

Table-3 Clinical characteristic neonates at WCSH south Ethiopia January /2016 to December 31/2019, (N=311),

Characteristics	Category	Frequency(311)	Percentage (%)
Presentation	Vertex	251	80.7%
	Non vertex	60	19.3%
Place of delivery	Home	10	3.2%
	health center	157	50.5%
	privet clinic	3	1%
	Hospital	141	45.5 %
Gender	Male	192	61.7%
	Female	119	38.3%
Birth weight	<2.5kg	59	19%
	2.5kg-4kg	240	77.2%
	>4kg	12	3.9%
Intra uterine meconium release	Yes	84	27%
	No	227	73%
Fetal distress during labor	Yes	119	38.3%
	No	192	61.7%
Perinatal asphyxia	Yes	228	41.2%
	No	183	58.8%

5.4. Factor associated with presence of perinatal asphyxia

Different parental, neonatal, antepartum and intra partum related variables were tested for their association with the presence of perinatal asphyxia among neonates. First all variables that have association with the outcome variables in bivariate logistic regression analyses at $P=0.25$ were included in the multivariate logistic regression models. Using multivariate logistic regression only six variables (Preeclampsia, antepartum hemorrhage, gestational diabetes mellitus, premature rupture of membrane, intra uterine meconium release and fetal distress during labor.) were found significantly associated with perinatal asphyxia (at $p \leq 0.05$). The final result of this study confirm that neonates delivered from mothers who had preeclampsia were six time more likely to be asphyxiated as compared to neonates from mother who had no preeclampsia during pregnancy (AOR= 6.2 ,95%CI, 3.1,12.3) at P value 0.000.

Among maternal factors antepartum hemorrhage was major contributing factor for the prevalence of perinatal asphyxia, neonates from mothers who had antepartum hemorrhage were 4.5 times more affected by asphyxia as compared to neonates who delivered from mothers who had no antepartum hemorrhage (AOR= 4.5, 95%CI, 2.3,8.6) at P-value= 0.000. The other significant factor was gestational diabetes mellitus; mothers with gestational diabetes mellitus were four times more asphyxiated than neonates from mothers without gestational diabetes mellitus (AOR= 4.2 ,95%CI, 1.9,9.2) at P-value= 0.000. In this study premature rupture of membrane was one of common associated factor, babies of mothers who had history of premature rupture of membrane were 2.5 times more likely asphyxiated than babies of mothers who had no premature rupture of membrane (AOR= 2.5, 95%CI,1.33,4.7) at P-value= 0.004.

The multivariable analysis showed that, neonates who had respiratory distress during labor three times more affected than neonates who were free from respiratory distress (AOR= 3.01, 95%CI, 1.3,7.01) at P-value= 0.010. neonates who were passes their meconium during labor were 7.7 times more affected by perinatal asphyxia as compared to those of neonates don't pass meconium (AOR= 7.7, 95%CI , 3.1,19.3) at P-value= 0.000.

Table-4 Bivariate and multivariate logistic regression model showing predictor of perinatal asphyxia neonates admitted at NICU of WCSH from January 1 /2016 to December 31/2019.

Variables	PNA		COR 95%CI	AOR 95%CI	p-value
	No	Yes			
Educational status					
No formal education	85	78	2.07(0.98, 4.4)	1.6(0.5, 5.1)	0.420
Primary	40	24	1.4(0.6, 3.2)	1.2(0.4, 3.7)	0.624
Secondary	31	14	1.0(0.4, 2.6)	1.2(0.4, 3.5)	0.607
Higher education	27	12	1	1	
Residence					
Rural	114	93	1.6(0.985,2.63)	1.0(0.4,2.3)	0.911
Urban	69	35	1	1	
Preeclampsia/Eclampsia					
Yes	25	61	5.75(3.33, 9.93)	6.2(3.1,12.3)	0.000
No	158	67	1	1	
Antepartum hemorrhage					
Yes	31	61	4.464 (2.656, 7.5)	4.5(2.3,8.6)	0.000
No	152	67	1	1	
Gestational diabetes mellitus					
Yes	17	44	5.115(2.757,9.5)	4.2(1.9,9.2)	0.000
No	166	84	1	1	
Mode of delivery					
SVD	139	83	1	1	
CS	39	33	1.417(0.828,2.425)	1.0(0.5,2)	0.912

Instrumental	5	12	4.019(1.368,11.81)	2.3(0.5,9.5)	0.258
Duration of labor					
>12hr	49	46	1.534(0.942,2.5)	1.1(0.6,2.2)	0.703
<12hr	134	82	1	1	
Presentation of the fetus					
Vertex	153	98	1	1	
Non vertex	30	30	1.561(0.886,2.75)	1.5(0.7,3.5)	0.311
Premature rapture of membrane					
Yes	42	58	2.782(1.705,4.54)	2.5(1.33,4.7)	0.004
No	141	70	1	1	
Obstructed labor					
Yes	52	63	2.442(1.522,3.92)	1.9(1.0,3.8)	0.053
No	131	65	1	1	
Fetal distress during labor.					
Yes	59	60	1.854(1.164,2.95)	3.0(1.3, 7.0)	0.010
No	124	68	1	1	
Intra uterine meconium release					
Yes	23	61	6.33(3.62,11)	7.7(3.1,19.3)	0.000
No	160	67	1	1	
Birth weight					
< 2.5kg	40	19		1	
2.5kg-4kg	137	103	2.105(0.6, 7.39)	2.67(0.6, 12.6)	0.207
>4kg	6	6	1.33(0.417, 4.24)	2.904(0.7,12.2)	0.146

Note: AOR- Adjusted odds ratio **COR-** crude odds ratio **CI-**Confidence interval at 95%

CHAPTER SIX

6. DISSCUSION

This study investigated magnitude and associated risk factors for neonates having neonatal asphyxia at WCSH south Ethiopia.

The overall three years magnitude of perinatal asphyxia among admitted neonates was 41.2%. This finding is higher when compared to study conducted in southern India (2.7%), in Swedish (5.4%), in albert Canada (2.28%) and South-East Nigeria (12.8%) respectively (24,25,26,6).The possible reason for this, since the hospital is tertiary hospital that lead to many of high risk mothers refer and managed. But it is lower than the study done in Bangladesh(56.9%) (28)and study done in Ghana, among 468 term neonates about 283(61.8%) were admitted for asphyxia(33).This great difference may be due to the methodology used in different study and definition of perinatal asphyxia, also the countries were developed when compare to Ethiopia so they use modernize medical equipment, give health service by well trained health profession and the peoples were more civilized.

A cross sectional study done in Naivasha district hospital of Kenya a total of 237 mother with their child included in the study with prevalence rate of 5.1%, in Children's Clinic of Warri Niger (32%), hospital of Nigeria (29.4%), and sub-urban hospital of Cameroon, found out from 332 neonates admitted to the neonatology unit (14. 5%) of neonates were diagnose as birth asphyxia, respectively(30–32,34). These all results were lower than the present study (41.2%), this difference could be due to study population and study area.

The cross sectional study done in Ethiopia, Tigray northern Ethiopia, from 421 neonates included in the study 93(22.1%)were cases of prenatal Asphyxia(35)and Dilla southern Ethiopia, from total 256 neonates, 84(32.8%) neonates diagnose as prenatal asphyxia(36). These result nearly comparative with present study that could be explained by somehow similar socio-demographic characteristics of the people especially with Dilla southern Ethiopia. Generally this high prevalence rate may be due to: first; it was conducted in 2018 and 2019, second; the present study conducted tertiary hospital (comprehensive specialized

hospital) that lead to many of high risk mothers refer and managed, also it is referral center for catchment health facility and give service for near zones.

The final model of logistic regression identify that perinatal asphyxia significantly associated with Preeclampsia, antepartum hemorrhage, gestational diabetes mellitus, premature rupture of membrane, intra uterine meconium release and fetal distress during labor. The result of this study identify that preeclampsia was significantly associated with perinatal asphyxia (AOR= 6.2, 95%CI, 3.1, 12.3 P=0.000)the result is similar with study done India 2.68(1.20-5.99, p= 0.02)(39), in Bangkok Rajavithi hospital (AOR 1.94, 95% CI 1.42 -2.65, p= 0.001)(41),Gusau Nigeria (p =0.003)(13) and Tigray north Ethiopia 4.68(2.28-9.60)(35). The possible explanation for this, around 40% of mothers of asphyxiated neonates not attending antenatal clinic in the study area, as a result, those mothers with pregnancy induce hypertension were not treated early.

The result of this study show that maternal age and educational status were not associated with perinatal asphyxia this finding similar with study conducted in new born unit of Naivasha district hospital of Kenya(30),the study found that maternal age as isolated event. In contrast these variables were associated with perinatal asphyxia study conducted in Colombia(37) and Dire Dewa east Ethiopia (38). Antepartum hemorrhage was among associated factor that causing perinatal asphyxia and neonates from mothers who had antepartum hemorrhage were 4.5 times more affected by asphyxia as compared to neonates who delivered from mothers who had no antepartum hemorrhage(AOR= 4.5, 95%CI, 2.3,8.6) this result is in line with study conducted in maternity hospital of Bangalore Karnataka which was strongly associated with 34.44% mothers of asphyxiated neonate(40), Dr Soetomo Hospital of Indonesia 2.607 (1.242 – 5.473, p = 0.009)(46) and teaching hospital of Accra, Gana (33).This may be explained by during APH the amount of blood flow from mother to placenta are decreasing so the hypoxia can occur in the fetus which lead to perinatal asphyxia.

In this study gestational diabetes mellitus (4.2(1.9,9.2) $p = 0.000$) was found to be associated factor for perinatal asphyxia, the result is in agreement with what was reported in albert Canada 1.45 (1.20, 1.76) (26), neonatal intensive care Unit of pediatric ward of Civil Hospital Karachi(AOR 4.00, CI 95% 0.83-19.24, $p = <0.06$)(7), and study done in Sweden(18). The possible explanation for these are the metabolic derangement responsible for the inadequate production of surfactant, fetuses of pregnant diabetes have a decrease formation of the two major surfactant phospholipids in addition activity of enzymes responsible for these phospholipids are decrease in the fetal lung that lead to the neonate be asphyxiated during birth.

This study also show that premature rupture of membrane (2.5(1.33, 4.7) $p = 0.004$) was another factor which associated with perinatal asphyxia. This is consistent with other finding like; a cross sectional study conducted in military hospital of Multan Pakistan(0.001)(42), study conducted at neonatal NICU of Civil hospital Karachi,(AOR 9.25 CI 95% 3.75-22.81, $p = <0.01$)(7), a research reviewed from Ghana, Accra(33) and Study from Tanzania, (RR 2.5; 95% CI 1.9–3.3)(48). Reason for this may be premature rupture of membrane is one of the leading causes of perinatal asphyxia because it is associated with infection and umbilical cord compression due to oligohydramnios. So birth asphyxia the adverse outcome occurs due to premature rupture of membrane.

In present study logistic regressions identify that most of asphyxiated neonates 100 (78.12%) were gestational age between 37wk-42wk, the remaining 20(15.62%) and 8(6.25%) were gestational age of <37wk and >42wk respectively. Over all maturity was not associated with perinatal asphyxia which is similar with Study conducted in Malawi(47) unlike study done of Civil Hospital Karachi(7). According to this study Birth weight was not associated with perinatal asphyxia. The result similar with what was reported in Gasua Nigeria and Dire-Dewa(13,38). This contrasts reported by study done in Dilla, south Ethiopia(36)

In this study fetal distress during labor was other significant factor associated with perinatal asphyxia, neonates who had distress during labor three times more affected than neonates who were free from distress (AOR= 3.01, 95%CI, 1.3.7.0, P-value= 0.010), this result is related with study conducted at NICU of Civil Hospital Karachi ($p = <0.01$)(7), Retrospective

study on prevalence and risk factor of Birth Asphyxia among Elderly Gravidarum in Bangkok (AOR 3.35 95%CI, 2.24, 5.01 $p < 0.001$)(41) and study done Queen Elizabeth Hospital in Malawi (p -value < 0.05)(47). The Possible explanation is, the fact that fetal distress predisposing neonates to perinatal asphyxia, there for health care provider be alert to identify and manage fetal distress.

In the present study there was statistical significance association found between meconium stained amniotic fluid and perinatal asphyxia, neonates who were passes their meconium during labor were 7.7 times more affected by perinatal asphyxia as compared to those of neonates don't pass meconium (AOR = 7.7, 95%CI , 3.1, 19.3, P -value = 0.000), similar findings were observed in other studies conducted in Civil Hospital Karachi ($p = < 0.001$)(7), India (AOR 4.29, 95%CI 2.12, 11.41, $p = < 0.00$)(39), military hospital of Multan Pakistan ($p = 0.008$)(42), Naivasha district hospital of Kenya (AOR 18.26, 95%CI, 5.2, 64.16, $p = < 0.001$)(30), Ghana, Accra (33) and Dilla south Ethiopia (AOR = 3.59, 95%CI: 1.74–7.42)(36). These could be explained by the fact that if the baby passes meconium before birth meconium containing amniotic fluid can enter in to the baby's lung and may cause breathing difficulty which lead to perinatal asphyxia during birth.

CHAPTER SEVEN

7. STRENGTH AND LIMITATION

7.1. Strength:

- ✚ This study is the first to assess magnitude of perinatal asphyxia and associated factor among neonates admitted at neonatal intensive care unit of Worabe Comprehensive Specialized Hospital.
- ✚ Medical records of neonates were properly handled
- ✚ WCSH is the latest hospital in the area; neonates are referred to here due to this both neonates in rural and urban residence were get chance to include in the study and makes very easy to get the desired sample size.

7.2. Limitation:

- Cross-sectional study was used, this type of study show exposure and out come at the same point in time, so that we can't formulate a cause and effect relationship.
- The study uses APGAR score to identify asphyxiated neonate, since it has a limitation measuring blood Gas of the neonate is better.

CHAPTER EIGHT

8. CONCLUSION AND RECOMENDATION

8.1. Conclusion:

Based on the finding of the study, magnitude of perinatal asphyxia was quite high (41.2%) when compared to other researches done on asphyxia. The finding also identifies Preeclampsia, antepartum hemorrhage; gestational diabetes mellitus, premature rupture of membrane; intra uterine meconium release and fetal distress during labor were associated factors for perinatal asphyxia. Reduce this high rate of the problem and prevent factors, associate with PNA need cooperative work at national level.

8.2. Recommendation:

Based on the finding of this study, the following recommendations were forwarded to different stakeholders:

For health institution:

The hospitals give emphasis on care of mother and the new born in actively detecting and managing perinatal asphyxia. Also training of health professionals on how to identify high risk mothers and prevent birth asphyxia is necessary. It could be better if health care provider increase their efforts to avoid complication during labor. It should be better the physician take proper history which includes antepartum intrapartum and any complication related to pregnancy. The hospital should mobilize the community to support and educate pregnant mothers about the need of ANC follow up and its purpose.

Ministry of health and regional health Bureau

The ministry of health and regional health bureau should arrange additional training services in both prevention and management of perinatal asphyxia. They should help health professionals to equip them with skill and awareness on the service. It is better to Plan and deliver necessary equipment and manuals that help the health professional to increase their knowledge and skill.

For researchers:

- ✓ Need to conduct further prospective study should be done in order to alleviate all the limitation that this study encounters.

REFERENCE

1. world health organization. Newborns : reducing new borns mortality. 2019;(September).
2. Summary, Executive, D'Alton, MD CG. Neonatal Encephalopathy and Neurologic Outcome, Second Edition VOL. 123, NO. 4, APRIL 2014.
3. Haider BA, Bhutta ZA. and Public Health Implications doi:10.1016/j.cppeds.2005.11.002. 2006;(June):178–88.
4. Lawn JE, Manandhar A, Haws RA, Darmstadt GL. Health Research Policy and Systems – a survey of health systems gaps and priorities. 2007;10:1–10.
5. Antonucci R, Porcella A, Pilloni MD. Perinatal asphyxia in the term newborn Journal of Pediatric Medicine, 2014;3(2)doi:10.7363/030269Access on www.jpnm.com. 2014;3(2):1–14.
6. Ekwochi U, Asinobi NI, Osuorah CDI, Ndu IK, Ifediora C, Amadi OF, et al. Incidence and Predictors of Mortality Among Newborns With Perinatal Asphyxia . 2017;
7. Aslam, Saleem, Afzal , Iqbal U, Saleem SM, Waqas M, et al. Italian journal of pediatrics “ Risk factors of birth asphyxia ” DOI 10.1186/s13052-014-0094-2. 2014;1–9.
8. Federal ministry of Health maternal and child health integration program of Ethiopia.
9. D HBM, D AMP, D MZP. Interleukins in diagnosis of perinatal asphyxia : A systematic review Volume 17, Issue no. 5, doi.org/10.18502/ijrm.v17i5.4598 Production and Hosting by Knowledge E Review. 2019;17(5):303–14.
10. Tunde Adegboyega WHO, Child and Adolescent Health GMU (now retired), Pyande MRWZ. Opportunities for Africa ' s Newborns Doyin Oluwole AED/Africa 2010 USA.
11. Lawn JE, Cousens S, Zupan J. Neonatal Survival : When ? Where ? Why ? 2005;891–900.
12. Bay G, Miller T, Fajier DJ. Estimates Developed by the UN Inter-agency group at UNICEF Headquarters for Child Mortality Estimation Report 2013 Estimates. 2013;
13. Ilah BG, Aminu MS, Musa A, Adelakun MB. Prevalence and Risk Factors for Perinatal Asphyxia as Seen at Nigeria Sub-Saharan African Journal of Medicine /Vol 2/ /Apr-Jun 2015 DOI: 10.4103/2384-5147.15742.
14. Nesbitt UUNI. UNICEF and United nation Ethiopia report 2015.

15. Directorate federal CH. National Strategy for Newborn and Child Survival in National level Strategy for Newborn and Child Survival in Ethiopia 2015/16-2019. 2019;(June 2015).
16. Survey H, Findings K. Ethiopia 2016 demographic and health survey. 2016;
17. Getachew Adem Commitments G, Trends P. Ethiopia 2017 Voluntary National Review on SDGs Government Commitments, National Ownership and Performance Trends 6. 2017;(June).
18. Berglund S, Grunewald C, Pettersson H, Cnattingius S. Risk factors for asphyxia associated with substandard care during labor DOI: 10.3109/00016340903418751. 2010;(January 2009):39–48.
19. Parer JT, King T, Flanders S, Fox M, Kilpatrick SJ. Fetal acidemia and electronic fetal heart rate patterns : Is there evidence of an association ? 2006;19(May):289–94.
20. Village EG. 2005 American Heart Association (AHA) Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) of Pediatric and Neonatal Patients : Pediatric Basic Life Support Pediatrics 2006;117:e989 DOI: 10.1542/peds.2006-0219. 2014;
21. Aragaw YA. Perinatal Mortality and associated Factor in Jimma University Gynecology & Obstetrics DOI: 10.4172/2161-0932.1000409 . 2016;6(11):9–13.
22. Usman F, Imam A, Farouk ZL, Dayyabu AL. Newborn Mortality in Sub-Saharan Africa : Why is Perinatal Asphyxia Still a Major Cause ? 2019;85(1):1–6.
23. Tenjiwe G, Kali J, Martinez-biarge M, Zyl J Van, Smith J, Rutherford M. Management of therapeutic hypothermia for neonatal hypoxic ischaemic encephalopathy in a tertiary centre in South Africa doi:10.1136/archdischild-2015-308398. 2015;1–6.
24. Selvakumar R, Vasanthamalar C, Deepthy SIJ. Incidence , Severity and Early Outcome of Hypoxic- ischemic Encephalopathy among Newborns Born in a Rural Tertiary Care Centre in Southern India DOI: 10.17354/ijss/2017/52. 2017;5(8):63–6.
25. MS. NIRMALA.M.L. NO 40 4TH A Cross Near RAMAN COLLEGE, VINAYAKA NAGAR Rajiv Gandhi University of Health Sciences , Bangalore , Karnataka Brief Resume of the Intended Work.

26. Wood S, Crawford S, Hicks M, Mohammad K, Wood S, Crawford S, et al. Hospital-related , maternal , and fetal risk factors for neonatal asphyxia and moderate or severe hypoxic ischemic encephalopathy : a retrospective cohort study DOI:10.1080/14767058.2019.1638901. J Matern Neonatal Med [Internet]. 2019;0(0):1–6.
27. Ebenezer ED, Londhe V, Rathore S, Benjamin S, Ross B, Jeyaseelan L. Peripartum interventions resulting in reduced perinatal mortality rates , and birth asphyxia rates , over 18 years in a tertiary centre in South India : DOI: 10.1111/1471-0528.15848 2019;21–6.
28. Solayman, Hoque, Akber,. Prevalence of Perinatal Asphyxia with Evaluation of Associated Risk Factors in a Rural Tertiary Level Hospital Vol. 8, No.-1 (2017).
29. Boskabadi H, Ashrafzadeh F, Doosti H, Zakerihamidi M. Assessment of Risk Factors and Prognosis in Asphyxiated Infants DOI: 10.5812/ijp.2006. 2015;25(4).
30. Gichogo. Prevalence Of Birth Asphyxia, Readiness For Neonatal Resuscitation And Associated Factors in Naivasha District Hospital. 2004;4–10. Available from: <http://erepository.uonbi.ac.ke/bitstream/handle/11295/75439>.
31. Ugwu GIM, Abedi HO, Ugwu EN. Incidence of Birth Asphyxia at Central Hospital and GN Children ' s Clinic both in Warri Niger Delta of Nigeria : Vol. 4, No. 5; 2012 doi:10.5539
32. BaW. Perinatal asphyxia in a specialist hospital in Port Harcourt Nigeria, DOI: <http://dx.doi.org/10.4314/njp.v40i3.1>. 2013;40(3):206–10.
33. Mumuni K, Samba A, Seffah JD. Birth Asphyxia among Term Neonates at Korle-Bu Teaching Hospital in Accra . DOI: 10.15406/. 2017
34. Ndombo PK, Ekei QM, Tochie JN, Temgoua MN, Teddy F, Angong E, et al. A cohort analysis of neonatal hospital mortality rate and predictors of neonatal mortality in a sub-urban hospital of Cameroon DOI 10.1186/s13052-017-0369-5 R. 2017;1–8.
35. Gebreheat G, Tsegay T, Kiros D, Teame H, Etsay N, Welu G, et al. Prevalence and Associated Factors of Perinatal Asphyxia among Neonates in General Hospitals of Tigray , Ethiopia , 2018 doi.1155/2018/. 2018.
36. Health P, Alemu A, Melaku G, Abera GB. Prevalence and associated factors of perinatal asphyxia among newborns in Dilla University referral hospital , Southern Ethiopia , 06-Aug-201. 2019;
37. Universitario H, Torres-muñoz J, Rojas C, et al. Risk factors associated with the

development,of,perinatal,asphyxia,in,neonates,at,the:<http://dx.doi.org/10.7705/biomedica.v37i1.2844>. 2017.

38. Ibrahim NA, Muhye A, Abdulie S. Prevalence of Birth Asphyxia and Associated Factors among Neonates Delivered in Dilchora Referral Hospital , in Dire Dawa , Eastern Ethiopia Clinics in Mother and Child Health Volume 14 • doi10.4172/2090-7214.1000279. 2017;14(4).

39.Gane B, Rao R, Nandakumar S, Adhisivam B, Joy R. Antenatal and intrapartum risk factors for perinatal asphyxia : A case control study www.pediatricresearch.info. 2013;(July).

40.MS. NIRMALA.M.. Rajiv Gandhi University of Health Sciences , Bangalore , Karnataka Brief Resume of the Intended Work : Introduction :1–30.

41. Gravidarum E, Nguanboonmak A. Prevalence and Risk Factors of Birth Asphyxia among Elderly Gravidarum Journal of Obstetrics and Gynaecology January 2019, Vol. 27,. 2019.

42. Kiyani AN,et al. Perinatal Factors Leading to Birth Asphyxia among Term Newborns in a Tertiary Care Hospital Iran J Pediatr; Vol 24 (No 5), Oct 2014.

43.Golubnitschaja O, Yeghiazaryan K, Cebioglu M, Morelli M, Herrera-Marschitz M. Birth asphyxia as the major complication in newborns: Moving towards improved individual outcomes by prediction, targeted prevention and tailored medical care. EPMA J. 2011;2(2):197–210.

44. Manandhar SR, Basnet R. Prevalence of Perinatal Asphyxia in Neonates at a Tertiary Care Hospital :Cross-sectional Study. 2019;57(219):

45.B SSS, Nair CC, Madhu GN, Srinivasa S, Mn M. Clinical profile and outcome of perinatal asphyxia in a tertiary care centre Curr Pediatr Res 2015 Volume 19.

46. Risk factors for birth asphyxia Martono Tri Utomo Department of Child Health Faculty of Medicine , Airlangga University Dr Soetomo Hospital Surabaya Correspondence , Airlangga University Faculty of Medicine. 2009;

47.Tewesa E, Chirwa E, Majamanda MD, Maluwa A, Chimwaza A. Associative Factors for BirthAsphyxiaatQueenElizabethCentralHospitalMalawi<https://doi.org/10.4236/jbm.2017.550.2017;22–31>.

48.Mitao M, Philemon R, Obure J, Mmbaga BT, Msuya S, Mahande MJ. Asian Paci fi c Journal of Reproduction Northern Tanzania : a registry-based retrospective cohort study. AsianPacificJReprod[Internet].2016;5(1):759.Availablefrom:<http://dx.doi.org/10.1016/j.apjr.2015.12.014>

49. Das JK, Ali A. Maternal undernutrition and intrauterine growth restriction www.expert-reviews.com 10.1586/17474108.2013.850857. 2013;559–67.

ANNEXES

Annex A: Information Sheet

Addis Ababa University College of Health Sciences, school of Nursing and Midwifery Graduate Studies.

Here, I the undersigned, at Addis Ababa University College of Health Sciences, School of nursing and midwifery graduate Study Program, currently I will be undertaking research on a topic entitled magnitude of perinatal asphyxia and associated factors among neonates admitted at NICU of Worabe Comprehensive Specialized Hospital . This information sheet is prepared for administration and Neonatal intensive care unit coordinating office, the aim of the form is 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 perinatal asphyxia and associated factors among admitted neonates at NICU of Worabe Comprehensive Specialized Hospital.

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 questioner and all 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 from this research will be kept confidentially and will not be revealed to anyone except for investigator and kept in computer password.

Address of the principal investigator:

Name: SeifuAwgchew (BSc Nurse)

Phone number: +251913126038,

E-mail: awgchewseife@gmail.com

Annex B: Hospital Consent Form

This study will be conducted in Worabe Comprehensive Specialized Hospitals. The objective of this study is to evaluate magnitude and associated factor of perinatal asphyxia. 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 chart record retrospectively. Information regarding any specific personal identifiers like the name of the clients will not be collected and information generated will be disclosed in totality. 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: -----

Annex C: Data collection checklist

Data will be collected from each medical card of admitted neonate in WCSH from January 1/2016 to December 31/2019 accordingly. This checklist is adopted and modified from literatures I used (7, 34, 35, 36 and 38). This checklist will be used for each neonate.

Code of neonate: _____/_____

Part I - Socio demographic characteristics of the mother

Code	Variable	Category	Remark
101	Age of the mother	1. <=19yr 2. 20-24yr 3. 25-29yr 4. 30-34yr 5. >=35	
102	Educational status	1.No formal education 2.Primary 3.Secondary 4.Higher education	
103	Residence	1.Rural 2.Urban	
104	Religion	1.Muslim 2.Orthodox 3.Protestant 4.Catholic	

		5.Others	
105	Occupation status	1.House wife 2.Private 3.Government 4.marchent 5. student	

Part II: Antenatal related factor

Code	Variable	Category	
201	Parity	1.primipara 2.multipare	
202	Gravidity	_____ in number	
203	what was gestational age of the mother	1.<37wk 2. >42wk 3. 37wk-42wk	
204	Did the mother visit health facility for ANC during her pregnancy	1.Yes 2. No	If no skip to 205
205	Did the mother suffer from any of these Complication/illnesses during pregnancy		
	Anemia	1.yes 2.No	

	Preeclampsia/eclampsia	1.yes 2.No	
	Chronic hypertension	1.yes 2.No	
	APH	1.yes 2.No	
	DM	1.yes 2.No	
	Gestational DM	1.yes 2.No	
	If other specify	_____	
	No illness	1.yes 2.No	

Part III: Intra partum related factor

Code	Variable	Category	
301	Mode of delivery	1.SVD 2.C/S 3.Instrumental	
302	Duration of labor	1.>12hr(prolong) 2.<12hr(non prolonged)	
303	What was presentation of the fetus	1.vertex 2. Non vertex	
304	Place of delivery	1.home 2.health center 3. private clinic 4. hospital	
305	Did the mother diagnose any of the following during labor		
	PROM	1.yes 2.No	
	Obstructed labor	1.yes 2.No	

Part IV variable related with Neonate

Code	Variable	Category	
401	Gender	1.male 2 female	
402	Birth weight	1.<2.5kg 2. 2.5kg-4kg 3. >4kg	
403	Fetal distress during labour	1. yes 2.No	
404	Intra uterine meconium release	1.yes 2.No	
405	Perinal asphyxia(PNA)	1.yes 2. No	

Annex D: Training module for data collectors and supervisors

I.Instruction

- ☞ Identify target chart to be checked.
- ☞ Procedures to be followed during extract data from the chart.
- ☞ When to collect data/safe time.
- ☞ When to start data collection and when to end (total period).

II. Methods of training

- ✓ Pass through the instrument or data collection tool with data collectors to point out specific instructions.
- ✓ Provide an example of a completed instrument for the data collectors.
- ✓ Allow data collectors to practice with the tool.

Table: training module manual

Data collection method Or instruction	Data collector	Training needs	Training activities
Chart review of Admitted neonates at neonatal intensive care unit of WCSH	BSc Nurses	observation and distribution techniques How to follow and feel the instrument	Observation instruction How to collect data Trainer observation practice