

HARAMAYA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

**MAGNITUDE AND PREDICTORS OF NEONATAL SEPSIS AMONG
NEONATES ADMITTED IN NEONATAL INTENSIVE CARE UNITS OF
PUBLIC HOSPITALS OF HARAR AND DIRE DAWA, EASTERN
ETHIOPIA**

MSC THESIS

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SCHOOL OF GRADUATE STUDIES

Magnitude and Predictors of Neonatal Sepsis Among Neonates Admitted in Neonatal Intensive Care Units of Public Hospitals of Harar and Dire Dawa, Eastern Ethiopia

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STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and compilation of this thesis. Any scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every serious effort has been made to avoid any plagiarism in the preparation of this thesis.

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BIOGRAPHICAL SKETCH

I was born in August 9, 1991 G.C in Oromia region, West Hararghe Zone, Gelemso town. I attend my primary, secondary and preparatory education in the government school of all located in Gelemso town, with which all schools named after the name of the town. I graduated in 2014 G.C from Jigjiga University with BSc. Degree in midwifery, then after I was hired in Chiro general hospital in 2015 and I have served there for three years. Then, at the end of year 2017, I joined Dire Dawa university, where I have been in charge of teaching (with GA II and Assistant lecturer titles) for two years before I joined Haramaya University in 2020 academic year, for attending my Master's class.

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ABBREVIATION AND ACRONYMS

AOR	Adjusted Odds Ratio
CI	Confidence Interval
CPAP	Continous Positive Airway Pressure
DALY	Disability-Adjusted life years
HFSUH	Hiwot Fana Specialized University Hospital
HMIS	Health Management Information System
LMIC	Lower and Middle-Income Countries
NMR	Neonatal Mortality Rate
NICU	Neonatal Intensive Care Unit
PROM	Premature Rupture of Membrane
SNNP	Southern Nations, Nationalities and Peoples
SSA	Sub-Sahara Africa
SVD	Spontaneous Vaginal Delivery
UNSDG	United Nations Sustainable Development Goals
UNICEF	United Nations International Children’s Emergency Fund
UTI	Urinary Tract Infection
WHA	World Health Assembly
WHO	World Health Organization

ABSTRACT

Introduction: Neonatal sepsis is yet one of the leading causes of neonatal mortality around the globe. Lower- and middle-income countries are the largest sufferer of the problem. Particularly countries in Sub Saharan Africa are suffering from unchecked magnitude of the problem where Ethiopia is not an exception. Failure to control the problem will leads to high neonatal mortality, short- and long-term complications and economic burden on the countries. Even though the magnitude of neonatal sepsis and its predictors are studied in different part of Ethiopia, the influence of factors like Maternal history of Anemia, chlorhexidine cord care are not studied yet and specific to the study area the magnitude of neonatal sepsis is unknown.

Objective: To assess the magnitude and predictors of neonatal sepsis among neonates admitted to neonatal intensive care unit of public hospitals of Dire Dawa and Harar cities, Eastern Ethiopia, from June 20 to August 20, 2021.

Method: Institutional based cross-sectional study was employed as the main study design. Four Hundred twenty-one (421) neonates with their index mother were studied. Data were collected from mothers by using an interviewer-administered questionnaire and from neonatal medical charts with check-list. Eight data collectors and two supervisors were recruited. The collected data were entered in to Epi data version 4.6 and then exported to SPSS window version 20 for analysis. Descriptive anylysis was performed. Bivariate and multivariate analysis were done to identify the association between independent variables and outcome variable.

Results: Magnitude of neonatal sepsis was 25.7% (95% CI: 21.8, 30.1). Neonates who were born with caesarean section [AOR=2.135, 95% CI (1.045,4.359)], neonates born to mothers who had history of urinary tract infection [AOR=3.088, 95% CI (1.735,5.496)], not received chlorhexidine cord care [AOR=4.195, 95% CI (2.362,7.449)] and bottle feeding [AOR=2.619, 95% CI (1.433,4.788)] were factors significantly associated with neonatal sepsis.

Conclusion and recommendation: The magnitude of neonatal sepsis was moderately lower compared to other studies. Caesarean section delivery, urinary tract infection (UTI), chlorhexidine cord care and bottle feeding were independent factors. Since neonatal sepsis is one of often preventable disease, it can be reduced further to its lower level.

Keywords: Neonatal sepsis, Predictors, NICU

1. INTRODUCTION

1.1. Background

The term neonatal sepsis is defined variably based on laboratory and clinical criterias among different literatures. But generally, it can be defined as a constellation of clinical syndromes with hemodynamic changes resulting from the presence of Infectious organism in the first 28 days of extra uterine life. Most commonly bacteria but, viral and fungal infection can lead to neonatal sepsis which can in turn ended in morbidity and mortality. It can be classified as early onset neonatal sepsis (EOS) if it presents less than 7 days of age. For EOS the clinical manifestation usually appears within the first 3 days of life and usually represent vertical mother-to-child transmission. The subsequent type is late onset neonatal sepsis (LOS), which will occur beyond 7 days of age. It is mostly due to community acquired and nosocomial infection. Among the pathogens Group B streptococcus (GBS) is the leading causative agent of neonatal sepsis globally (Sinha *et al.*, 2016;Shane *et al.*, 2017).

In 2017 sepsis has been listed as one of the key health care priority in the coming ten years with its increasing virulence in extreme age groups (Reinhart *et al.*, 2017). Despite the medical advancement, neonatal sepsis is still the leading cause of neonatal morbidity and mortality around the globe. It is the major public health problem in lower- and middle-income countries (Amare *et al.*, 2019). In neonate's sepsis accounts for 26% of annual neonatal death with mortality rate highest in sub- Saharan Africa (Ranjeva *et al.*, 2018).

Neonatal sepsis is a cause for 30-35% neonatal death in Ethiopia with high mortality risks among neonates with EOS (Dessu *et al.*, 2020). It is also one of the top causes of neonatal admission and it is the major cause of neonatal mortality in the neonatal intensive care unit of hospitals in Ethiopia (Demisse *et al.*, 2017). This might contribute a lot for the disproportionatly high rate of mortality seen in neonates among under five children and for the stagnant change regarding to neonatal mortality reduction. In which, only 41% reduction was seen in the period of 16 years (between 2000-2016 GC) compared to under-five mortality 60% reduction and infant mortality which reduced by 50% (CSA, 2016).

The world health assembly (WHA) in 2017 passed resolution on sepsis, which called actions on reducing the burden of sepsis includes preventing infection by vaccination, context-specific

management plan and protocols, context-specific locally generated treatment guidelines (Kissoon *et al.*, 2017), promotion of World Sepsis Day (on 13 September) and world sepsis Congress were endorsed (Singer, 2017). But those efforts are challenged by the information gap exists about the burden of the disease, especially from LMIC (Reinhart *et al.*, 2017). In Ethiopia, strategy in order to combat neonatal sepsis was set, community case management of neonatal sepsis and increasing the utilization of chlorhexidine cord care by 90% by 2020 were among the packages of high impact child survival interventions in the strategy (FMOH, 2015).

Besides management, diagnosis remains one of the most challenges of neonatal sepsis. There is also lack of general consensus on the definition by itself. Diagnosis can be made based on clinical sign and symptom such as temperature instability, not feeding well, respiratory rate greater than 60 breaths per minute, dyspnea, grunting, rapid and weak pulse, convulsion, drowsy, or unconscious, decreased activity, (Shane *et al.*, 2017). But these sign and symptoms are not specific. The other criteria is diagnosis based on blood culture, which is not feasible in resource poor setting, relatively time consuming and lack sensitivity under some circumstances (Shane *et al.*, 2017; Procianoy and Silveira, 2020).

1.2. Statement of the Problem

Globally 2202 neonates per 100000 livebirths develop neonatal sepsis with case fatality rate 11-19%. This is an estimate of 3.0 million incidence case annually. The incidence of sepsis varied across the countries and it is the reflection of the resource and health care setting of specific country or region. The incidence of neonatal sepsis is 40-times higher in middle-income countries than high-income countries (Fleischmann-Struzek *et al.*, 2018). The overall pooled prevalence of neonatal sepsis in developing country is around 29.92%. The highest was in Africa 38.56% followed by Latin America 26.48% and Asia 14.68% (Amare *et al.*, 2019). The prevalence of neonatal sepsis in East Africa is around 29.65% and higher compared to other low and middle-income countries (LMIC) where the prevalence of neonatal sepsis is around 17.2%. This shows the neonatal sepsis is significant public health problem in this area (Abate *et al.*, 2020). In Ethiopia the prevalence of neonatal sepsis ranges from 17%-78%, with the pooled prevalence of 45%. The highest magnitude encountered in Amhara region while the lowest in Southern Nations, and Nationalities Peoples (SNNP) region (Assemie *et al.*, 2020).

The annual expenses for neonatal sepsis can range \$10 billion to \$469 billion in sub-Saharan Africa only and an estimated 5.29 to 8.73 million disability-adjusted life years (DALY) are lost in Sub-Sahara Africa due to neonatal sepsis. Unless identified and managed early it will cause septic shock, multiple organ failure and finally death. Even those who survive from sepsis are not free of danger: they may suffer from long-term complications such as brain damage, neurodevelopmental delay, impaired vision, hearing loss, cognitive delay and high chance to die in the first year of life (Bakhuizen *et al.*, 2014). The physical lost added to the economic burden will put a greater pressure on the development of the country as a general, and put the health care system in danger. Especially in country like Ethiopia where there exist limited resource and weak health care system.

Sepsis incidence and death from sepsis in this specific age group is disproportionately high (UNICEF, 2018;WHO, 2020). Globally, every year 2.6 million babies die before reaching 1 month old. Ironically most of the causes (greater than 80%) are easily preventable which includes neonatal sepsis. From 7000 babies died every day, neonatal sepsis accounts the 3rd most common cause of neonatal mortality (UNICEF, 2018). Being neonates and living in poor resource setting are amongst favorable conditions for the occurrence of sepsis. Eighty five percent (85%) of sepsis cases and sepsis related deaths occur in those conditions. Additionally, the current pandemic of COVID-19 may further complicate its occurrence and outcome (WHO, 2020). Neonatal sepsis is a result of a combination factors. Prolonged rupture of membrane, history of STI, being male neonate, multiple per vagina digital examination were amongst the multiple factors which influence neonatal sepsis (Yismaw *et al.*, 2019;Mersha *et al.*, 2019;Bayana *et al.*, 2020).

In a study conducted in some part of Ethiopia, factors such as place of residence, prolonged rupture of membrane, intrapartum fever, history of UTI were explained differently and in contrasting fashion (Mersha *et al.*, 2019;Agnche *et al.*, 2020;Sorsa, 2019). Moreover, there is limited information on some factors which has importance in influencing neonatal sepsis occurrence, such as HIV status of a mother, bottle feeding and no studies were done in Ethiopia, on factors such as maternal history of Anemia and chlorhexidine cord care. So, identification of these factors will have an importancy, in early evidence-based risk prevention, diagnosis and management of neonatal sepsis. Which inturn will have a good impact in reduction of morbidity and mortality of neonates from sepsis. likewise, no studies were done in the study area which

determine the magnitude of neonatal sepsis and its predictors in spite of neonatal sepsis was the leading cause of neonatal mortality (Eyeberu *et al.*, 2021). Therefore, this study aims at assessing magnitude and predictors of neonatal sepsis in NICU of public hospitals of Harar and Dire Dawa.

1.3. Significant of the Study

The result of this study will be helpful for respective stakeholders and other concerned body, who will probably wish to know and utilize the knowledge resulted from this specific topic of study. For Dire Dawa administration health bureau, Harari regional health bureau and HFSUH health officials and respective hospital administrators, the result of the study will help to inform the magnitude of the disease which will use in prioritizing the setting and resource, planning appropriate intervention to tackle the problem and in evidence-based decision making. For health care personnel it further builds their knowledge of risk factors of neonatal sepsis. This will indirectly use in evidence-based early diagnosis of sepsis which will improves survival, management and prevention of neonatal sepsis in at-risk population.

With complimentary to other literature it will be an input in further reducing the knowledge gap exist about magnitude of neonatal sepsis, the gap that occurred due to lack of data at the local and LMIC level. In identifying the major risk factors of neonatal sepsis, the result of the study will have its own contribution. And finally, the study will help the principal investigator in partial fulfillment of his master's degree in maternity and neonatal nursing.

1.4. Objective

1.4.1. General Objective

To assess the magnitude and predictors of neonatal sepsis among neonates admitted to neonatal intensive care unit of public hospitals of Dire Dawa and Harar city, Eastern Ethiopia from June 20 to August 20, 2021.

1.4.2. Specific Objectives

- To determine the magnitude of neonatal sepsis among neonates admitted in NICU of public hospitals of Harar and Dire Dawa.
- To identify predictors of neonatal sepsis among neonates admitted in NICU of public hospitals of Harar and Dire Dawa.

2. LITERATURE REVIEW

To identify relevant literatures, review of several searching engines like PubMed, Cochrane library, Google Scholar were used. Studies made around the globe including Africa, sub-Saharan Africa, East Africa and local studies were searched and identified by using key words such as sepsis, sepsis definition, EOS, LOS). Predictors of neonatal sepsis were identified from different literatures and those predictors which associated significantly sorted out.

2.1. Magnitude of Neonatal Sepsis

The global estimate of neonatal sepsis prevalence has been hindered by lack of data from LMIC. Nevertheless, there are an estimated 1.3 to 3.9 million neonatal sepsis cases occurred annually worldwide. Also the burden was high in LMIC, particularly in Africa (WHO, 2020). The trend was varied across the countries. It ranges, from 8.7% sepsis cases among NICU admitted neonates of a study conducted in Saudi Arabia, where 11.1% had EOS as against the rest 88.9% had LOS (Al-Matary *et al.*, 2019) to 69.35% in a study done in Bangladesh, where EOS takes 65.38% of the whole proportion (Nyima *et al.*, 2020). Around 54.8% neonatal sepsis cases encountered in a study conducted in Haiti (Boulos *et al.*, 2017).

In Africa, where the enormous magnitude of neonatal sepsis occurred, the range was reported as low as 8.6% in Egypt (Medhat and Khashana, 2017) and as big as (72.2%) as per a study conducted in Bishoftu Ethiopia (Woldu *et al.*, 2017). In a study done in Zambia the prevalence was 33%, out of proportionately the prevalence of EOS was high (85%) (Kabwe *et al.*, 2016). The magnitude of neonatal sepsis in the Africa's wealthiest nation of Nigeria was around 16% (Ogundare *et al.*, 2019). On a study conducted among a total of 174 NICU admitted neonates of Uganda's particular health facility 21.8% of them had reported culture confirmed neonatal sepsis (John *et al.*, 2015). But significantly lower result was reported with the study made in the same country, of which 12.8% of neonates admitted in NICU of Mulago hospital of Uganda had neonatal sepsis (Tumuhamyé *et al.*, 2020). A proportion of 31.4% and 28.6% of neonatal sepsis were reported among 220 and 196 NICU admitted neonates of study made in Tanzania and Kenya respectively (Okube and Komen, 2020; Jabiri *et al.*, 2016). Unlike to that of studies of Nigeria and Zambia, in studies conducted of Uganda and Egypt the Prevalence of LOS is higher than the prevalence of EOS. As the magnitude varies according to the country's wealth across

the world, accordingly the same is true across the nations of Africa's continent. The poorest has high magnitude.

In the studies conducted among neonates admitted in neonatal intensive care unit of public hospitals of Ethiopia, discrepantly reported magnitude of neonatal sepsis existed through out different geographic locations. In most of the studies the magnitude of neonatal sepsis was high. The highest (72.2%) reported in a study made in NICU of Bishoftu general hospital (Woldu *et al.*, 2017), while the lowest was in university of Gonder specialized hospital 11.7% (Yismaw *et al.*, 2019). Despite of reported low prevalence from the immediate previous study, a cross-sectional hospital-based study from central Gondar zone found that the prevalence of neonatal sepsis was so high 64.8 (Agnche *et al.*, 2020). Similarly study done in Jimma, the prevalence of neonatal sepsis among NICU admitted neonates was reported as 52.6% (Bayana *et al.*, 2020). A related findings of 33.8% (Sorsa, 2019) and 34% (Mersha *et al.*, 2019) of neonatal sepsis cases were found in studies conducted in Arsi and Wolita respectively.

2.2. Factors Associated with Neonatal Sepsis

2.2.1. Socio-Demographic Factors

Maternal age: In a study conducted in Tanzania maternal age showed statistically significant association with the occurrence of neonatal sepsis (AOR 6.7, 95% CI 2.1-3.88). In this study, neonates born to mothers whose age were less than 20 years were 6.7 times in higher risk for having neonatal sepsis compared to neonates born to mothers of age ranged between 21-30 (Jabiri *et al.*, 2016). In Ethiopia's study of Wolita sodo, neonates from a mother who were in age range of 20-34 years, the odds of neonatal sepsis were 4.33 times higher than neonates from mother in range of <20 years (AOR 4.33, 95% CI 1.01-18.52) (Mersha *et al.*, 2019). This is almost inverse compared to the previous study of Tanzania. In similar study done in Gondar zone maternal age of 30-34 showed statistical significant association (AOR 0.19, 95% CI 0.047-0.81) with neonatal sepsis (Agnche *et al.*, 2020).

Marital Status: A study conducted in Kenya found significant association (AOR 5.474, 95% CI 1.457 – 20.556) in which being neonates from single mom was 5 times increase the risk for neonatal sepsis compared to being from married (Okube and Komen, 2020). But the above result was not consistent when the result was undergone in Ethiopia, which resulted not statistically

significant association of marital status and neonatal sepsis (AOR 0.14, 95% CI 0.01 – 1.42) (Agnche *et al.*, 2020).

Maternal education: According to a study conducted in Tanzania, being a neonate from mothers whom never gone to school was statistically significantly associated (AOR 1.15, 95% CI 1.18-4.48) with neonatal sepsis (Jabiri *et al.*, 2016). However, a study from Uganda came up with no statistically significant association (AOR 1.11, 95% CI 0.39-3.19) of primary, and (AOR 0.89, 95% CI 0.30-1.79) secondary level of education of the mothers with neonatal sepsis (Tumuhamyé *et al.*, 2020)

Residence: A study conducted in Northern Ethiopia of Central Gondar Zone, Maternal residence did not resulted statistically significant association (AOR 0.75, 95% CI 0.34-1.66) with neonatal sepsis (Agnche *et al.*, 2020).

2.2.2. Labor and Delivery Factors

Prolonged labor: Except a study conducted in Jimma the rest literatures in this review showed no statistical significance association interms of labor duration. In Jimma's study, those neonates delivered in the prolonged hours of labor duration 6-12 hrs., 12-24hrs. and >24hrs. each were 10times (AOR 10.22, 95% CI 1.73 – 60.27), 7.8 times (AOR 7.8, 95% CI 1.41 – 42.96) and 15.86 times (AOR 15.86, 95% CI 2.51 – 100.29) more likely to had sepsis during their first month of life compared to neonates delivered in <6hrs. duration respectively (Bayana *et al.*, 2020). But, result from Gondar found no statistically significant association between neonatal sepsis and labor duration of 6-12hrs. (AOR 0.47, 95% CI 0.181 – 1.19), > 24hrs (AOR 1.02 95% CI 0.21-4.93) compared to <6hrs. duration (Agnche *et al.*, 2020). Similarly, no statistically significant association for labor durations of 12-24 hrs (AOR 0.9, 95% CI 0.269-2.874), 6-12hrs (AOR 0.7, 95% CI 0.245-1.842) and <6hrs (AOR 0.6, 95% CI 0.218-1.689) was found from the study conducted in Bishoftu (Woldu *et al.*, 2017).

Mode of Delivery: The link between neonatal sepsis and mode of delivery was established in different literatures. Among some, the study conducted in Uganda estimated that the odds of neonatal sepsis in those who delivered by caesarean section was 3 times (AOR 3.02, 95% CI 1.10 – 8.43) higher than those who delivered by spontaneous vaginal delivery. But, in this study the association between assisted vaginal delivery and neonatal sepsis compared to SVD was not statistically significant (Tumuhamyé *et al.*, 2020). Another study from Ethiopia also found

statistical significant association between C/S (AOR 4.3 95% CI 1.025 – 17.924), instrumental delivery (AOR 6.3, 95% CI 1.252 – 31.768) and neonatal sepsis (Woldu *et al.*, 2017). But, as a study by (Sorsa, 2019) reported no statistically significant association (AOR 1.11, 95% CI 0.565 – 2.199) were showed between mode of delivery and neonatal sepsis. likewise a study by (Kabwe *et al.*, 2016) came up with same conclusion of statistically insignificant (AOR 0.49, 95% CI 0.23 – 1.01) association between C/S and neonatal sepsis.

Place of Delivery: Ogundare et al. found a result of statistical significant (AOR 31.69, 95% CI 3.83 – 262.03) association between neonatal sepsis and place of delivery (Ogundare *et al.*, 2019). In similar study done by Sorsa 2019, being delivered in health center was associated (AOR 3.3, 95% CI 1.934 – 8.967) with neonatal sepsis (Sorsa, 2019). But a study by Agnche et al. found home delivery with compared to hospital delivery was not statistically significantly associated (AOR 4.06. 95% CI 0.69 – 23.86) with neonatal sepsis. On the other hand health center delivery compared with hospital delivery was associated statistically (AOR 3.05, 95% CI 1.19 - 7.79) with neonatal sepsis (Agnche *et al.*, 2020). Home delivery or being delivered on the way to hospital was not associated statistically (AOR 3.4, 95% CI 0.45 – 5.56) with neonatal sepsis when it compared to hospital delivery, as one report revealed from Tanzania (Jabiri *et al.*, 2016).

Frequency of PV examination: In a study conducted in Southern part of Ethiopia of Wolita Sodo, neonates born to those mothers who had <4 digital vaginal examination during labor were less likely to suffer from neonatal sepsis compared to neonates of mothers those who had >4 digital vaginal examination (AOR 0.10, 95% CI 0.04 – 0.25) (Mersha *et al.*, 2019). On the other hand, in a study conducted in Gondar the odds of neonatal sepsis in newborns whose mother had >3 digital vaginal examination were 6 times (AOR 6.06 95% CI 2.45 – 14.99) greater than in neonates of mothers who had \leq 3 digital vaginal examination (Agnche *et al.*, 2020).

2.2.3. Maternal Factors

Urinary tract infection during pregnancy: In a study conducted in Nigeria, neonates born to mother with urinary tract infection during pregnancy had double (AOR 2.3, 95% CI 1.194 - 4.274) likelihood of having sepsis compared to neonates from mothers who didn't had UTI (Olorukooba *et al.*, 2020). The same result was reported from study done in Kenya which stated that urinary tract infection was associated (AOR 2.969, 95% CI 1.261- 6,948) with neonatal sepsis (Okube and Komen, 2020). In the study conducted in Jimma of Ethiopia the odds of

neonatal sepsis among neonates of mother who had history of urinary tract infection were 2 times higher compared to neonates born to mothers who did not (AOR 2.40, 95% CI 1.16 – 4.95) (Bayana *et al.*, 2020).

Premature Rupture of Membrane: As indicated in different retrieved literatures neonates from mother who had history premature rupture of membrane were high likely to suffer from neonatal sepsis. A study conducted in Nigeria showed as prom was statistically significantly associated with neonatal sepsis (AOR 4.6, 95% CI 2.156-9.719) (Olorukooba *et al.*, 2020). In a study conducted in NICU of Kenyatta’s national hospital of Kenya it came up with similar result which stated neonates born of mothers with history of premature rupture of membrane were 6 (AOR 6.124, 95% CI 2.984-14.625) times more likely to develop neonatal sepsis compared to those who didn’t (Okube and Komen, 2020). In a study conducted in Gondar of Ethiopia, the odds of neonatal sepsis was 2.74 in neonates born to mothers who had history of premature rupture of membrane compared to those who didn’t (AOR 2.74, 95% CI 1.40-5.38) (Yismaw *et al.*, 2019). But, in similar study done in Arsi university teaching hospital premature rupture of membrane for greater than 18 hours was not statistically significantly (AOR 2.31, 95% CI 0.94-5.65) associated with neonatal sepsis (Sorsa, 2019).

Intrapartum fever: In Uganda’s study, having fever during intrapartum period was statistically significantly associated with neonatal sepsis (AOR 0.37 95% CI 0.15 – 0.91) (Tumuhamyie *et al.*, 2020). In Ethiopia’s study of Jimma maternal fever during intrapartum also shows statistical significance (AOR 3.17, 95% CI 1.52 – 6.58). In this study, the odds of neonatal sepsis among neonates whose mother had been febrile during intrapartum were three times than those whose mothers didn’t had fever (Bayana *et al.*, 2020). The same result was found from study done in Gondar, where neonatal sepsis showed significant association (AOR 3.35, 95% CI 1.70 – 6.62) with intrapartum maternal fever (Yismaw *et al.*, 2019). But different result retrieved from Bishoftu, where maternal fever didn’t statistically associate with neonatal sepsis (AOR 1.4 95% CI 0.755 – 2.609) (Woldu *et al.*, 2017).

Prity: In a study done in Zambia neonatal sepsis showed significant association with increased parity (AOR 1.18. 95% CI 1.01 – 1.37) (Kabwe *et al.*, 2016). But, in the following two different studies conducted in Ethiopia showed lack of statistical significance to formulate association between neonatal sepsis and parity. In a study done by Zelalem and his colleagues in Gondar of

Ethiopia, no statistical significant association showed between neonatal sepsis and for being para 1 (AOR 1.21, 95% CI 0.41 – 3.62) and para 2 (AOR 0.58, 95% CI 0.18 – 1.88) (Agnche *et al.*, 2020). In the other study of Gondar of Ethiopia also no statistically significant (AOR 1.009, 95% CI 0.23 – 2.09) association showed between being multipara and neonatal sepsis compared to with being primipara (Yismaw *et al.*, 2019).

Antenatal care (ANC): A study conducted in Kenyatta National Hospital of Kenya stated that, no statistically significant (AOR 1.846, 95% CI 0.766-4.448) association was found between frequency of ANC followup and neonatal sepsis (Okube and Komen, 2020). A study conducted in Ethiopia also found as there was no statistically significant association (AOR 1.8, 95% CI 0.881-3.754) between having antenatal care during pregnancy by mothers of neonate and occurrence of neonatal sepsis (Woldu *et al.*, 2017).

Maternal medical problems: A study from Kenya revealed that, neonates born to mothers who had Anemia during pregnancy had 3.379 times likelihood (AOR 3.379, 95% CI 1.343 – 8.504) to develop neonatal sepsis compared to those neonates from non-anemic mother (Okube and Komen, 2020). Another study from Zambia revealed that, neonates from HIV infected mother were less likely (AOR 0.46, 95% CI 0.23 – 0.93) to develop neonatal sepsis than that of neonates of mothers who tested negative for HIV (Kabwe *et al.*, 2016). There is no evidence from Ethiopia on the influence of the above factor on neonatal sepsis.

Chorioamnionitis: As per a study conducted in Jimma, Ethiopia. Neonatal sepsis statistically significantly associated (AOR 2.65, 95% CI 1.31 – 5.37) with maternal history of chorioamnionitis. The odds of neonatal sepsis was 2.65 times higher among neonates born to mothers with chorioamnionitis compared to those neonates from mothers who didn't (Bayana *et al.*, 2020).

2.2.4. Neonatal Factors

Sex of the Neonate: No statistically significant association (AOR 0.9, 95% CI 0.1 – 4.5) was found according to a study done in Tanzania (Jabiri *et al.*, 2016). Similar result was found by Kabwe and his colleagues, no statistically significant association (AOR 0.97, 95% CI 0.59 – 1.59) between being male and neonatal sepsis compared to being female (Kabwe *et al.*, 2016). The odds of neonatal sepsis among male neonates were about 9 times higher (AOR 9.30, 95% CI 4.54 – 19.04) than that of in female, said a report made by Bayana and his colleagues (Bayana

et al., 2020). Neonates who were male had a risk of neonatal sepsis 3.73 times (AOR 3.73, 95% CI 1.76 – 7.89) that of female neonates, as reported by Agnche and his colleagues (Agnche *et al.*, 2020). But, no statistically significant association (AOR 1.405, 95% CI 0.769 – 2.568) between neonatal sepsis and sex of neonates were reported from study done in Arsi (Sorsa, 2019).

Gestational Age: The odds of having neonatal sepsis was 6 times higher among premature neonates compared to that of mature or term neonates (AOR 6.402, 95% CI 2.731 – 15.006), according to study conducted in Kenya (Okube and Komen, 2020). But no significant association (AOR 1.41, 95% CI 0.04 – 26.55) was reported by Nigeria’s study (Jatsho *et al.*, 2020). Similarly, study from Tanzania also showed no significant association (AOR 1.99, 95% CI 0.22 – 4.4) existed between prematurity and neonatal sepsis (Jabiri *et al.*, 2016). A prospective cross-sectional study done among primary hospital of Gondar zone also got no significant association (AOR 0.98, 95% CI 0.35 – 2.78) between neonatal sepsis and being neonates delivered less than 37 weeks of gestation (Agnche *et al.*, 2020).

Birth weight: A study from Nigeria revealed that birth weight of <2.5 kg were associated (AOR 53.17, 95% CI 1.25 – 52.13) with neonatal sepsis (Jatsho *et al.*, 2020). However, the following three literatures found no significant association between neonatal sepsis and birth weight. Study done by Tumuhamyie and his colleagues in Uganda stated no statistically significant association (AOR 0.84, 95% CI 0.30 – 2.31) between low birth weight and neonatal sepsis compared to normal birth weight (Tumuhamyie *et al.*, 2020), study from Zambia also revealed as birth weight and neonatal sepsis were not associated statistically (AOR 0.87, 95% CI 0.64 – 1.18) (Kabwe *et al.*, 2016), and no statistically significant association (AOR 1.3, 95% CI 0.5 – 3.3) showed in study conducted in Ethiopia’s Arsi study as well (Sorsa, 2019).

Age of neonates: Even if neonatal period by itself is a short period of time, further classification of the first 28 days of newborn life will distinguish the riskier days for neonatal sepsis. According to a study conducted in Zambia age of the neonates showed association with neonatal sepsis (AOR 1.07, 95% CI 1.01 – 1.13) (Kabwe *et al.*, 2016). In a study conducted in Jimma the risk of neonatal sepsis was less among neonates aged between 8-28 days (AOR 0.40, 95% CI 0.22 – 0.72) compared to neonates less than 7 days of age (Bayana *et al.*, 2020). On the other hand, a study done Wolita sodo town the odds of neonatal sepsis among neonates of 0-7 days

age were 2.61 times higher (AOR 2.61, 95% CI 1.45 – 4.68) than that of neonates aged 8-28 days (Mersha *et al.*, 2019).

History of Asphyxia: A study conducted in Bangladesh revealed that neonates who suffered from asphyxia were more likely (AOR 3.37, 95% CI 1.27 – 8.90) to develop neonatal sepsis than who didn't (Nyima *et al.*, 2020). In a study done in Nigeria the risk of neonatal sepsis among neonates who had asphyxia was 22.34 (AOR, 22.34, 95% CI 3.3 – 152.38) times higher than that of who didn't had asphyxia (Ogundare *et al.*, 2019). However, in a study done Gondar of Ethiopia, no statistically significant association seen (AOR 0.55, 95% CI 0.18 – 1.68) between birth asphyxia and neonatal sepsis (Agnche *et al.*, 2020).

History of Neonatal Resuscitation at Birth: Neonates who were resuscitated during birth were more likely (AOR 1.25, 95% CI 1.22 – 3.38) to having neonatal sepsis than that of not, according to a study done in Tanzania (Jabiri *et al.*, 2016). A study from Jimma, Ethiopia also in line with the previous study. Which stated that the odds of neonatal sepsis among resuscitated neonates were 13.87 times higher compared to those who didn't had history of resuscitation (Bayana *et al.*, 2020). A study from Gondar also stated, the odds of neonatal sepsis was 6 times (AOR 6.11, 95% CI 1.71 – 21.84) higher among resuscitated neonates compared to neonates who didn't had resuscitation during the time of birth (Agnche *et al.*, 2020).

Oxygen administration: As per study conducted in Tanzania founded, there was statistically significant (AOR 1.76, 95% CI 1.08-2.89) association between adminstartion of oxygen with mask and neonatal sepsis (Kiwone *et al.*, 2020). Likewise, a study conducted in Shashamene of Ethiopia also found statistically significant (AOR 2.859, 95% CI 1.3-6.289) association between delivery of oxygen via mask and neonatal sepsis (Getabelew *et al.*, 2018). However, there was no statistically significant (AOR 2.06, 95% CI 0.642-6.59) association between oxygen administration to neonate and neonatal sepsis as presented by a study conducted in Central Gondar Zone (Agnche *et al.*, 2020).

Nasogastric tube insertion (NG): As a study conducted in Gondar of Ethiopia revealed no statistical significant (AOR 10.36, 95% CI 0.81-132.78) association was found between neonatal sepsis and insertion of nasogastric tube (Agnche *et al.*, 2020).

Bottle feeding: A study conducted in Bangladesh found statistically significant (AOR 3.02, 95% CI 1.11-8.25) association between neonates who had bottle feeding and neonatal sepsis (Nyima *et al.*, 2020). But no finding was retrieved from Ethiopia.

2.3. Conceptual Frame Work

The conceptual frame work for magnitude and predictors of neonatal sepsis was developed after critical review of different literatures and after identification of factors which influence the occurrence of neonatal sepsis. Then identified factors will be sorted out in different categories (distal, intermediate, proximal) according to their relationships with the outcome variable.

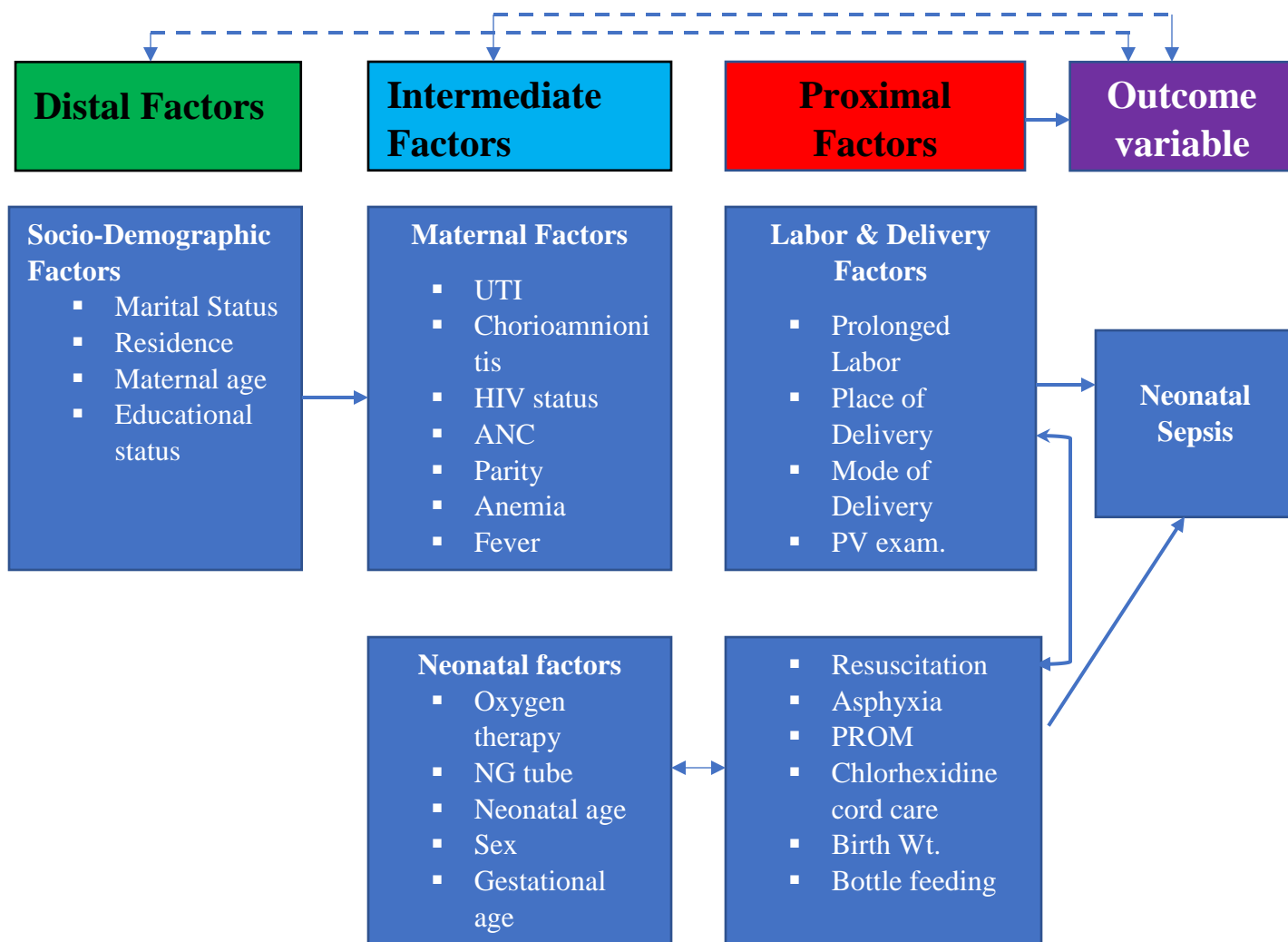


Figure 1: Conceptual Frame Work for magnitude and predictors of neonatal sepsis, 2021

Source: Done with retrieving different literatures by Principal Investigator. With modification on neonatal factors. The solid lines show direct relations while the broken lines show indirect relationships (Bayana *et al.*, 2020;Woldu *et al.*, 2017;Agnche *et al.*, 2020;Okube and Komen, 2020;Jabiri *et al.*, 2016;Nyuma *et al.*, 2020)

3. METHODS AND MATERIALS

3.1. Study Setting and Period

The study was conducted at the four neonatal intensive care units of public hospitals of Harar and Dire Dawa cities. Two of them, Dil-Chora Referral Hospital and Sabian General Hospital exists in Dire Dawa city while Hiwot Fana Specialized University Hospital, and Jugal General Hospital exists in Harar city. Harar and Dire Dawa cities are found in East direction 525 km and 517 km far from the capital city Addis Ababa respectively (Yifru *et al.*, 2020;Hussen *et al.*, 2020). The NICU of Dil-chora referral hospital has 25 beds, and equipped with 4 CPAP, 3 phototherapy, 4 oxygen machines and 4 radiant warmers. There are 2 pediatricians, 2 neonatology nurses and 8 clinical nurses (trained with one-month neonatology nursing care) (Dil-chora Hospital Health Management Information system, 2021). While the NICU of Sabian General Hospital has 20 beds, 1 pediatrician, and 6 nurses (one neonatology and 5 clinical nurses). Equipment such as three mechanical ventilators, four CPAP machines, four phototherapy and one ECG are avail in the department of NICU (Sabiyan Hospital Health management Information System, 2021). The neonatal intensive care unit of Hiwot Fana Specialized University Hospital has three rooms septic room, kangaroo mother care (KMC) room and critical and sub-critical room. Generally, it has 32 beds, 5 incubators, 10 radiant warmers, 4 phototherapy machines. There are 7 pediatricians, 4 neonatal nurses and 7 clinical nurses (Hiwot Fana Specialized University Hospital Health management information System, 2021). And the NICU of Jagula hospital has 2 pediatricians, 6 nurses and equipped with 2 heaters, 1 phototherapy machine and generally has 10 beds (Jagula General Hospital Health Management Information System, 2021). The study was conducted from June 20 to August 20, 2021.

3.2. Study Design

Facility-based cross-sectional study design was used.

3.3. Population

3.3.1. Source of Population

All neonates admitted in NICU of public hospitals Harar and Dire Dawa cities.

3.3.2. Study Population

All neonates admitted in NICU of public hospitals of Harar and Dire Dawa cities during actual data collection period.

3.4. Inclusion and Exclusion Criteria

3.4.1 Inclusion Criteria

All randomly selected neonates (less than 28 days of age) who were admitted in the NICU of four public hospitals. And whose mothers gave a will to participate in the study.

3.4.2. Exclusion Criteria

If the diagnosis was not written on neonate's medical card and neonates with incomplete medical charts were excluded from the study.

3.5. Sample Size Determination

3.5.1. For the first objective

For the magnitude of neonatal sepsis among neonates admitted in NICU of public hospitals of Harar and Dire Dawa

Sample size was calculated by using single population proportion formula. Based on the following assumption.

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

by considering 95% confidence interval (CI), with level of precision $Z_{\alpha/2} = 1.96$, margin of error (d) = 0.05.

n- The minimum sample size required

P- proportion of neonatal sepsis which is 52.6% obtained from a study conducted in two hospitals of Jimma city (Bayana *et al.*, 2020).

To get the optimal sample size, 10% non-response rate was considered.

$$n = \frac{(1.96)^2 * 0.526 * (1 - 0.526)}{(0.05)^2} = 383.12 \approx 383$$

By adding 10% non-response rate, the final sample size will be 421

3.5.2. For the Second Objective

For the predictors of neonatal sepsis, a double population proportion formula was used to determine the sample size. The sample size was calculated by using Epi Info 7 Software. The following assumptions were considered.

Power – 80%, 95% confidence level

Table 1 Sample size calculation for second objective by using factors retrieved from different literatures.

Variables	Neonatal sepsis		AOR	Sample size	References
	Exposed	Non-exposed			
Frequency of PV examination	39.9% (>3 times)	24.9 (≤3 times)	6.06	330	(Agnche <i>et al.</i> , 2020)
Sex of neonates	41.1% (male)	23.7% (female)	3.73	248	(Agnche <i>et al.</i> , 2020)
Age of neonates	40.4% (0-7days)	20.7% (8-28 days)	2.19	190	(Mersha <i>et al.</i> , 2019)

So, the appropriate final sample size was 421 (determined by first objective).

3.6. Sampling Procedure

In the two cities (Dire Dawa and Harar), there are 4 public hospitals. All hospitals were included in the study. Study participants were selected from the admission log book by using Systematic Sampling method. In order to get the total population (N), the sum of three-months total admission (3 months back from data collection started time) of neonates was taken from all hospitals. Then this (N) was divided for a determined sample size (n =421), in order to get (K). The study subjects from each facility was taken based on proportionate allocation of sample size, based on respective hospitals 3-months total admission. The first K was selected by lottery method between the first two admissions on the registration log book for each hospital.

Proportion to size allocation of = $\frac{\text{Each hospital 3-month admission} \times \text{determined sample size}(n)}{\text{Total 3-month admission of four hospitals}}$
 sample size for each hospital

Each hospital 3-month number of admissions, HFSUH= 328, Jagula= 60, Dilchora= 280, Sabiyan= 124 and Total 3-month admission of all hospital= 792

Hiwot Fana Specialized University Hospital= $\frac{328 \times 421}{792} = 174$

Jagula general Hospita= $\frac{60 \times 421}{792} = 32$

Dil-Chora Referral Hospital= $\frac{280 \times 421}{792} = 149$

Sabiyan General Hospita= $\frac{124 \times 421}{792} = 66$

So, $K = 792/421 = 1.88 \approx 2$

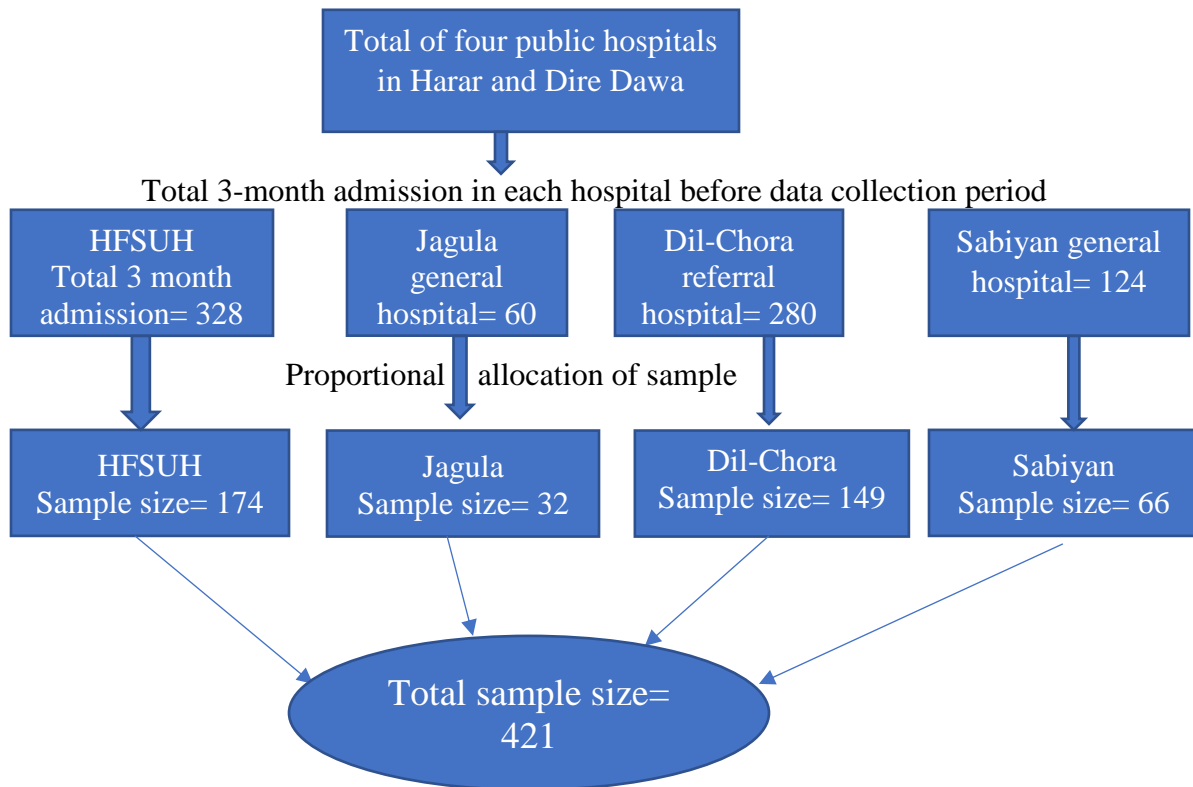


Figure 2: Schematic presentation of sampling procedure

3.7. Data collection Methods

3.7.1. Data collection Instruments

An interviewer-administered questionnaire and check list, which assesses maternal and neonatal risk factors associated with neonatal sepsis were used to collect data from respondents and neonatal medical records. It was prepared after reviewing different literatures and by adapting most of the questions from other study (Kabwe *et al.*, 2016; Gelano *et al.*, 2019; Nyma *et al.*, 2020; Okube and Komen, 2020; Bayana *et al.*, 2020; Akalu *et al.*, 2020). Then the questionnaire was translated to Affan-oromo Amharic and Somali languages and back to English Language by experts. The tool has five parts socio-demographic, labor and delivery, maternal and neonatal related factors and finally checklist which assesses most neonatal related factors.

3.7.2. Data Collectors

Eight data collectors (6 BSc nurses and 2 Bsc midwives) and two supervisors (1 MPH and 1 BSc nurse) recruited. All data collectors were staffs of corresponding hospitals. The two supervisors were from HFSUH and Sabiyan general hospital. Supervisors were trained on the details of the questionnaire, how to control the quality of data and efficiency of data collectors. Data collectors were trained for two days on questions included in the questionnaire, data included in the check list, on interviewing techniques, purpose of the study, and importance of privacy, discipline and approach to the interviewees and confidentiality of the respondents.

3.7.3. Data Collection Procedures

A letter from Haramaya University College of Health Medical Science were submitted to all health facilities to get a permission for data collection. After the letters submitted to all hospitals administrative bodies, acceptance letters were written to concerned department (NICU) heads. The data was collected for two months of all days including weekends were utilized. The principal investigator made overall supervisions and with supervisors a thorough supervisions were made through out the data collection period. They had checked data completeness, accuracy and consistency. Thorough record review was made to assess neonatal related factors from medical records and face-to-face interview to assess socio-demographic, maternal, neonatal and labor related factors.

3.8. Study Variables

3.8.1. Dependent Variable

Neonatal sepsis

3.8.2. Independent Variables

Socio-demographic factors- Age of the mother, marital status, religion, ethnicity, residence, maternal education, maternal occupation and monthly income of the Household.

Labor and delivery factors- duration of labor, mode of delivery, place of delivery, frequency of pervaginal examination.

Neonatal factors- Age of neonates, sex of neonates, gestational age, birth weight, birth asphyxia, resuscitation during birth, bottle feeding, chlorhexidine cord care, umbilical catheter, surgery, oxygen therapy, endotracheal intubation, nasogastric tube.

Maternal factors- Parity, intrapartum fever, history of UTI, maternal medical problems (HIV, Anemia), PROM, chorioamnionitis, antenatal care, antepartum hemorrhage, pregnancy induced hypertension,

3.9. Operational Definition

Neonatal sepsis- Medical diagnose of neonates stated as “neonatal sepsis” by the physician based on clinical symptom and hematologic findings as recorded on neonates medical records (Agnche *et al.*, 2020).

PROM- Premature rupture of fetal membrane is when a sudden gush of clear or pale-yellow fluid occur before the onset of labor (MOH, 2020).

Newborn resuscitation- Life saving intervention for the neonate who couldn't able to start or sustain breathing naturally during birth and given by the health personnel who attended the delivery and documented on neonatal medical information sheet (MOH, 2020).

Birth Asphyxia- A history of clinical condition due to impaired gas exchange in the body that leads to failure to start or sustain breathing at birth (Nyma *et al.*, 2020).

Bottle Feeding- Fed with any liquid (including breast milk) or semi-solid food from a bottle with nipple/teat (WHO, 2021).

Chlorhexidine cord care- Single application of 4% chlorhexidine on the cord as soon as possible after birth (El Arifeen *et al.*, 2012).

3.10. Data Quality Control

To insure the quality of data supervisors and data collectors were taken at least two days training on the objective, procedures, relevance of the study. And Principal investigator and supervisors will make day today supervisions during the time of data collection. Before conducting the actual study, the tool was pretested on 5% of the sample size on Haramaya general Hospital, which is located on the way Harar to Dire dawa. And then possible modification and adjustment were done. Completeness of the data were checked on daily basis by the supervisors and principal investigator. Double data entry was done in order to check the consistency.

3.11. Data Processing and Analysis

After all necessary data collected, the data were coded, cleaned and entered into Epi data statistical software version 4.6 and then exported to SPSS window version 20 for analysis. Descriptive statistical analysis such as simple frequency, measure of central tendency and measure of variability were used to describe the characteristics of the participants such as socio-demographic factors, labor and delivery factors, neonatal and maternal factors. And then the pertinent findings were presented by using frequencies, tables, diagrams and summary measures. Neonatal sepsis will be categorized in to yes and no based on the diagnosis documented on neonatal medical record.

The model goodness of fit was tested by Hosmer-Lemeshow statistic and omnibus test. The model was declared a good fit because it was found significant for omnibus test ($P= 0.000$) and insignificant for Hosmer-Lemeshow ($P= 0.101$). Bi-variate and multivariate analysis were done in order to determine the association between each independent variable and the outcome variable by using binary logistic regression. All the variables with P value of ≤ 0.25 in the bivariate analysis were included in the final model of multivariate analysis in order to control possible con-founders. In order to see the correlation, exist between independent variable, Multi co-linearity test was carried out and there was no single variable with VIF value of >10 and with test of tolerance <0.1 . The direction and strength of statistical association was measured by odds ratio with 95% confidence interval. Adjusted odds ratio along with 95 % CI was estimated to

identify predictors for neonatal sepsis by using of multivariate analysis in the binary logistic regression. P-value <0.05 was considered to declare statistically significant association.

3.12. Ethical Consideration

Ethical clearance was obtained from Haramaya University, college of health and medical science, Institutional Health Research Ethical Review Committee (IHRERC). After thoroughly discussing the ultimate purpose and method of the study an informed voluntary written and signed consent were sought from each respective hospitals head. Additionally, an informed voluntary written and signed consent was taken from each parents/guardian and anyone who was not willing to take part in the study had given full right to leave. To ensure confidentiality of respondents, their names were not mentioned on the questionnaire. All interviews were made individually to keep privacy. The data from neonatal medical records was retrieved after approval taken from department head. During the data collection period, in order to prevent the current pandemic of COVID 19 transmission appropriate safety measures were taken according to the country's guideline. Such as, wearing mask, hand washing, not shaking hands, keeping the limited distance. Those measures were applied on both the participants and data collectors.

4. RESULT

4.1. Socio Demographic Charactersics of the Mothers

Among an intended 421 neonates and their index mother admitted in neonatal intensive care unit of four public hospitals available in Dire Dawa and Harar cities a total of 409 neonates and their index mother were included in the study which made up a response rate of 97 %. The median age of the mothers was 26 years with interquartile range of 7 years. The most, 31.8 % of the mother's age fall in the age group of 25-29. With regard to marital status, 373 (91.2 %) of the mother were married. From the total 409 mothers around 285 (69.7 %) of the mothers were muslim, 228 (55.7 %) of mothers belong to ethnic Oromo, the most 247 (60.4%) of the mothers resided in urban and most of the mother around 127 (31.1 %) didn't attended formal education. Concerning occupation, 181 (44.3 %) mothers of the neonates were housewife. Most (73.1%) of mothers of neonates were from a household which had >2500-birr income per month (Table 2).

Table 2 Sociodemographic characteristics of mothers of neonates admitted to NICU of public hospitals of Harar and Dire Dawa, Ethiopia, June 20 to August 20, 2021 (n=409)

Variables	Frequency	Percentage
Maternal residence (n=409)		
Urban	247	60.4
Rural	162	39.6
Maternal education (n=409)		
No formal education	127	31.1
Primary	99	24.2
Secondary	96	23.5
More than secondary	87	21.3
Matrenal age (n=409)		
15-19	33	8.1
20-24	120	29.3
25-29	130	31.8
30-34	95	23.2
35+	31	7.6
Occupation of mothers (n=409)		
House wife	181	44.3
Civil servant	72	17.6
Business women	99	24.2
Private organization	19	4.6
Student	38	9.3
Ethnicity (n=409)		

Oromo	228	55.7
Amhara	83	20.3
Somali	65	15.9
Harari	20	4.9
Others	13	3.2
Marital status (n=409)		
Single	13	3.2
Maried	373	91.2
Widow	8	1.9
Divorced	15	3.7
Income of the house hold (n=409)		
>2500	299	73.1
2001-2500	43	10.5
1501-2000	48	11.7
1001-1500	11	2.7
<1000	8	2
Maternal Religion (n=409)		
Muslim	285	69.7
Orthodox	95	23.2
Protestant	29	7.1

N.B. Others= Gurage, Wolayita, Silte

4.2. Labor and Delivery Characteristics

According to the result of this study out of the total (409) study participants more than three fourth 331 (80.9%) of neonate were delivered by spontaneous vaginal delivery. While the rest 52 (12.7%) and 26 (6.4%) of the neonates were delivered by cesarean section and assisted instrumental delivery respectively. With regard to place of delivery most of the neonates, 395 (96.6%) of them were delivered in the health institution. During the time of giving birth while the mothers were admitted in the health institutions around 159 (40.3%) of mothers had undergone 3 and below pervaginal examination by the health professional. The median time of labor duration were 15 hours with 13 hours interquartile range (Table 3).

Table 3 Labor and delivery related characteristics of mothers of neonates admitted to NICU of public hospital of Harar and Dire Dawa, Ethiopia, from June 20 to August 20, 2021.

Variables	Frequency	Percentage
Mode of delivery (n=409)		
SVD	331	80.9
C/S	52	12.7
Instrumental	26	6.4

Place of delivery (n=409)		
Institutional	395	96.6
Home	14	3.4
Number of pervaginal examination (n=395)		
≤3	159	40.3
>3	236	59.7
Duration of labor (n=409)		
<6 hours	31	7.6
6-12 hours	132	32.3
12-24 hours	227	55.5
>24 hours	19	4.6

N.B. C/s= Caesarean Section, SVD= Spontaneous Vaginal Delivery

4.3. Maternal Characteristics

Among the total (409) mothers of neonates participated in this study, the vast majority of them 325 (79.5%) had taken ante natal care (ANC) during their time of pregnancy. From those who had antenatal care follow up, mothers who had ≥ 4 frequency of ANC were 195 (60%). More than half 239 (58.4%) of mothers were multiparous. Related to common medical problems encountered during pregnancy, as revealed by this study mothers who had urinary tract infection during the time of pregnancy were 94 (23%), mothers who tested positive for HIV were 17 (4.2%), fever during the time of delivery were encountered by 67 (16.4%) womens. Around 190 (46.5%) mothers of neonates had anemia during pregnancy (Table 4).

Table 4 Maternal related characteristics of mothers of neonates admitted to NICU of public hospital of Harar and Dire Dawa, Ethiopia, from June 20 to August 20, 2021 (n=409).

Variables	Frequency	Percentage
ANC follow up (n=409)		
Yes	325	79.5
No	84	20.5
Number of ANC follow up (n=325)		
≥4	195	60
<4	130	40
Parity (n=409)		
Primipara	170	41.6
Multipara	239	58.4
UTI (n=409)		
Yes	94	23
No	315	77
Maternal HIV status (n=409)		
Negative	375	91.7
Positive	17	4.2
Unknown	17	4.2
Intrapartum Fever (n=409)		
Yes	67	16.4
No	342	83.6
Anemia during Pregnancy (n=409)		
Yes	190	46.5
No	219	53.5

ANC= Antenatal Care, UTI= Urinary Tract Infection, HIV= Human Immunodeficiency Virus, Primipara= Women who gave one viable birth, Multipara= Women who had more than one pregnancy resulted viable offspring.

Regarding obstetrical complications, from the total (409) of mothers of neonates participated in this study, mothers who had premature rupture of membrane (PROM) were 70 (17.1%). Among this 42 (60%) of them had <12 hours PROM duration. Mothers who had faced antepartum hemorrhage (APH) were 29 (7.1%). Pregnancy induced hypertension (PIH) was happened on 31 (7.6%) of mothers of neonates. According to this study 20 (4.9%) of mothers of neonates had suffered from chorioamnionitis during pregnancy time (Table 5).

Table 5 Obstetrical complications of mothers of neonates admitted to NICU of public hospitals of Harar and Dire Dawa, Ethiopia, from June 20 to August 20, 2021 (n=409)

Variables	Frequency	Percentage
PROM (n=409)		
Yes	70	17.1
No	339	82.9
PROM duration (n=70)		
<12 hours	42	60
12-18 hours	8	11.4
>18 hours	20	28.6
APH (n=409)		
Yes	29	7.1
No	380	92.9
PIH (n=409)		
Yes	31	7.6
No	378	92.4
Chorioamnionitis (n=409)		
Yes	20	4.9
No	389	95.1

N.B. PROM= Premature Rupture of Membrane, APH= Antepartum Haemorrhage, PIH= Pregnancy Induced Hypertension

4.4. Neonatal Characteristics

This study revealed that among the total (409) neonates included, nearly more than half (54.3%) of the neonates were female. The median age of neonates during diagnosis was 5 days with interquartile range of 11 days. While most of neonates 251(61.4%) were in the age group of <8 days during the time of diagnosis. The majority of neonates 266 (65%) had gestational age ranged between 37 to 42 weeks and 85.1% birth weight was ranged between 2500 to 3999 gms. Less than one fourth 79 (19.3%) of the neonates had history of bottle feeding and around 85 (20.8%) of the neonates were suffered from birth asphyxia (Table 6).

Table 6 Neonatal characteristics of neonates admitted to NICU of public hospital of Harar and Dire Dawa, Ethiopia, from June 20 to August 20, 2021 (n=409).

Variables	Frequency	Percentage
Sex of neonates (n=409)		
Male	187	45.7
Female	222	54.3
Age of neonates (n=409)		
<8 days	251	61.4
8-28 days	158	38.6
Gestational age (n=409)		
≥42 weeks	18	4.4
37-42 weeks	266	65.0
<37 weeks	125	30.6
Birth weight (n=395)		
≥4000 grams	36	9.1
2500-3999 grams	336	85.1
≤2499 grams	23	5.8
Bottle feeding (n=409)		
Yes	79	19.3
No	330	80.7
Birth asphyxia (n=409)		
Yes	85	20.8
No	324	79.2

Concerning medical interventions and some life saving activities given for the neonates, during the time of birth 19 (4.6%) neonates were putted on oxygen with different method of oxygen delivery system. Among neonates who were on oxygen, 9 (47.4%) neonates were on nasal cannula, 8 (42.1%) neonates with intranasal catheter and 2 (10.5%) neonates were oxygen given with mask. Total of 7 (1.7%) neonates had had surgery of any type. Resuscitation was given for 83 (20.3%) neonates out of total 409 neonates. Endotracheal intubation was made for 15 (3.7%) of neonates. Umbilical catheter inserted for 8 (2%) neonates and for 33 (8.1%) of neonates' nasogastric tube was inserted. Out of total 409 neonates included in this study for 199 (48.7%) neonates chlorhexidine cord care was given at least once (Figur 3).

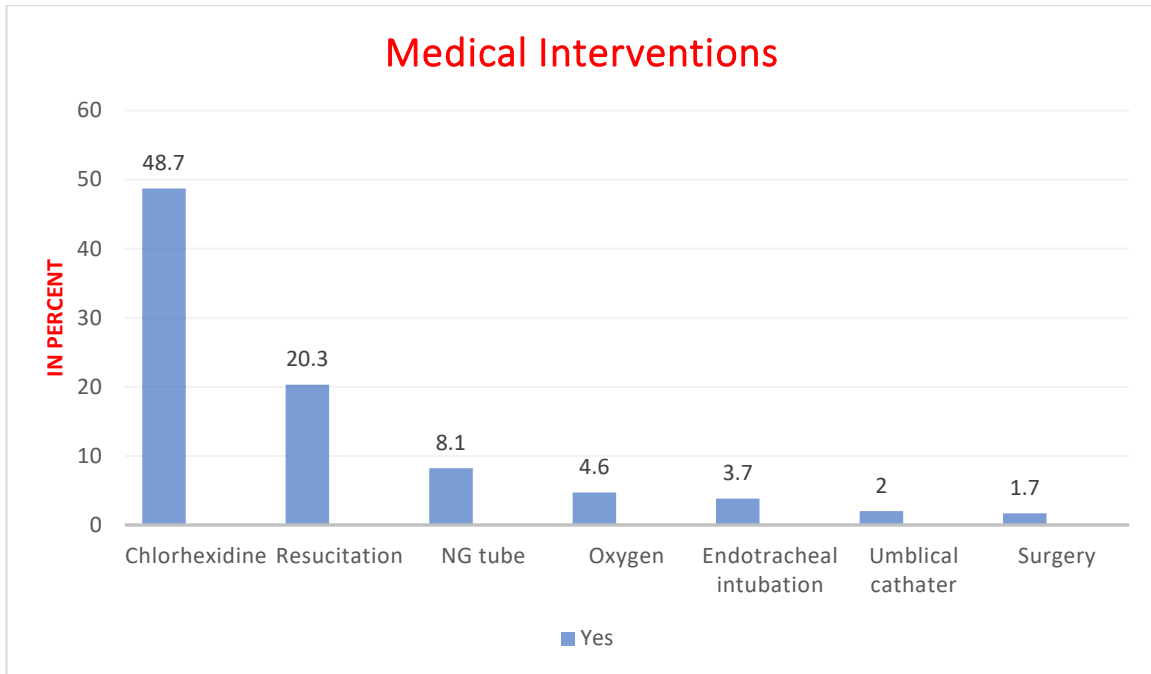


Figure 3: Medical interventions done for neonates admitted to NICU ward of public hospital of Harar and Dire Dawa, Ethiopia, from June 20 to August 20, 2021 (n=409).

4.5. Magnitude of Neonatal Sepsis

As this study revealed, of 409 neonates who were admitted during two months of data collection period in neonatal intensive care unit of public hospitals of Harar and Dire Dawa cities, 105 neonates were diagnosed with neonatal sepsis. According to this, the magnitude of neonatal sepsis was found to be 25.7 % (95% CI: 21.8, 30.1) (Figure 4).

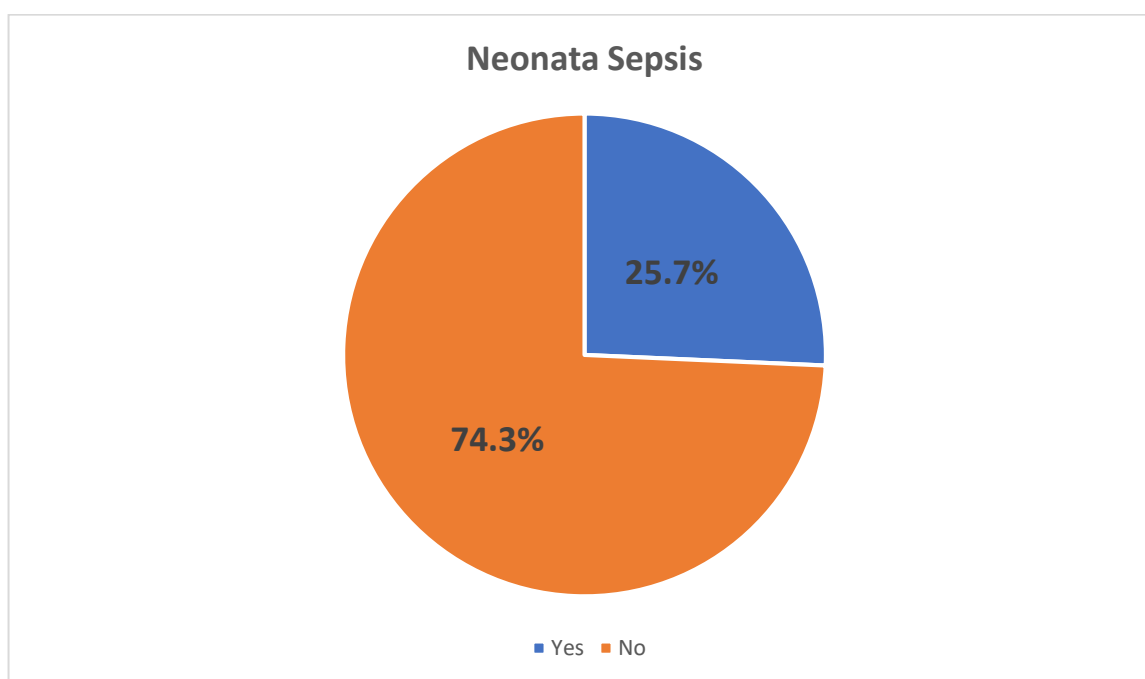


Figure 4: Magnitude of neonatal sepsis in NICU of public hospitals of Harar and Dire Dawa cities, Ethiopia, from June 20 to August 20, 2021 (n=409).

Table 7 Proportion of neonatal sepsis across four public hospitals of Harar and Dire Dawa cities, Ethiopia, June 20 to August 20, 2021.

Name of the hospital	Proportionally allocated sample size	Proportion of neonatal sepsis
HFSUH	174	52 (29.9%)
Jagula	32	9 (28.1%)
Dil-chora	149	32 (21.5%)
Sabiyan	66	12 (18.2%)

4.6. Factors Associated with Neonatal Sepsis

In order to see the association between independent and dependent variables, bivariate and multivariate logistics regression was done. With bivariate model the following independent variables were identified of having significant associations with the neonatal sepsis. These are, educational level of the mothers, sex of the neonates, neonatal age, mode of delivery, maternal history of anemia during pregnancy, maternal UTI infection during pregnancy, history of chorioamnionitis, history of birth asphxia, bottle feeding, chlorhexidine cord care, maternal fever during intrapartum.

In multivariate logistic regression the following variables were entered, variables such as, educational level, sex of neonate, anemia, UTI, mode of delivery, chorioamnionitis, age of neonates, bottle feeding, chlorhexidine cord care, fever during pregnancy and birth asphxia. But variables which showed significant association in the final model were mode of C/S delivery, UTI history, chlorhexidine cord care and bottle feeding.

A neonate born via caesarean section had high odds of developing neonatal sepsis. The odds of having neonatal sepsis was 2.14 times [AOR=2.14, 95% CI: (1.045,4.359)] higher among neonates born via C/S compared to neonates born through spontaneous vaginal delivery. Having UTI history during pregnancy was significantly associated with neonatal sepsis. The odds of developing neonatal sepsis among neonates whose mothers had history of UTI during pregnancy were 3.09 times [AOR=3.09, 95% CI: (1.735,5.496)] higher compared to neonates whose mothers didn't had history of UTI during pregnancy.

Neonates who had fed with bottle feeding were 2.62 times [AOR=2.62, 95% CI: (1.433,4.788)] more likely to develop neonatal sepsis compared to neonates who didn't had bottle feeding. The odds of having neonatal sepsis was 4.2 times [AOR=4.2, 95% CI: (2.362,7.449)] higher among neonates who didn't take chlorhexidine cord care as opposed to neonates who did take chlorhexidine cord care (Table 7).

Table 8 Factors associated with neonatal sepsis among neonates admitted in NICU of public hospitals of Harar and Dire Dawa, Ethiopia, June 20 to August 20, 2021.

Variables		Neonatal Sepsis		COR (95% CI)	AOR (95% CI)
		Yes	No		
Asphyxia	Yes	30	55	1.81(1.083,3.029) *	1.06(0.566,1.973)
	No	75	249	1	1
Maternal Education	No formal education	47	80	3.67(1.809,7.453) **	1.9(0.845,4.279)
	Primary	23	76	1.89(0.878,4.074)	1.45(0.616,3.407)
	Secondary	23	73	1.97(0.913,4.248)	1.77(0.751,4.154)
	More than secondary	12	75	1	1
Sex of neonates	Male	58	129	1.67(1.071,2.617) *	1.45(0.863,2.449)
	Female	47	175	1	1
Age of neonates	<8 days	70	181	1.36(0.853,2.166)	1.17(0.662,2.082)
	8-28 days	35	123	1	1
Maternal anemia	Yes	55	135	1.38(0.883,2.148)	1.18(0.692,2.022)
	No	50	169	1	1
Mode of delivery	C/S	20	32	2.21(1.193,4.090) *	2.14(1.045,4.359) *
	Instrumental	12	14	3.03(1.343,6.835) *	1.83(0.700,4.760)
	SVD	73	258	1	1
Maternal fever	Yes	30	37	2.89(1.673,4.980) **	1.9(0.993,3.635)
	No	75	267	1	1
UTI	Yes	45	49	3.9(2.384,6.389) **	3.09(1.735,5.496) **
	No	60	255	1	1
Chlorhexidine cord care	No	79	131	4.01(2.439,6.602) **	4.2(2.362,7.449) **
	Yes	26	173	1	1
Bottle feeding	Yes	41	38	4.49(2.669,7.534) **	2.62(1.433,4.788) *
	No	64	266	1	1
Chorioamnionitis	Yes	9	11	2.5(1.005,6.207) *	1.12(0.396,3.169)
	No	96	293	1	1

*significant with P<0.05 and **significant with P<0.001

CI= Confidence Interval, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio, UTI= Urinary Tract Infection, SVD= Spontaneous Vaginal Delivery, C/S= Caesarean section

5. DISCUSSION

The magnitude of neonatal sepsis from the current study was moderately lower than most of the studies conducted in Ethiopia. In the current study C/S delivery, maternal UTI, chlorhexidine cord care and bottle feeding were significantly associated with neonatal sepsis.

The magnitude of neonatal sepsis (25.7%) from the current study along together with other studies conducted in Ethiopia may imply that, the Goals seted in national strategy for newborn and child survival, is still facing a major challenge from neonatal sepsis, which was one of the diseases that the national strategy prioritized to intervene and reduce it, in order to deacrase neonatal mortality.

The overall proportion of neonatal sepsis in this study 25.7 % (95% CI: 21.8, 30.1), is in line with the study conducted in Kenyatta national hospital of Kenya 28.6% (Okube and Komen, 2020) and with the study made in Uganda 21.8% (John *et al.*, 2015). But, the proportion of neonatal sepsis in this study appeared being high compared to studies conducted in University of Gondar Specialized Hospital of Ethiopia 11.7% (Yismaw *et al.*, 2019), in Hospital of King Fahad Medical City of Saudi Arabia 8.7% (Al-Matary *et al.*, 2019), Wesley Guild Tertiary University Hospital of Nigeria 16% (Ogundare *et al.*, 2019) and Mulago national university hospital of Uganda 12.8% (Tumuhamye *et al.*, 2020). The possible reason for these discrepancies could be, the diagnostic criteria utilized in the studies of Saudi Arabia, Nigeria, Uganda and Gondar were blood culture and this is highly specific type of diagnostic criteria. Which is in contrast to the current study used physician diagnosis (based on clinical algorithm and hematology) as a diagnostic criterion. Which is highly sensitive type of diagnostic criteria which would lead likely to over diagnose the infection (Obiero *et al.*, 2015). The other possible reason could be the sample size of this study was higher than that of study made in Uganda (Tumuhamye *et al.*, 2020). The sterility of the delivery and NICU setup and socioeconomic status also had undeniable contribution (Al-Matary *et al.*, 2019).

Meanwhile, the proportion of neonatal sepsis in this study is lower than studies conducted in, Gondar 64.8 Ethiopia (Agnche *et al.*, 2020), Jimma 52.6% Ethiopia (Bayana *et al.*, 2020), Arsi 33.8% Ethiopia (Sorsa, 2019) and Wolita 34% Ethiopia (Mersha *et al.*, 2019), study done in public hospitals of Bangladesh 69.35% (Nyma *et al.*, 2020), Haiti 54.8% (Boulos *et al.*, 2017), study conducted in University teaching hospital of Zambia 33% (Kabwe *et al.*, 2016) and

Tanzania 31.4% (Jabiri *et al.*, 2016). Perhaps the time gap exist with some of these studies can have its own contribution for the result discordancy. More over, more than three fourth (79.77%) of the neonates in the Bangladesh's study (Nyma *et al.*, 2020) had asphyxia, which is greater by four fold than current study in which 20.8% of the neonates had encountered asphyxia during birth. So that, asphyxia by itself could be the manifestation of fetal aspiration of infected amniotic fluid and secretion of birth canal which lead to pneumonia and sepsis (Al-Matary *et al.*, 2019). On the other hand, neonates who had asphyxia could had a higher chance to be exposed for resuscitation procedures like endotracheal intubation and ventilators this in turn led for the introduction of exogenous pathogens to the neonates' respiratory canal which will finally resulted neonatal infection and sepsis (Procianoy and Silveira, 2020). High proportion of low birth weights 40.8% in study done in Gondar (Agnche *et al.*, 2020) than this study 5.8% might brought the discrepancy. Due to their immature immune system low birth weight neonates had high likelihood of neonatal sepsis (Martin *et al.*, 2014)

In this study, the odds of neonatal sepsis among neonates delivered by caesarean section was 2.14 times higher compared to those neonates delivered by spontaneous vaginal delivery. This is consistent with studies made in Bishoftu Ethiopia (Woldu *et al.*, 2017) and Uganda (Tumuhamy *et al.*, 2020). This might explain as, with C/S delivered neonates, they may loss the advantage of exposure with microbes from maternal vaginal and fecal flora which leads for the alteration of intestinal microbiota (dysbiosis). Since this intestinal microbiota has a vital role in maturation of immune system and prevention of infection during neonatal period, neonates born with C/S had increased risk of neonatal sepsis (Turroni *et al.*, 2020; Ficara *et al.*, 2020). The other possible explanation could be with C/S delivery there is high risk of initial respiratory difficulties and skin laceration. In both condition there may be high risk of neonatal sepsis due to the utilization of invasive procedures for respiratory problem alleviation and bacterial invasion following skin laceration (Dashe *et al.*, 2018; Procianoy and Silveira, 2020).

Neonates born to mothers who had history of urinary tract infection (UTI) during pregnancy were more likely to have neonatal sepsis than that of neonates born from mothers who didn't have history of UTI. This is in agreement with studies made in Jimma Ethiopia (Bayana *et al.*, 2020), Nigeria (Olorukooba *et al.*, 2020) and Kenya (Okube and Komen, 2020). This might be due to bacteria that cause UTI may concomitantly appeared in lower genital tract and colonize the fetus during delivery. It could also ascend to the upper genital tract and could make infection

of amniotic fluid which might aspirated by the fetus and finally causes neonatal sepsis (Sebastian *et al.*, 2013).

In addition to this, neonates who did not take chlorhexidine cord care at least once during the first seven days of neonatal period, were 4.2 times more likely to suffer from neonatal sepsis than neonates who took chlorhexidine cord care. The possible justification for this could be, infectious pathogens that originates from unclean delivery setup, birth canal and from culture specific application of harmful substances may directly inter in to neonates' blood stream via umbilical cord and cause neonatal sepsis or cause omphalitis then this may advance to neonatal sepsis. This mechanism of neonatal sepsis occurrence would averted by application of chlorhexidine on cord as witnessed by significant reduction of neonatal sepsis among neonates who had chlorhexidine cord care especially in developing countries (Stewart and Benitz, 2016; Gelano *et al.*, 2019)

The odds of having neonatal sepsis was 2.62 higher among neonates who had bottle feeding compared to those neonates who had no history of bottle feeding. This is in consistent with study conducted in Bangladesh (Nyman *et al.*, 2020). This might attributed to, an opportunistic pathogen especially *Cronobacter Sakazakii* that may exist on baby bottles and breast pumps, in dry foods such as powdered infant formula, powdered milk, expressed breast milk, which can cause sepsis in neonates (McMullan *et al.*, 2018; CDC, 2021)

6. STRENGTH AND LIMITATION OF THE STUDY

The strength of the study was, the study tried to assess additional independent predictors of neonatal sepsis which was not investigated by other similar previous studies. So. This will lay a base for future studies that will be made in this particular problem.

On the other hand, this study has the following limitations. Non-differential misclassification bias might be introduced for frequency of digital vaginal examination and duration of labor due to difficulty of remembering the exact frequency of vaginal examination and labor duration by the concerned mothers. Interviewer bias might be introduced.

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

The study found that the prevalence of neonatal sepsis was moderately lower. According to this study, statistically significant association were found between neonatal sepsis and independent factors such as caesarean section delivery, urinary tract infection (UTI), chlorhexidine cord care and bottle feeding. Overall, as the result from this study and other studies made in different parts of Ethiopia had tried to show, the magnitude of neonatal sepsis among admitted neonates were not in the appreciation level. Since neonatal sepsis is one of often preventable disease, it can be further reduced to its lower level if appropriate prevention can be done on those predictors and other possible exposing factors.

7.2. Recommendation

To Hiwot Fana specialized university hospital, Dil-chora referral hospital, Sabiyan general hospital, Jagula primary hospital and health professionals working in those mentioned institutes.

- Improvement of your new born care practices by keeping the consistency of chlorhexidine cord care application as directed by the national protocol is needed.
- Early management of risks of neonatal sepsis during pregnancy like UTI with further considering of advanced diagnostic preferences should be appraised.
- Health education about bottle feeding, when it is needed. Mothers should gate appropriate knowledge about safe preparation, storage and handling of bottle feeding including expressed breast milk.

To Researchers

- Future studies needed to investigate the role of some factors such as, chlorhexidine cord care and bottle feeding will have in neonatal sepsis with prospective study designs.

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7. ANNEXES

Annex I. Information Sheet and Informed Voluntary Consent Form for The Head of Hospital

Introduction:

My name is **Sewmehon Amsalu** I am working as a principal investigator of the study being conducted in this Hospital. I am Msc student at Haramaya University, College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your inistitiution being selected as a study participant.

Title of the study:

Magnitude and Predictors of Neonatal Sepsis Among Neonates Admitted in NICU of Public Hospital Available in Harar and Dire Dawa, Eastern Ethiopia, 2021.

Purpose of the study:

The main aim of this study is to write a thesis as a partial requirement for the fulfillment of Master's degree in maternity and neonatal nursing for the principal investigator. Moreover, the result of the study will contribute in the need of data about the magnitude and factors affecting neonatal sepsis.

Procedure and duration:

I will ask the mother of neonates about their baby by questionnaire and I will extract some information from baby's medical record by using check-lists, that will help us to now the predictors of neonatal sepsis and its existence. There are around 23 questions to answer where I will fill the questionnaire by interviewing the mothers of neonates. And around 15 questions mainly about neonates which will be filled by reviewing the medical record and by asking the mothers of neonates.

Risks and benefits:

The risk of being participating in this study is very minimal, but only taking a few minutes from mothers' time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for different stakeholders.

Confidentiality:

The information that would be provided will be kept confidential. There will be no information that will identify participants in particular. The finding of the study will be general for the study community and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. The participants have the right to declare to allow their neonates to be involved or not in this study. If they decide to participate in this study, they have the right to withdraw from the study any time and this will not label them for any loss of benefits which they entitled. They don't have to answer to any question that they don't want to answer.

Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact the following address:

Principal investigator: Sewmehon Amsalu Adudga, E-mail – sewmehonamsalu@gmail.com,
Mobile phone- 0921440331.

Institutional Health Research Review Committee: Office Phone Number- +251254662011,
P.O.BOX 235, Harar, Ethiopia.

Declaration of informed voluntary consent:

I have read/was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risk and benefits, issues of confidentiality, the right of participating and the contact address to for any queries. I have been given the opportunity to ask questions for thigs that may have been unclear. I was informed that participants have the right to withdraw from the study at any time or not to answer any questions that they don't want. I am also informed that the hospital has the right to stop this study from being conducted if any misdeeds or unethical procedures are observed during the data collection process in the hospital's premises. Therefore, I declare my voluntary consent on behalf of (_____) management to allow this study to be conducted in the (_____) hospital with my initials (signatures).

Name and signature of head of the hospital _____,
_____ date_____.

Name and signature principal investigator _____, _____
date_____

Thank you for your cooperation!

Annex II. Participant Information Sheet and Informed Voluntary Consent Form for the Parents/Guardian

Introduction:

My name is (_____). I am working as a data collector for the study being conducted in this Hospital by (Sewmehon Amsalu Adugna) who is studying for his Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your being selected as a study participants.

Title of the study:

Magnitude and Predictors of Neonatal Sepsis Among Neonates Admitted in NICU of Hospitals Available in Harar and Dire Dawa, Eastern Ethiopia, 2021.

Purpose of the study:

The main aim of this study is to write a thesis as a partial requirement for the fulfillment of Master's degree in maternity and neonatal nursing for the principal investigator. Moreover, the result of the study will contribute in the need of data about the magnitude and factors affecting neonatal sepsis.

Procedure and duration:

I will be interviewing you using a questionnaire and I will extract data about your neonate from his/her medical record to provide me with pertinent data that is helpful for the study. There are around 23 questions to answer where I will fill the questionnaire by interviewing you. And around 15 questions mainly about your neonates which will be filled by reviewing the medical record and by asking you.

Risks and benefits:

The risk of being participating in this study is very minimal, but only taking a few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for different stakeholders.

Confidentiality:

The information you will provide us will be confidential. There will be no information that will identify you in particular. The finding of the study will be general for the study community and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you don't want to answer.

Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact the following address:

Principal investigator: Sewmehon Amsalu Adudga, E-mail – sewmehonamsalu@gmail.com,
Mobile phone- 0921440331.

Institutional Health Research Review Committee: Office Phone Number- +251254662011,
P.O.BOX 235, Harar, Ethiopia.

Declaration of informed voluntary consent:

I have read/was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risk and benefits, issues of confidentiality, the right of participating and the contact address to for any queries. I have been given the opportunity to ask questions for thigs that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any questions that I don't want. Therefore, I declare my voluntary consent to participate in this study with my initials (signatures).

Name and signature of parents/guardian _____, _____ date _____

Name and signature of data collector _____, _____ date _____

Thank you for your cooperation!

Annex III. Afan Oromo Version of Participants Information Sheet and Informed Voluntary consent Form to be Filled by a Parent/Guardian

Haadholii gaffi irratti hirmatanif odeffanno kennamufii Gabatee odeffanon irratti guutamuu

Maqaan koo _____ Jedhama yeroo amma kanatti isin faana kanan argame university haramayatti kollejjii fayya fii saayinsii yaalatti barataa digirii lammaffa kan ta`efii barreffama ebbisaa daa`iman (dhalatani jii`a 1 gadii kan jirran) dhibee qaama (dhaqna) summaa`uu irrattii haalonni fi rakkoolee hamma (qixxe) isaan mudatuu kan qoratu barataa Sawmahoon Amsalutiif ragaalee barbachisan sassaabudhafi. Kanaafuu wa`ee qorannoo kanaa ibsa gababaan isinif kennamee qoranno kanarratti qooda akka fudhattan kabajan isin gaafanna.

Mataduree Qorannichaa: - Bara 2021tti daa`iman hospitaalota mootummaa harar fi diredhawa keessati kan cisaan kessa hamma (qixxe) daa`iman qaama (dhaqna) summaa`uu fi haalonni isaanin kan walqabate.

Kayyoo qorannichaa: - kayyon isaa inni guddaan barataa Sawmahoon Amsalu waraqaa Eebbaa digirii lammaffa kununsa hadholii fi da`imman irratti qophessufi. Qoranno kana irraa odeeffannon argamu wajiraa fayyaa magaloota harar fii diredhawatiif gummachaa gudda qabaa.

Haala adeemsa gaaffichaffii yeroo inni fudhatu:- Gaffichi waliigalati gaffi 33 kan qabu yoo ta`u giddugalessatti daqiiqa 20 ni fudhata. Kanaafuu yeroo qabdanirraa yero murasa gaffile kanaf akka naaf eyyamtan dhifamanin isin gaafadha.

Faayidaafi midhaa qorannichaa: - qorannoo kanarratti hirmachuu keessanif gaffii gaafachuuf yeroo isin jalaa fudhatun ala isinifii daa`iman kessan irratti midhan ga`u hin jiru. Qorannoo kanarratti hirmachuu keessanif kaffaltin isinif laatamu hin jiru garuu, faayidaan qorannichaa wajjiralee fayyaa nannootiif akkasumas waajjiralee tajajila da`umsaa kennanif fayidaa guddaa qaba.

Odeeffanno kessanif ofegganno taasifamu: - odeffannon isin nuuf laattan iccitidhan waan qabamuuf homalle yaadda`un isinirra hin jiru. Haala kaminuu odeeffannon kessan qaama hin ilaallanne harka hin galu. Qorannichi akka waligalaatti malee isin qofa wabii goonee kan ibsinu miti. Gaafficharratti maqaan keessan hin jiraatu.

Mirga isin qorannicharratti qabdan: - guutumatti qorannon kun fedha keessanirratti kan hunda`e yoo ta`u irratti hirmachus ta`e dhisuufis mirga guutuu qabdu. Qaama qorannicha ta`uf

fedha yoo qabattan gaffi deebisuu hin feene debisuu dhisuu akkaasumas qorannicha yeroo barbaddan addan kutuf mirga qabdu. Sababa kana gootanif tajaajilli isinitti hira`atuu fi yakki isinirra ga`u hin jirus hin jiraatus.

Naannoo qorannichaa: - qorannichi yeroo taasifamu kamittuu haala qorannichaa ilaalchisee fi gaaffii kamiyyuu yoo qabaataan odeeffannoo kanaa gaditti fayyadamtani nu argachuu dandeessuu.

- i. Qo`ata olanaa: - Sawmahoon Amsaaluu
Toora email: sewmehonamsalu@gmail.com
Lakk. Bilbilaa: - 0921440331
- ii. Dhaabbata qoranno fayya fi hoji raawwachistu to`anna sirna naamusaa: -
Lakk bilbilaa: - +251254660708
Lakk sanduqa poosta: - 235, harar, Ethiopia

Hubanno gubbaatti argattani irraatti hunda`udhan hirmaattota qorannoo kanaa ta`uu kessaan kan itti dhugomsitan: - haala qorannichaa odeeffannoo kennamerra naaf dubbifameera/dubbifadheera. Kaayyoo bu`uura qorannichaa, adeemsi isaa, faayidaafi midhaa, fayyummaa odeeffannoo kootii, mirga hirmannaa koofi bakki qoratichaa naaf ibsameera. Yeroo qoranna sana gaaffii naaf hin galle gaafachuu akkan danda`uufi yeroon barbaadetti qoranicha addan kutuu akkan danda`u carraan naaf laatameera. Haaluma kanaan qoranicharatti hirmachuuf fedha qabaachu ko mallattoo ko kanan gaditinan raggaasisa.

Maqaa fi mallattoo hirmataa.....

Mallatto walitti qabaa

Guci feedhumma ibsuf guutamu kun walitti qabaan harmee gaafatamtu fulduratti mallatteessu kan qabu yoo ta`u garagalchisaa haadhasanaaf laatamu qaba.

Gargaarsa keessanif onnerra isin galateeffanna!!!!

Annex IV. Amharic Version of Participant Information Sheet and Informed Voluntary Consent Form to be Filled by Parents/Guardian

የተሳታፊዎች የመረጃ ቅጽ በአማርኛ

እንደምን አደሩ/ዋሉ?

ስሜ _____ እባላላወ:: በሀረማያ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ ነርሲንግና ሚድዋይሬሪ ትምህርት ክፍል ማስተርስ ዲግሪ ተማሪ በሆነው ሰውመሆን አምሳሉ አዳኛ አማካኝነት እዚህ ሆስፒታል ለሚሰራው ጥናት መረጃ ሰብሳቢ ነኝ:: ስለጥናቱ ምንነት እና እርስዎ ለምን ለዚህ ጥናት እንደተመረጡ እንዳሰረዳ : የርስዎን መላክም ትብብር እንዲሰጡኝ ስል በትህትና እጥይቃለሁ::

የጥናቱ ርዕስ:

ለጨቅላ ህጻናት የሰውነት መመሪዝ አጋላጭ ሁኔታዎች እና የችግሩ መጠን በሀረር እና ድሬዳዋ ውስጥ በሚገኙ የመንግስት ሆስፒታሎች፣ ምስራቅ ኢትዮጵያ፣ 2021::

የጥናቱ አላማ:

የጥናቱ ዋና አላማ ፣ የማስተርስ ዲግሪውን በእናቶች እና ጨቅላ ህጻናት የትምህርት ዘርፍ በመማር ላይ ለሚገኘው ተማሪ ለመመረቅ የሚሆን የጥናት ጽሁፍ ማዘጋጀት ሲሆን ከዚህም በላይ ከጥናቱ የሚገኘው ውጤት በአካባቢው ለሚገኙ ጤና ቢሮዎች እንዲሁም ሌሎች ፈላጊዎች ያገለግላል::

የጥናቱ አሰራር እና የሚወሰደው ጊዜ:

የበሽታውን አጋላጭ ሁኔታዎች ለማወቅ በሚረዳ መጠይቅ እርስዎን (ማለትም የህጻኑን እናት) እጠይቆታለሁ:: እንዲሁም የህጻኑን ጤና በሚገልጹ ምልክቶች በተዘጋጀ ቅጽ መሰረት ከህጻኑ የህክምና ካርድ ላይ የምወስዳቸው መረጃዎች ይኖራሉ:: ለዚህም ሲባል 21 የሚሆኑ የርስዎን ሁኔታ የሚገልጹ እንዲሁም 12 የሚሆኑ የልጅዎን የጤና ሁኔታ የሚጠይቁ ቅጾች በአጠቃላይ ወደ 20 ደቂቃ የሚፈጁ ተዘጋጅተዋል::

የጥናቱ ጥቅም እና ጉዳት:

ጥናቱ የእርስዎን የተወሰነ ጊዜ ከመሸማት በስተቀር በእርስዎም ሆነ በልጅዎ ላይ የሚያስከትለው ምንም አይነት ጉዳት አይኖርም:: በዚህ ጥናት ውስጥ በመሳተፍዎ የሚከፈል ምንም አይነት ክፍያ የለም ፤ ነገር ግን ከዚህ ጥናት የሚገኘው ውጤት በዚህ ዙሪያ ፍላጎት ላላቸው ሰዎች እንዲሁም አካላት የሚጠቅም ይሆናል::

የመረጃዎ ሚስጥራዊነት:

ከእርስዎ የሚገኘው መረጃ ሚስጥራዊነቱ የተጠበቀ ሲሆን፤ ከጠያቂውና ከአጥኚው በስተቀር በምንም አይነት መልኩ ለሌላ ሰብተኛ ወገን ተላልፎ አይሰጥም:: እንዲሁም የእርስዎን ማንነት በተለየ መልኩ የሚገልጽ ምንም አይነት መረጃም አይኖርም::

የተሳታፊው መብት:

ጥናቱ ውስጥ ለመሳተፍ ሙሉ በሙሉ በእርስዎ ፍቃድ ላይ የተመሰረተ ነው:: ልጅዎን በጥናት ውስጥ አዲሳተፍ የመከልከልም ሆነ የመፍቀድ መብት የእርስዎ ነው:: እንዲሳተፍ ከፈቀዱ ደግሞ በፈለጉት ሰዓት ጥናቱን የማቋረጥ መብት የእርስዎ ነው:: እንደዚህ በማድረግዎ የሚያጥት ምንም አይነት ጥቅም የለም:: ከዚህም በላይ የማይፈልጉትን ጥያቄ ያለመመለስ መብት የእርስዎ ነው::

አድራሻዎች

ለማንኛውም አይነት ጥያቄ በየትኛውም ሰዓት የሚከተሉትን አድራሻዎች ይጠቀሙ::

ዋና አጥኚ:- ሰውመሆን አምሳሉ አዳኛ E-mail – sewmehonamsalu@gmail.com, ስልክ ቁጥር- 0921440331.

የሀረማያ ዩኒቨርሲቲ የህክምና ጥናት ስነምግባር አጥሪ ኮሚቴ የቢሮ ስልክ ቁጥር- +251254662011, ፖሳቁ 235, ሀረር፣ኢትዮጵያ።

የስምምነት መግለጫ ፎርም -

እኔ ለዚህ ጥናት የስምምነት ፊርማዬን ስለጥ፤የዚህ ጥናት ዓላማ በደንብ የተብራራልኝ ሲሆን የጥናቱንም ዓላማ ተረድቻለሁ። በዚህ ጥናት ላይ መሳተፍ በሙሉ ፈቃደኝነት ላይ የተመሰረተ መሆኑን በሚገባ የተረዳሁ ሲሆን በማንኛውም ጊዜ ከጥናቱ ራሴን የማግለል መብት እንዳለኝ አውቄአለሁ። ስለሆነም የምሰጠው መረጃ እስከተጠበቀ ድረስ በዚህ ጥናት ለመሳተፍ ተስማምቻለሁ። በጥናቱ ስላተፍ በህጻኑ/ኗ ወይም በኔ ላይ ምንም አይነት ጉዳት እንደሌለው በግልጽ ተረድቻለሁ። በሙብቴ ዙሪያም ሆነ ስለጥናቱ ያልገባኝ ጥያቄ ካለ በማንኛውም ሰአት መጥየቅ እንደምችል ተገልጾልኛል።

የመረጃ ሰጭ ስምና ፊርማ _____ ፣ _____ ቀን _____

የመረጃ ሰብሳቢ ስምና ፊርማ _____ ፣ _____ ቀን _____

ይህ የፈቃደኝነት ማረጋገጫ ቅጽ መረጃ ሰብሳቢዉ ባለበት ከተጠያቂዋ እናት ፊት ለ ፊት መፈረም ያለበት ሲሆን ቅጂዉ ለእናትዬዋ መሰጠት አለበት።

ለትብብርዎ ከልብ እናመሰግናለን!!!!

Annex V. Somali Version of Participant Information Sheet and Informed Voluntary Consent Form to be Filled by Parents/Guardian

Hordhac:

Magacaygu waa (_____). Waxaan u shaqeynayaa sidii xog ururiye daraasadda lagu sameeyo Isbitaalkan oo uu (Sewmehon Amsalu Adugna) oo dhigta shahaadada masters-ka ee jaamacada Haramaya, kuliyaada Caafimaadka iyo sayniska Caafimaadka. Waxaan si naxariis leh kaaga codsanayaa inaad i amaahiso dareenkaaga si aan kaaga sharaxo daraasadda iyo in lagu xusho Kaqeybgalaha daraasad.

Cinwaanka daraasadda:

Baaxadda iyo Saadaalinta Cudurka Neonatal Sepsis oo ka mid ah Dhallaanka la dhigey NICU ee Isbitaalada Waxaa laga heli karaa Harar iyo magaalada Dire Dawa, Bariga Itoobiya, 2021.

Ujeedada daraasadda:

Ujeedada ugu weyn ee daraasaddan ayaa ah in la qoro daraasad shardi ahaan qayb ahaan looga baahan yahay dhammaystirka shahaadada Masterka ee hooyada iyo xannaanada carruurta Dhallaanka ah ee baaraha ugu sarreeya. Intaa waxaa dheer, natiijada daraasaddu waxay gacan ka geysan doontaa baahida loo qabo xogta ku saabsan baaxadda iyo arrimaha saameynaya sepsis-ka dhallaanka.

Nidaamka iyo muddada:

Waan ku wareysan doonaa adiga oo adeegsanaya xogwaraysi waxaan ka soo saari doonaa xogta ku saabsan ilmahaaga cusub diiwaankiisa / keeda caafimaad si ay ii siiso xog muhiim ah oo ka caawinaysa daraasadda. Waxaa jira ku dhowaad 21 su'aalood oo laga jawaabo halka aan ku buuxiyo foomka su'aalaha adiga oo ku wareysanaya. Iyo kudhowaad 12 su'aalood oo inta badan ku saabsan dhallaankaaga kuwaas oo lagu buuxin doono iyadoo la fiirinayo diiwaanka caafimaadka iyo adiga oo ku weydiinaya.

Khataraha iyo faa'iidooyinka:

Khatarta kaqeybgalka daraasaddan waa mid aad uyar, laakiin waxay qaadaneysaa daqiiqado yar waqtigaaga. Ma jiri doono wax lacag bixin toos ah oo loogu talagalay kaqeybgalka daraasaddan. Laakiin natiijooyinka ka soo baxay cilmi-baaristani waxay daaha ka qaadi karaan macluumaad muhiim u ah daneeyayaasha kala duwan.

Qarsoodiga:

Macluumaadka aad na siiso wuxuu noqon doonaa mid sir ah. Ma jiri doono macluumaad kuu aqoonsan doona gaar ahaan. Raadinta daraasaddu waxay guud ahaan u noqon doontaa bulshada daraasadda mana ka tarjumeeyso wax gaar ah oo shaqsiyeed. Foomka su'aalaha waxaa lagu calaamadeyn doonaa si looga reebo magacyo muujinaya. Tixraac laguma sameyn doono warbixinno afka ah ama qoraal ah oo ku xiri kara ka-qaybgalayaasha cilmi-baarista.

Xuquuqda:

Ka qaybqaadashada daraasaddan waa ikhtiyaari ikhtiyaari ah. Waxaad xaq u leedahay inaad ku dhawaaqdo inaad kaqaybqaadato ama aanad kujirin daraasaddan. Haddii aad go'aansato inaad kaqeyb gasho, waxaad xaq u leedahay inaad ka baxdo daraasadda wakhti kasta taasna kuma calaamadeyn doonto luminta waxtarrada aad xaq u leedahay haddii kale. Ma aha inaad ka jawaabto su'aal kasta oo aadan rabin inaad ka jawaabto.

Cinwaanka lagala xiriirayo:

Haddii ay jiraan wax su'aalo ah ama wax ka weydiiyaan waqti kasta oo ku saabsan daraasadda ama nidaamyada, fadlan la xiriir cinwaanka soo socda:

Baadhe maamule: Sewmehon Amsalu Adudga, E-mailka - sewmehonamsalu@gmail.com, Telefoonka gacanta- 0921440331.

Guddiga Dib-u-eegista Cilmi-baarista Caafimaadka ee Hay'adda: Lambarka Taleefanka Xafiiska- +251254662011, P.OBOX 235, Harar, Ethiopia.

Bayaanka ogolaanshaha ikhtiyaariga ah ee la wargeliyey:

Waan akhriyay / waa lay akhriyay xaashida macluumaadka kaqaybgalaha. Waxaan si cad u fahmay ujeedada cilmi baarista, habraacyada, halista iyo waxtarka, arimaha sirta, xaqa kaqeybgalka iyo cinwaanka lala xiriirayo wixii su'aalo ah. Waxaa la isiiyay fursad aan ku waydiiyo su'aalo ku saabsan cawrada oo aan cadeyn karin. Waxaa la igu wargeliyay inaan xaq u leeyahay inaan ka baxo daraasadda waqti kasta ama aanan ka jawaabin wixii su'aalo ah ee aanan rabin. Sidaa darteed, waxaan caddaynayaa Translated from en - English to so - Somali

ogolaanshahayga ikhtiyaariga ah ee kaqaybqaadashada daraasaddan oo ay kujiraan magacyo (saxiixyadayda).

Magaca iyo saxiixa waalidiinta / ilaaliyaha _____, _____
taariikhda_____

Magaca iyo saxiixa xog aruuriyaha _____, _____
taariikhda_____

Waad ku mahadsantahay wada shaqayntaada!

Annex VI. English Version Questionnaire

Haramaya University College of Health Science Department of Maternity and Neonatal Nursing

A questionnaire to determine the magnitude and predictors of neonatal nursing among neonates admitted in NICU of Hospitals available in Harar and Dire Dawa city, Eastern Ethiopia.

1. Questionnaire ID number _____

2. Address, Kebele _____

3. Name of health facility _____

Instruction: Encircle from a given alternatives and write if any other answer is given.

PART I. Socio-demographic characteristics of mother of neonate

No.	Question	Response	Skip
101	Mother's age	(in years)	
102	Marital status	1. Single 2. Married 3. Widow 4. Divorced 5. Separated 6. Cohabitated	
103	Number of Parity	_____ in number	
104	What is your religion?	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. other (specify) _____	
105	Ethnicity	1. Oromo 2. Amhara 3. Somali 4. Harari 5. Other (specify) _____	
106	Residence	1. Urban 2. Rural	
107	Maternal education	1. No formal education 2. Primary 3. Secondary 4. More than secondary	
		1. Housewife 2. Civil servant 3. Business women 4. Private organization	

108	Occupation of mother	5. Daily laborer 6. Student	
109	Monthly income of the household	_____in Ethiopian birr	
PART II. Labor and delivery factors			
201	What was the duration of labor?	_____in hours	
202	What was your mode of delivery?	1. SVD 2. C/S 3. Instrumental	
203	Where was your place of delivery?	1. Hospital 2. Health center 3. Private clinic 4. Home 5. Other (specify)_____	If in "Home" skip to 301
204	If the place of delivery was at hospital, health center, private clinic, how many times did the health personnel perform per vaginal examination?	_____in numbers	
PART III. Maternal related factors			
301	Did you visit health facility for ANC during pregnancy for this neonate?	1. Yes 2. No	If 'No' skip to 303
302	If yes, how many times did you receive antenatal care during your time of pregnancy for this neonate?	_____times	
303	Did you have urinary tract infection during the time of pregnancy of this neonate?	1. Yes 2. No	
304	Did you have fever during the time of labor?	1. Yes 2. No	
305	What was your HIV status during pregnancy?	1. Positive 2. Negative 3. Unknown	
306	Did you had diagnosed with Anemia during pregnancy?	1. Yes 2. No	

307	Did you have bleeding during the time of pregnancy for this neonate? / APH	1. Yes 2. No	
308	Did you have pregnancy related hypertension PIH/Eclampsia during the pregnancy of this neonate?	1. Yes 2. No	
309	Did you have history of premature rupture of membrane?	1. Yes 2. No	If "No" skip to 401
310	How long it takes to labor initiation after a rupture of membrane?	_____ (in Hours)	
PART IV. Neonatal related factors			
401	Did the neonate receive chlorhexidine cord care?	1. Yes 2. No	
402	Did the neonate have history of bottle-feeding?	1. Yes 2. No	
PART V. A Checklist on neonatal health related factors			
501	Sex of the neonates	1. Male 2. Female	
502	Gestational age	_____in weeks	
503	Weight of neonate during birth	_____in grams	
504	Age during diagnosis	_____in days	
505	History of birth asphyxia	1. Yes 2. No	
506	History of chorioamnionitis	1. Yes 2.No	
507	Did the neonate resuscitated at birth?	1. Yes 2. No	
508	Did the neonate had any type of surgery done?	1. Yes 2. No 3. Specify__	
509	Was the neonate on oxygen?	1. Yes 2. No	If 'No' skip to 511
510	If yes what was the method of oxygen administration	1. Intranasal Cathater 2. Mask 3. Nasal Cannula	
511	Did the neonate had endotracheal intubation?	1. Yes 2. No	

512	Did the neonate had NG tube inserted?	1. Yes 2. No	
513	Did the neonate had umblical cathather inserted?	1. Yes 2. No	
514	Does the neonate diagnose with neonatal sepsis?	1. Yes 2. No	

Annex VII. Afan Oromo Version Questionnaire

Yuunivaristii haaromayyaa kolleejii saayinsii fayyaa kutaa narsii fi midwifri

qaama (dhaqna) ijolee daa’iman summaa’aniif (neonatal sepsis) haalonni fi rakkoolee hamma (qixxe) hospitaalota mootummaa harar fi diredhawa keessati jiraan beekuf kan qopha’ee.

1 Lakk Eenyummaa Gaafata _____

2 Tessoo, Aarada _____

3 Maqaa Dhaabatichaa _____

lakk	Gaafii	Debii	Utaala
101	Umriin keysaan meqaa?	------(Bagatti)	
102	Akaataa /haala gaa’ila	1. Qaree/kan hin herumne 2. Heerumtu 3. Abbaamanaa ishee kan jalaa du,ee 4. Kan adda bate 5. Kan adda fagaatan 6. Osoo hin herumin kan dhiraa wajii jiratu	
103	Daa’ima batti torba darbe meqaa dhaltani (dessan) du’an kan dhalatan ida’ee?	----- (lakkofsaan)	
104	Amaantin keysaan malii?	1. Ortodoksii 2. Musliima 3. Protestantii 4. Katolikii 5. Kan bira (maqaa dhahaa)	
105	Sabnii kee malii	1. Oromoo 2. Amaraa 3. Somaalee 4. Harraari 5. Kan biraa (maqaa dhahaa)	
106	Idoo jirenyaa	1. Magaala 2. Baadiyaa	
107	Sadarkaa barnoota	1. Kan hinbaranee 2. Sadarkaa takkoffaa 3. Sadarkaa Lammaffaa 4. Kolleejii fi sana ol	
108	Gaheen hojii keysaan malii	1. Haadha manaa 2. Hojaatu mootummaa 3. Daldalaa 4. Hojjetaa dhunfaa 5. Hojjetaa guyyaa 6. Barataa	

109	Galii ji'aa kan maatii waligalaa	_____ (Qarshiidhaan)	
Kutaa II: Akaataa ciniinsu fi dahumsa			
201	Hogaa daa'ima kana dessan ciniinsi hammam isiin tursiisee?	----- (saa'atidhan)	
202	Haala kamiin dhaltaan?	1. Uumamaan (ciniinsun) 2. Opreeshiniin 3. Meeshaa dhan gargaaramun	
203	Eessaaatti dhaalan?	1. Hospitaala 2. Buufata fayyaa 3. Kiliniika dhuunfaa 4. Manaa 5. Kan bira (dhahaa)	Debian kessan 'manaa' yoo tahe garaa lakkofsa 301
204	Hospitaala, buufata fayyaa, kiliniika, kandhaltan yoo tahee oggessin fayyaa yaroo meqaa gadameessa isiin qoratan?	----- (lakkofsan)	
Kutaa III: Haala haatii wajjin waal qabatee			
301	Daa'ima amma yaroo ulfa turtan hordoffi ulfooma niqabdu ture?	1. Eeyyee 2. Hinqabu ture	Debisan kessan "hinqabu'yoo tahe" garaa lakkofsa 303
302	Hordoffi ulfoma yoo kanqabdan ture yaroo hammamif?	_____ (lakkofsan)	
303	Daa'ima kana yaroo ulfa turtan summa'uu ykn faallama tubboo fincanii (infection) isiin mudatee ture?	1. Eeyyee 2. Natti hin mudane	
304	Yaroo ciniinsa layidaa (gubaa) haalan qabdu ture?	1. Eeyyee 2. Hinqabu ture	
305	Daa'ima kana yaroo ulfa turtan qorannoo HIV Eeddsi bu'aan maal ture?	1. Natti arkame ture 2. Billisaa 3. Hinbekamu	
306	Yaroo ulfoma hir'ina dhigaa akka qabdan oggeessa fayyaattin isiin himame ture?	1. Eeyyee 2. Natti hin himamne	
307	Yaroo daa'ima kana ulfo turtan dhangala'uu dhigaa isiin mudate ture?	1. Eeyyee 2. Natti hin mudane,	

308	Yaroo daa'ima kana ulfa turtan ulfoma wajiin walqabate dhibaa dhigaa isiin mudate ture?	1. Eeyyee 2. Natti hin mudane,	
309	Jalqaba cinninsu dura garbi isiin ira yaa'ee ture?	1. Eeyyee 2. Hin yaane	Debisan kessan "Hin yaane'yoo tahe" garaa lakkofsa 401
310	Garbi yoo isiin yaa'ee ture hamma ciniinsu jalqaba sa'aa hangam ture?	_____ (sa'aa dhan)	
Kutaa IV: Daa'ima wajiin waal qabatee haalonni saxilaan			
401	Daa'imaaf handhuraa irratti dawaa dibamuu (kiloroksidin) kanameefii dibdani turtanii?	1. Eeyyee 2. Hin dibaminee	
402	Masasa (xuxo) luge ture?	1 Eeyyee 2 Lakkii(Gonkuma)	

Annex VIII. Amharic Version Questionnaire

ሀረማያ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ ነርሲንግና ሚድዌይሪ ትምህርት ክፍል

ለጨቅላ ህጻናት የሰውነት መመረዝ አጋላጭ ሁኔታዎች እና የችግሩን መጠን በሀረር እና ድሬዳዋ ውስጥ በሚገኙ የመንግስት ሆስፒታሎች ለማወቅ የተዘጋጀ መጥይቅ

የመጥይቁ መለያ ቁጥር _____

አድራሻ፡ ቀበሌ _____

የተቋሙ ስም _____

ክፍል አንድ፡- የጨቅላዉ ህጻን እናት አጠቃላይ ሁኔታ

ተ.ቁ	ጥያቄ	መልስ	ይዘለሉ
101	እድሜዎ ስንት ነዉ?	_____ (በአመት)	
102	የትዳር ሁኔታ	<ol style="list-style-type: none"> 1. ያላገባች 2. ያገባች 3. ባሏ የሞተባት 4. የተፋታች 5. የተራራቁ 6. ሳታገባ አብራ የምትኖር 	
103	ስንት ልጅ 7 ወር ከሞላቸዉ በኋላ ወልደዋል?(ሞተዉ የተወለዱትን ጨምሮ)	_____ (በ ቁጥር)	
104	ሀይማኖትዎ ምንድነዉ?	<ol style="list-style-type: none"> 1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላ(ይጥቀሱ) _____ 	
105	ብሄሮዎ ምንድነዉ?	<ol style="list-style-type: none"> 1. ኦሮሞ 2. አማራ 3. ሶማሌ 4. ሀረሪ 5. ሌላ(ይጥቀሱ) _____ 	
106	የመኖሪያ አካባቢ	<ol style="list-style-type: none"> 1. ከተማ 2. ገጠር 	
107	የትምህርት ደረጃ	<ol style="list-style-type: none"> 1. ያልተማሩ 2. የመጀመሪያ ደረጃ 3. ሁለተኛ ደረጃ 4. ኮሌጅና ከዛ በላይ 	
108	የስራ መደብዎ ምንድነዉ?	<ol style="list-style-type: none"> 1. የቤት እመቤት 2. የመንግስት ሰራተኛ 3. ነጋዴ 4. በግል ተቋም 5. የቀን ሰራተኛ 6. ተማሪ 	

109	የቤተሰቡ አጠቃላይ ወራዊ ገቢ	_____ (በብር)	
ክፍል ሁለት፡- የምጥ እና ወሊድ ሁኔታ			
201	ይህን ህጻን ሲወልዱ ምጥ ምን ያህል ቆየብዎ?	_____ (በሰአት)	
202	እንዴት ነበር የወለዱት	1. በተፈጥሮ በምጥ 2. በቀዶ ጥገና 3. በመሳሪያ በመታገዝ	
203	የት ወለዱ	1. ሆስፒታል 2. ጤና ጣቢያ 3. የግል ክሊኒክ 4. እቤት 5. ሌላ(ይጥቀሱ)	መልሱ 'እቤት' ከሆነ ወደ ቁጥር 301
204	ሆስፒታል፣ ጤና ጣቢያ፣ ክሊኒክ ከሆነ የወለዱት የጤና ባለሙያዉ በእጁ ስንት ጊዜ መሀጸኖቻን መረመሮት?	_____ (በቁጥር)	
ክፍል ሶስት፡ የእናት የሞ ሁኔታ			
301	ያሁኑን ህጻን እርጉዝ እያሉ የእርግዝና ክትትል ነበረዎ?	1. አዎ 2. አልነበረኝም	መልሱ 'አልነበረኝም' ከሆነ ወደ ቁጥር 303
302	የእርግዝና ክትትል ከነበረዎ ምን ያህል ጊዜ?	_____ (በቁጥር)	
303	ይህን ህጻን እርጉዝ እያሉ የሸንት ቱቦ መመረዝ(ኢንፎክሽን) አጋጥሞዎት ነበር?	1. አዎ 2. አላጋጥመኝም	
304	የምጥ ጊዜ ከፍተኛ ትኩሳት ነበረብዎ?	1. አዎ 2. አልነበረብኝም	
305	ይህን ህጻን እርጉዝ እያሉ የ HIV ኤድስ ምርመራ ዉጤትዎ ምን ነበር?	1. ተገኝቶብኝ ነበር 2. ነጻ 3. አይታወቅም	
306	በእርግዝና ወቅት የደም ማነስ እንዳለብዎ በህክምና ባለሙያ ተነግሮዎት ነበር?	1. አዎ 2. አልተነገረኝም	
307	ይህን ህጻን እርጉዝ እያሉ የደም መፍሰስ አጋጥሞዎት ነበር?	1. አዎ 2. አላጋጥመኝም	
308	ይህን ህጻን እርጉዝ እያሉ ከእርግዝና ጋር የተገናኘ ደም ግፊት አጋጥሞዎት ነበር?	1. አዎ 2. አልገጠመኝም	
309	ምጥ ሳይጀምር በፊት የሸርት ዉሀ ፈሦሶ ነበር?	1. አዎ 2. አልፈሰሰም	መልሱ 'አልፈሰሰም' ከሆነ ወደ ቁጥር 401
310	የሸርት ዉሀ ፈሦሶ ከነበረ ምጥ እስኪጀምር ስንት ሰአት ፈጀ?	_____ (በ ሰአት)	
ክፍል አራት፡- ከህጻኑ ጋር የተያያዙ አጋላጭ ሁኔታዎች			
401	ህጻኑ እንደተወለደ እምብርቱ ላይ የሚቀባ መድሃኒት (ክሎርክሲዲን) በጤና ባለሙያ ወይም በእርሰዎ ቀብታችሁለት ነበር?	1. አዎ 2. አልተቀባም	
402	ለህጻኑ በጡጡ በአፉ የተሰጠዉ ነገር ነበር?	1. አዎ 2. አልወሰደም	

Annex IX. Somali Version Questionnaire

Kulliyadda Caafimaadka ee Jaamacadda Haramaya ee Sayniska Caafimaadka Waaxda Hooyada iyo Dhallaanka

Su'aalo-waydiin lagu ogaanayo baaxadda iyo saadaalinta kalkaalinta caafimaad ee Dhallaanka ee dhallaanka cusub ee la dhigeey NICU ee Isbitaalada laga heli karo Harar iyo magaalada Dire Dawa, Bariga Itoobiya.

1. Lambarka Aqoonsiga Su'aalaha _____
2. Cinwaanka, Kebele _____
3. Magaca xarunta caafimaadka _____

Tilmaamid: Ka meermeer meerisyada kale waxna qor haddii jawaab kale la bixiyo.

QEYBTA I. Astamaha bulshada-bulshada ee hooyada dhashay

Tirada	Su'aal	Jawaab	Ka bood
101	Da'da Hooyada	_____ (Sanadaha)	
102	Xaaladda guurka	<ol style="list-style-type: none"> 1. Kali 2. Xaasley 3. Carmal 4. Furiinka 5. Kalasocay 6. Wada noolaansho 	
103	Imisa carruur ah ayaad leedahay oo ku dhashay 7 bilood ama dhicis (marka lagudaro ilmo mayada soo dhashay)	_____ (lambarka)	
104	Diintaadu maxay tahay?	<ol style="list-style-type: none"> 1. Orthodox 2. Muslim 3. Protestant 4. Kaatoolig 5. kale (caddee) _____ 	
105	Qowmiyadda	<ol style="list-style-type: none"> 1. Oromo 2. Amxaarada 3. Soomaali 4. Harari 5. Mid kale (caddee) _____ 	
106	Degenaanshaha	<ol style="list-style-type: none"> 1. Magaalo 2. Reer Miyiga 	

107	Waxbarashada hooyada	1. Waxbarasho la'aan 2. Hordhac 3. Dugsi Sare 4. Kuleej iyo ka sareeya	
108	Shaqada hooyada	1. Marwadda guriga 2. Shaqaalaha dawladda 3. Haweenka ganacsatada ah 4. Urur gaar loo leeyahay 5. Shaqaale maalinle ah 6. Arday	
109	Dakhliga bishii ee qoyska	_____ in lacagta Itoobiya	

QAYBTA II. Sababaha shaqada iyo dhalimada

201	Muxuu ahaa mudada foosha?	_____ saacadood gudahood	
202	Qaabkaagii gaarsiinta sidee ahaa?	1. SVD 2. C / S 3. Qalab	
203	Aaway meeshii lagugu keenay?	1. Isbitaalka 2. Xarunta caafimaadka 3. Xarun caafimaad oo gaar loo leeyahay 4. Guri 5. Mid kale (caddee)_____	Haddii aad ku jirto "Guri" u gudub 301
204	Hadday goobta umulintu ku taal cisbitaalka, xarunta caafimaadka, rug caafimaad oo gaar loo leeyahay, immisa jeer ayay shaqaalaha caafimaadku sameeyeen baaritaan kasta oo siilka ah?	_____ nambarada	

QAYBTA III. Waxyaabaha la xiriira hooyada

301	Miyaad booqatay xarun caafimaad oo loogu talagalay ANC inta lagu guda jiro uurka qofkan cusub?	1. Haa 2. Maya	Haddii 'Maya' u gudub 303
302	Hadday haa tahay, immisa jeer ayaad heshay daryeelka ka horreeya dhalimada inta aad uurka leedahay ilmahan dhasha ah?	_____ marka	
303	Miyaad ku dhacday infekshinka kaadi mareenka inta lagu jiro	1. Haa 2. Maya	

	waqtiga uurka ee Dhallaanka cusub?		
304	Ma ku xumeyd intaad foolaneysay?	1. Haa 2. Maya	
305	Muxuu ahaa xaaladdaada HIV intaad uurka leedahay?	1. Wanaagsan 2. Wax taban 3. Lama yaqaan	
306	Miyaad ku ogaatay dhiig yari intaad uurka leedahay?	1. Haa 2. Maya	
307	Ma ku dhiigbaxday waqtiga uurka qofkan cusub? / APH	1. Haa 2. Maya Sheeg _____	
308	Miyaad qabtaa dhiig-karka uurka leh ee la xiriira PIH/Eclampsia inta lagu guda jiro uurka ilmahan dhasha ah?	1. Haa 2. Maya Caddee _____	
309	Taariikhda dillaaca dhicis ee xuubka	1. Haa 2. Maya	Haddii 'Maya' u gudub 401
310	Mudo intee le'eg ayay ku qaadaneysaa bilaabida foosha kadib dillaaca xuubka oo deg deg ah?	_____ (Saacadaha)	
QAYBTA IV. Liis-hubin ku saabsan arrimaha la xiriira Dhallaanka			
401	Dhallaanka ma helay daryeelka xarka chlorhexidine?	1. Haa 2. Maya	
402	Ilmuhu ma taariikh buu u lahaa quudinta dhalada?	1. Haa 2. Maya	

Annex X. Curriculum Vitae (CV)

1. Personal Information

Full name: Sewmehon Amsalu Adugna

Place of birth: Gelemso

Date of birth: Month: 12 Year: 1984 E.C

Sex: M

Age: 28

Nationality: Ethiopian

Current Address: Dire Dawa

Phone: 0921440331

Email Address: sewmehonamsalu@gmail.com

Marital Status: Married

2. Educational Qualification: BSc degree in Midwifery

Level in national classification: Higher education

3. Skill: Three (3) years' Hospital experience as a clinical Midwife in Ciro General Hospital, Two (2) years' experience as Instructor of Dire Dawa University College of Health and Medical Science.

Language skill	Lessening	Speaking	Writing	Reading
1. Amharic	Excellent	Excellent	Excellent	Excellent
2. English	Excellent	V. good	Excellent	Excellent
3. Afan Oromoo	Excellent	Excellent	V. Good	Excellent

4. Hobbies: I enjoy by reading book and helping elder peoples, teaching, sharing experience, Watching Television.

5. Training

Training on Cervical Cancer Screening from PATH FINDER, 1st trimester Abortion Care from IPASS, Post-Partum IUCD and Midwife Mentoring from Oromia Health Office.