DETERMINANTS OF NEONATAL SEPSIS PREVENTIVE PRACTICES AMONG POSTNATAL MOTHERS ATTENDING MOTHER AND CHILD CLINIC AT EMBU LEVEL FIVE HOSPITAL, KENYA

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been submitted for an award of diploma or conferment of degree in any University.

Signature _____ Date 18/10/2024

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Recommendation

This thesis has been examined, passed and submitted with our approval as University supervisors.

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DEDICATION

I dedicate this study to my loving father Lawrence Alemun and mother Scovia, my adoring husband Samson Biko, and lovely son Alpha Biko Junior for their endless support and encouragement.

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May God bless you all

ABSTRACT

Globally, neonatal sepsis accounts for 35% of neonatal deaths, with its burden estimated at 203,000 sepsis-associated deaths annually. The third Sustainable Development Goal (SDG 3.2) on child health aspires to end avoidable childhood and newborn deaths by 2030. However, this cannot be achieved because of the high number of sepsis-specific neonatal deaths, especially in third-world countries. This study sought to assess determinants of neonatal sepsis preventive practices among postnatal mothers attending the mother and child health clinic at Embu Level Five Hospital in Kenya. The study adopted a descriptive cross-sectional survey design. Eighty-one postnatal mothers selected by systematic random sampling from the Mother and Child Health clinic at the Embu Level Five Hospital participated in the study. Five key informants, including nurses and midwives purposively selected from the nursing department, also participated in the study. Quantitative data was collected using a researcher-administered semi-structured questionnaire and analyzed using the statistical package of social sciences (SPSS) computer software version 29.0. Qualitative data was collected using in-depth interviews and analyzed thematically. The chi-square test and multivariate logistic regression analysis were used to establish the association between the variables. The mean age of the respondents was 26.56 (SD ±6.905). The results showed that 30 (37%) were self-employed, with the majority being multiparous. The average age of the neonates was 15.02 days (SD ±4.602). The determinants associated with neonatal sepsis preventive practices among postnatal mothers included age (p = < 0.001), employment status (p = < 0.001), level of education (p = < 0.001), parity (<0.001), and marital status (p = 0.020). Home-based factors to be associated with neonatal sepsis preventive practices included decision makers for neonate care on place of delivery (AOR 0.120; 95% CI 0.016, 0.921, p-0.041), on baby's current food (AOR 0.125; 95% CI 0.024, 0.655, p=0.014), and cultural beliefs (AOR 5.842; 95% CI 1.014, 33.670, p=0.003). Qualitative data results discussed the following themes: sepsis preventive practices, cultural beliefs detrimental to preventive practices, challenges in implementing preventive practices, and recommendations to improve neonatal sepsis preventive practices. In conclusion, the demographic characteristics and home-based factors are some of the factors that determine neonatal sepsis preventive practice among postnatal mothers. The study recommends promoting neonatal sepsis preventive practices through increased health awareness and education during pregnancy, labor, and delivery. Drafting policies and implementing strategies on neonatal sepsis prevention should be done thus reducing the risk and repercussions of neonatal sepsis.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC	Antenatal Care
BBA	Born Before Arrival
GPS	Global Positioning System
KDHS	Kenya Demographic Health Survey
MCH	Mother and Child Health Clinic
NNS	Neonatal Sepsis
SPSS	Statistical package of social sciences
WHO	World Health Organization

CHAPTER ONE
INTRODUCTION

1.1 Background Information

Neonatal mortalities have decreased from 5 million in the 1990s to 2.4 million in 2000, though neonates still face the highest mortality threat due to neonatal sepsis (NNS). The worldwide burden of NNS is estimated at 1.3 million, with 203,000 sepsis-associated neonatal deaths annually (WHO, 2020). Neonatal sepsis is the leading reason for neonatal morbidity and mortality worldwide, liable for about 35% of all neonatal mortalities, followed by other factors such as prematurity, intrapartum complications, and asphyxia which also, in one way or another, are related to neonatal sepsis progression (WHO, 2020). Overall, neonatal deaths due to neonatal sepsis are mainly due to inadequate quality of care at birth, poor care continuum during the neonatal period, and failure to use skilled birth attendants (WHO, 2022).

The third Sustainable Development Goal (SDG 3.2) on child health aspires to end all childhood and neonatal deaths that occur due to preventable causes such as sepsis by 2030 (WHO, 2016). However, it becomes difficult to achieve the goal if there is no decline in sepsis-specific neonatal deaths, especially in third-world countries (WHO, 2016; Paulson *et al.*, 2021). According to Chaurasia *et al*. (2019), the highest NNS burden globally is experienced in South Asia and sub-Saharan Africa. It was estimated in 2013 that 38.9% of all neonatal deaths due to sepsis occurred in South Asia (Chaurasia *et al.*, 2019). Twenty-three out of 1000 live births die in central and southern Asia. Neonatal sepsis and deaths in South Asia were associated with mothers and caregivers' poor knowledge, poverty, healthcare delivery inequalities, and low coverage of effective interventions necessary to prevent infections in neonates (Chaurasia *et al*., 2019). Nevertheless, even then, the reported neonatal sepsis statistics might still be an underestimate due to the decreased number of skilled birth attendants and increased rate of home deliveries in which some cases of the condition may not be established or reported (WHO, 2020).

Sub-Saharan Africa has the utmost neonatal mortality rate, with 27 deaths per 1000 live births, thus liable for 43% of global neonatal mortalities (WHO, 2022). The significant reasons for NNS in sub-Saharan Africa have been documented as aseptic breaches

resuscitation, low birth weight, low Apgar score, prematurity, prolonged labor, premature rupture of membranes, multiple digital vaginal examinations, and low maternal socioeconomic status (Bech *et al*., 2022). Also, mothers' low socioeconomic status and high maternal illiteracy in practices to prevent neonatal sepsis increases the chances of infection in neonates (Ranjeva et al., 2018). In Burkina Faso, neonatal mortality due to NNS and other infectious diseases was found to have increased from 0.04% in 2003 and grew to 0.07% by 2017. This was attributed to a lack of adequate healthcare professionals to conduct skilled birth, high maternal illiteracy, and home factors such as culture predisposing neonates to infections (Ouedraogo *et al.,* 2020). In Ethiopia, the primary cause of early newborn deaths and morbidities is neonatal sepsis. A pooled prevalence indicates 45% of cases of NNS in Ethiopia. Even though there have been improved mother and child care services, the incidence of NNS remains high. The high prevalence of NNS was attributed to the illiteracy of mothers regarding the risks of neonatal sepsis and the practices that should be employed to prevent sepsis (Belachew & Tewabe, 2020).

According to Beletew *et al*. (2019), the prevalence of NNS in East Africa is 29.6% (Beletew *et al*., 2019). In Tanzania, the prevalence of NNS is 32%. This accounts for 29% of neonatal fatalities. The increased prevalence is due to maternal and health-related factors. This includes substandard procedures during labor and delivery, obstetric complications, and maternal infections (Masanja *et al.,* 2020). In Uganda, Neonatal sepsis is reported to be among the principal causes of late neonatal death. According to one study report, 1.7% of all live neonates experience sepsis before the end of 28 days post-delivery. The occurrence of NNS increased from 2016 to 2020 by an average of 0.004 cases per 1000 live births. This was supported by another study, which indicated that neonatal sepsis in eastern Uganda accounts for 31% of all neonatal deaths (Migamba *et al*., 2020).

The newborn mortality rate in Kenya in 2022 (KDHS, 2022) was estimated to be 21 deaths for 1,000 live deliveries. This is lower than that in the African region, which had 27 per 1,000 live births. However, it exceeded the worldwide rate of 18 deaths for every 1,000 live births. Neonatal mortalities account for 66% of infant deaths and 51% of under-five deaths in Kenya. These fatalities are caused by avertible diseases such as

respiratory illness, and 17 percent are linked to neonatal sepsis (Irimu *et al*., 2021; Paulson *et al*., 2021). A study by Okabe and Komen (2020) at Kenyatta National Hospital estimated the prevalence of NNS in Kenya to be 28.6%. In Embu County, neonatal mortality is among the top twenty causes of mortalities in Embu Hospital. Neonatal mortality can be linked to other neonatal factors such as pneumonia, prematurity, and birth asphyxia. These factors combined increase the risk of neonatal sepsis in one way or another (Embu Strategic Plan 2014-2018).

1.2 Statement of the Problem

Neonatal sepsis is among the leading causes of neonatal deaths worldwide, accounting for 35% of neonatal deaths. The World Health Organization guidelines recommend the prevention of neonatal sepsis through preventive practices. This includes antenatal care (ANC) attendance, clean and safe delivery, early initiation of breastfeeding, cord care using 7.1% chlorhexidine, and eye care using tetracycline eye ointment. Non-adherence to these practices results in neonates developing NNS. As a result, there is increased cost of care, decreased quality of life, physical morbidity, psychological handicaps, and increased mortality rates. Despite all the recommended precautions, many cases of neonatal sepsis are still reported within Embu County, with sepsis being recorded as one of the top 20 causes of death within Embu hospital. Thus, the study seeks to explore the determinants of neonatal sepsis preventive practices among postnatal mothers attending the mother and child clinic at Embu Level Five Hospital in Embu County, Kenya.

1.3 Objectives

1.3.1 Broad Objective

The broad objective of this study is to investigate the determinants of neonatal sepsis prevention practice among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital, Embu County, Kenya.

1.3.2 Specific Objectives

i. To assess the level of knowledge on neonatal sepsis preventive practice among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital

ii. To determine the relationship between level of knowledge on neonatal sepsis and demographic characteristics of postnatal mothers attending mother and child health clinic at Embu Level Five Hospital
iii. To determine the home-based factors that influence the practice of neonatal sepsis prevention among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital
iv. To evaluate the practices adopted by postnatal mothers to prevent neonatal sepsis among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital

1.4 Research Questions

i. What is the level of knowledge on the risk of neonatal sepsis among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital?
ii. What is the relationship between level of knowledge on neonatal sepsis and demographic characteristics of postnatal mothers attending mother and child health clinic at Embu Level Five Hospital
iii. Which are the home-based factors that influence the practice of neonatal sepsis prevention among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital?
iv. Which are the care practices adopted by postnatal mothers to prevent neonatal sepsis among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital?

1.5 Significance of the Study

The study's findings support the national government's determination to achieve SDG 3.2(neonatal and child mortality reduction by 2030). It adds new knowledge to nursing research and can be a reference for other researchers conducting similar studies. Additionally, the findings are helpful to policymakers in planning and developing policies that would lead to reduced sepsis in clinical practice. Furthermore, policymakers can create training programs for healthcare professionals directly caring for the mother and newborn during the prenatal and postnatal periods. Additionally, the findings will help improve knowledge among postnatal mothers on neonatal sepsis, thus improving the practice of neonatal sepsis prevention within the community. Finally, when disseminated, the findings will impact the community since postpartum mothers

will be provided with knowledge that helps prevent community-acquired neonatal sepsis.

1.6 Scope of the Study

The study was conducted at Embu Teaching and Referral Hospital, Embu County. It aimed at investigating the neonatal sepsis preventive practice among postnatal mothers attending the mother and child health clinic at Embu Referral Hospital Embu County. The study explicitly focused on determining the knowledge level on neonatal sepsis, care practices adopted by postnatal mothers, and home-based factors influencing the practice of neonatal sepsis prevention among mothers attending mother and child health clinics. The study utilized questionnaires and interview schedules to obtain information from the participants. The study involved a sample size of 81 postnatal mothers with neonates. The study embraced a descriptive cross-sectional study design and data collection process took one month (5th august 2024-5th September 2024).

1.7 Study Limitation and Delimitations

Since the study comprised of postnatal mothers attending mother and child clinic within 28 days, the sample size was small

To minimize recall bias the study recruited the most recently delivered mothers with a limited period up to 28 days.

1.8 Assumptions of the Study

i. The researcher assumed that the respondents availed themselves for data collection.
ii. The researcher assumed that respondents provided truthful responses during the study hence providing accurate information.

1.9 Operational Definition of Terms

Adopted Care practices: The neonatal care interventions that have been put in place by postnatal mothers to ensure prevention of neonatal sepsis**.** They in cord care practices, eye care practices, hygiene, and breastfeeding, among others

Home-based factors: These are conditions/elements within the postnatal mother's background that hinder or facilitate the prevention of neonatal sepsis**.** They include cultural factors, home environment, and support system.

Level of Knowledge: The degree of acknowledging and understanding the facts and truths about the risks, and prevention practices for neonatal sepsis. This will be computed by adding the total number of correct spontaneous response per question and changing it to a percentage with 0-50 being poor knowledge, 51-70 moderate knowledge, and 71100 good knowledge.

Neonate: A baby from birth to 28 days of life.

Neonatal sepsis: A clinical syndrome that results from systemic infection within 28 days after the birth of a newborn

Postnatal mother: The mother who has given birth up to 42 days post-delivery.

Preventive Practice: Actions taken for the purpose of decreasing chances of developing neonatal sepsis.

CHAPTER TWO
LITERATURE REVIEW

2.1 Overview of Neonatal Sepsis

Neonatal sepsis is a clinical syndrome characterized by signs and symptoms of infection due to the spread of bacteria into the bloodstream of the neonates. It can be classified as either early onset or late onset neonatal sepsis based on the period of occurrence of symptoms from the period of delivery. Early-onset neonatal sepsis occurs within 72 hours, while late-onset neonatal sepsis occurs after 72 hours of delivery. Neonatal sepsis is the leading cause of neonatal mortality and morbidity worldwide. The immaturity of the immune system increases the neonates' risk of neonatal sepsis. Other risk factors for neonatal sepsis include maternal factors such as maternal infection during labor and delivery, colonization of the birth canal by bacteria during pregnancy and delivery, early rupture of membranes, and prematurity, among others. The clinical syndrome is mainly caused by Escherichia coli, listeria, and streptococcus (Masanja *et al.,* 2020).

The signs and symptoms of neonatal sepsis depend on the severity of the infection. They include high body temperature, more than 37.5 degrees Celsius, bulging of the fontanel, yellowish palms and skin, difficulty breathing, lethargy, increased irritability, and inability to breastfeed, among other symptoms. Therefore, reduction of the risk of neonatal sepsis in neonates requires taking measures that reduce exposure. This includes taking appropriate actions during the prenatal period, labor and delivery, and the postnatal period (Masanja *et al.,* 2020). Mothers should follow preventive practices such as attendance of antenatal care services, ensuring a safe and clean delivery by a skilled birth attendant, cord care using 7.1% chlorhexidine, eye care using tetracycline eye ointment, thermal care, proper hygiene through hand washing and also early and exclusive breastfeeding practices. Failure to follow such precautions leads to neonatal sepsis complications. The colonization of the bloodstream by bacteria weakens the immune system and prevents it from fighting the infection. As a result, the infection spreads to body organs and tissues, causing inflammation, decreased blood flow, and decreased oxygen supply to vital organs. This results in septic shock (Odabasi & Bulbul, 2020).

2.2 Level of Knowledge on Neonatal Sepsis

Globally, NNS is among the primary causes of early infant deaths and morbidities (Chhetri *et al*., 2018). Mothers' knowledge and practices are critical to the newborn's health because they are crucial in health maintenance and disease prevention (Fardan *et al*., 2023). The healthy survival and development of the newborn depends on whether the mother had adequate knowledge before, during, or after pregnancy and delivery (Amare *et al*., 2019). According to the WHO recommendations for preventing NNS, mothers should know the risks, causes, and prevention of neonatal sepsis through simple hygiene practices, such as hand washing (WHO, 2016).

2.2.1 Knowledge of Risks and Causes of Neonatal Sepsis

Postnatal mothers have had varied knowledge levels on neonatal sepsis across different countries (Murthy *et al.*, 2019). However, developing countries have shown low knowledge of neonatal sepsis risk compared to developed countries. This is evident by comparatively higher cases of reported NNS in developing countries than in developed countries (Amare *et al*., 2019). A descriptive cross-sectional study by Chhetri *et al*. (2018) on the level of knowledge concerning NNS among postnatal mothers reported that only 10% of mothers who participated in the study had adequate knowledge, 76% had moderate knowledge, and 13% had inadequate knowledge. The study concluded that most postnatal mothers had moderate knowledge regarding NNS, hence the need to intensify education on NNS and improve diverse health programs. However, the study's results cannot be generalized since it was restricted to the postnatal mothers of the postpartum period within the postnatal ward, and the data collection period was narrowed to 4 weeks only. These findings cannot be generalized to women who have been discharged home and are now the primary caregivers of neonates. This evident gap calls for an extensive study that comprehensively covers the target population frame to enhance generalizability (Chhetri *et al.*, 2018).

2.2.2 Knowledge of Signs and Symptoms of Neonatal Sepsis

Postnatal mothers should know the signs and symptoms of neonatal sepsis during the neonatal period; hence, they should take appropriate measures (Mersha *et al.*, 2017). According to Fardan *et al.* (2023), a study that investigated the postnatal

mothers' level of awareness of neonatal danger signs as stipulated in the WHO guidelines, participants had varied responses to danger signs. In the study, 28% of study subjects acknowledged yellow palms and sores as a danger sign, 19.4% reported awareness of fast breathing, and 18.8% acknowledged convulsion as a danger sign. Other danger signs recorded responses of less than 10%. Even though a good percentage had knowledge of danger signs, most reported having received the information while seeking care. Hence, the knowledge of signs and symptoms could be increased if health education is done before seeking care, such as during antenatal visits, pregnancy, and delivery. The study focused on mothers who had delivered and nurtured babies for the past two years. Hence, this study will focus on postnatal mothers who seek postnatal services within 28 days post-delivery (Fardan *et al.*, 2023).

A Community Survey in southwest rural Uganda shows that there needs to be a higher knowledge level among new mothers on childhood disease and danger signs. Mother's acknowledgment of at least one important danger sign was considerably allied with birth preparation. The participants demonstrated insufficient knowledge of the primary newborn danger signs, where 58.2% could identify one and 14.8% could identify two. Recognizing danger signs is essential in identifying a child with neonatal sepsis. However, this study was biased since it focused on inadequate knowledge of danger signs among postnatal mothers, hence the need to conduct an unbiased study by investigating the knowledge levels (Sands *et al*., 2018).

According to Abdi (2023), in a study on knowledge of danger signs among postnatal mothers at Pumwani maternity hospital, a significant number of mothers had insufficient knowledge of the signs and symptoms of neonatal sepsis. The study revealed that less than half of the participants could identify more than three danger signs which included difficulty in breathing, convulsions, and jaundice. As a result, the study participants had reported having sought care from the chemists before taking the child to the hospital for a thorough assessment.

According to a study by Kibaru and Otara (2016) in Nakuru County on knowledge of danger signs by postnatal mothers, there needed to be more knowledge among mothers appearing for well-baby clinics. About 57.2% of mothers were not aware of the neonatal

danger signs during the antenatal clinic. Additionally, 84.5% of mothers acknowledged no more than three neonatal danger signs. The knowledge level was affected by education level, health care providers' explanation of the danger signs to the mother, and reading of the MCH booklet. Therefore, this study cannot be generalized since the study population used was mothers from six weeks postnatal up to nine months, indicating that they have passed the postnatal period, and the results could be based on recall.

2.1.3 Knowledge of Prevention Practices

Poor umbilical cord care has been the most reported risk for neonatal sepsis. According to an analytical cross-sectional study by Kalufya *et a*l. (2022) in Tanzania on understanding and the practice of cord care by new mothers, more than 62.2% of the study subjects had adequate knowledge of cord care. Only 21% of the mothers had good care practices. This was linked to education status, environmental influence, and exposure to necessary information during delivery. Living in rural areas and home delivery also contributed to deficient knowledge of prevention due to limited access to empowering information (Kalufya *et al*., 2022).

2.2 Demographic Factors among Postnatal Mothers Affecting Neonatal Sepsis Preventive Practice

Demographic characteristics are crucial in the health of neonates and prevention of neonatal sepsis. In efforts to provide basic and essential needs during postnatal period, postnatal mothers adopt poor neonatal care practices which lead to neonatal sepsis (Sanjel *et al*., 2019). According to a study on maternal factors associated with neonatal sepsis, factors such as maternal age, low socio-economic status, being first time mother, and unemployment had significantly influenced the risk of neonatal sepsis (Muthwii *et al.,* 2020). Neonates born to primi gravidas have 64% increased chances of neonatal mortality due to infection than those born to experienced mothers. This is due to the social and economic challenges faced by first time mothers as they provide neonatal care services. As a result, many opt to adopt poor practices that predispose to neonatal sepsis such as home delivery and mixed feeding (Muthwii *et al.,* 2020). A study by Kebede (2019), reported that maternal age and occupation is significantly associated with newborn care practices. Those mothers younger than 20 years have poor practices with poor knowledge. The age factor might be associated with lack of exposure as those

younger than 20 years are usually first time mothers and hence have limited information on prevention of neonatal and care practices.

According to Bulto et al. (2019), a study on determinants of neonatal sepsis, maternal age, and parity are associated with neonatal sepsis. The study reported that neonates whose mothers were aged between 25-30 years were less likely to develop neonatal sepsis. Mothers in such age groups have increased knowledge of prevention practices and can implement such practices, especially from previous exposures (Bulto *et al*., 2019). Level of education also has a great influence on the prevention of neonatal sepsis. It increases the likelihood of being knowledgeable about neonatal sepsis and, hence, deploying good newborn care practices to prevent it (Mersha *et al.,* 2019).

2.3 Home-based factors that influence the practice of neonatal sepsis prevention

2.3.1 Cultural Factors

Globally, the western culture on neonatal care has been conceptualized. However, some cultural practices and beliefs are still carried out in most African settings (Simane-Netshisaulu *et al.,* 2022). There seems to be a common belief among mothers in East, west, and Central southern Africa. They include putting up specific restriction and use of specific treatment modalities during the postnatal period. Additionally, this pooled study indicated that in Ethopia, delivery of the placenta is given first priority. Therefore, after delivery, the baby is left uncovered and unattended because it is a taboo to prioritize neonate care before the burial of the placenta. As a result, most neonates die due to hypothermia (Simane-Netshisaulu *et al* 2022). This has also been reported in countries such as Tanzania and Senegal where birth attendants become preoccupied with the delivery of the placenta while forgetting immediate neonate care (Simane-Netshisaulu *et al* 2022).

A study by Tulelo & mulaudzi (2021) showed that indigenous bathing and feeding practices are embraced in South Africa. Most of the neonates are not given colostrum with alternative feeds being introduced during this period. A mixture of boiled water with some herbs was given to neonates for stomach cleansing as soon as they arrived from the hospital. This also helped with soothing of abdominal colics (Tulelo & Mulaudzi, 2021). A similar study carried out in Zambia indicated that mothers use

herbs and powder to make it heal faster. Traditional herbs were also mixed in the neonate's feeds to keep them stronger and healthy (Buser *et al*., 2020).

According to Arumugam et al. (2023), on traditional newborn care practices, cultural and traditional practices increase the rate of neonatal deaths and morbidities. Some cultural beliefs and traditions that impact neonatal health include substance application to the cord, oil installation to the nostrils and ears, vernix removal, and herbal medication in case of illnesses such as diarrhea. The study's findings could not be generalized that there are many tribes with different cultural practices within the study area (Arumugam *et al.,* 2023). Another study by John *et al.* (2015) in Uganda revealed that some cultures discourage washing hands before carrying the neonate. They believe that washing hands is washing away the blessing. This increases the transmission of infection from the visiting members to the neonates (John *et al*., 2015).

A study in coastal Kenya among the Giriama population revealed that there are cultural practices revolving around pregnancy and childbirth that could affect newborn health. During labor, the mother is a companied to the traditional birth attendant's (TBA) home by a woman who has ever given birth. The TBA carries out delivery while the woman observes an upright position. The cord is then cut using a new unsterilized razor blade while awaiting delivery of the placenta. The placenta is considered more scared, and procedural cultural beliefs should be followed before disposal. Therefore, women deliver at home due to health facility attitudes that the placenta must remain in the hospital hence preventing them from following their culture. Additionally, men are the sole decision-makers concerning pregnancy, labor, and delivery. The Giriama women mainly rely on their husbands to make decisions concerning their care and that of the neonate (Ombere et al, 2021).

In western Kenya, populations in and around the area have been using outdated and cultural methods of newborn care for decades (Mutori, 2021). Due to their customs, women embraced traditional ways of healing the cord, such as tying it with a cloth and applying ash, lizard droppings, cow dung, kitchen soot, and mud. However, these methods delay cord healing because some make the cord dump, becoming a breading area for microorganisms that cause sepsis. Women involved in the study cited that

distance to the hospital and family members contributed to using such herbal remedies on newborns (Mutori, 2021).

2.3.2 Environmental Factors

The home environment is crucial in NNS prevention (Regassa *et al*., 2022). A clean home environment with proper ventilation decreases the breeding rate of bacteria, thus decreasing the risk of infections (Goel *et al.*, 2015). According to a comparative study by Ditai *et al*. (2018), evidence shows that NNS is a disease connected with poverty and a poor home environment. Neonates from rural-urban and slum settings have increased chances of neonatal sepsis compared to those in urban settings (Ditai *et al*., 2018). In addition, those living in overcrowded places are more prone to infection due to a lack of preventive measures such as hygiene (Mitra *et al*., 2018). A highly densely populated household increases the risk of infection transmission from the family members to the neonates (Medhat *et al*., 2017). In Kenya, research conducted by Moraa *et al*. (2019) in Nairobi indicated that children from slum areas of Nairobi have an increased risk of neonatal sepsis in comparison to their counterparts. This is due to the state of slum areas, which includes scarcity of clean water for use and increased poverty levels (Moraa *et al.*, 2019).

2.3.3 Support Systems

Having a sound support system determines labor and delivery outcomes and the neonatal period (Kayom *et al.*, 2018). Financial support is among the primary factors that influence the prevention of NNS (Moindi *et al.*, 2015). According to Kayom *et al*. (2018), babies whose mothers receive financial support from their spouses and family members are four times more unlikely to contract NNS than those without financial support. The financial support enables mothers to seek health care, including antenatal care services, early healthcare services, especially in premature rupture of membranes, and early postnatal services, including neonatal assessment (Kayom *et al*., 2018). Most of the mothers who lacked financial support attended public hospitals. Inadequate financial support affects the choice of place of delivery and the general welfare of the mother, thus impacting neonatal care (John *et al*., 2015).

2.4 Practices Adopted by Postnatal Mothers to Prevent Neonatal Sepsis

2.4.1 Antenatal Care Practices

The WHO states that all pregnant women should attend at least eight antenatal care visits (ANC) (WHO, 2022). During antenatal visits, special aspects of neonatal sepsis prevention are covered (WHO, 2018). Firstly, all mothers attending the antenatal clinic must be taught about danger signs in pregnancy and danger signs in the neonate after delivery. This helps increase their knowledge of preventing neonatal sepsis (WHO, 2016). Secondly, routine practices are done to ensure that both the mother and baby are free from infections. This includes conducting an antenatal profile to rule out some common conditions that lead to sepsis (Arunda *et al*., 2017).

In a study by Bayih *et al*. (2021) on attendance of Antenatal Care services by expectant mothers, antenatal care is useful because it helps screen and treat infections that could predispose to neonatal sepsis. Those who attended antenatal clinics have decreased chances of transmitting infections to the neonates than those who did not (Bayih *et al*., 2021). Another study by Murthy *et al*. (2019) in India showed that prenatal care is important in reducing health issues that occur during pregnancy and delivery. Expectant women who seek antenatal care services have less likelihood of antenatal-related mortalities and morbidities, which in turn lead to neonatal health consequences. Neonatal sepsis has been linked to failure to attend the antenatal clinic, failure to finish the four recommended visits, and lack of attaining the recommended antepartum services such as screening for diseases and immunization. However, these studies have not explained why some expectant mothers still do not attend the recommended antenatal services despite the benefits of the care practice towards NNS prevention (Murthy *et al*., 2019).

According to Teshome *et al.* (2022), a study on factors associated with early onset neonatal sepsis, the frequency of antenatal care follow-ups was significantly associated with neonatal sepsis. Neonates whose mothers attended more than three antenatal care visits were less likely to develop sepsis compared to their counterparts. However, the results of this study cannot be generalized since the study was conducted on neonates who were admitted in the postnatal wards. Therefore, there is a need to carry out the

study on postnatal mothers who have already been discharged from the postnatal units (Teshome *et al.*, 2022).

A study by Mizumoto *et al.* (2015) on the quality of antenatal care as a risk factor for early neonatal sepsis showed that Antenatal care is among the major ways of decreasing neonatal morbidity. Early initiation and completion of recommended visits help decrease the risk of maternal infection and other factors leading to neonatal complications such as sepsis. This study did not assess the quality of ANC and its relationship with the development of early neonatal sepsis (Mizumoto *et al.*, 2015). In Embu County, according to the KDHS (2022), on antenatal care, 100% of mothers interviewed attended antenatal clinics, but only 62% adhered to the fourth antenatal visit as recommended by WHO (KDHS 2022).

2.4.2 Place of Delivery

Hospital delivery is most significant in the prevention of early neonatal sepsis. According to a cross-sectional survey done in south Ethiopia, a substantial number of mothers still have home births assisted by family members. The prevalence of home deliveries was recorded at 22.8%, with 32% occurring among women from rural areas. These women who deliver from home attribute this to many reasons, such as the inconvenience of health facilities, personal preference, fear of delivering before arriving at the health facility, and poor and lack of means of transportation. However, this study did not indicate the relationship between the place of delivery and neonatal sepsis (Regassa *et al*., 2022).

According to a study by Yeshambel *et al.* (2024) on determinants of neonatal sepsis, there is a positive relationship between the place of delivery and the development of neonatal sepsis. The study indicated that neonates born within hospital settings, such as health centers, were 78% less likely to develop sepsis during the neonatal period. This is due to birth preparations put in place in a hospital setting to prevent exposure risk of both the mother and neonate to the infections. Hospital delivery has some advantages, including a decreased period of labor due to close observation and following of aseptic technique during labor and delivery (Yeshambel *et al.*, 2024).

In Kenya, over one-third of births are home deliveries. However, there is insufficient literature to indicate why most women are still delivering at home despite the provision of free maternity care through the Linda Mama program. In Embu County, four percent of mothers still have home deliveries, and this can be linked to a lack of prior arrangements to reach the health facility for skilled birth attendance (KDHS, 2022). Therefore, home deliveries lead to poor cord care, with the umbilical cord being cut with unsterile blades and tied with a thread. Exploring how factors related to home delivery can be influenced to reduce the associated burden is thus an area for research.

2.4.3 Hygiene Practices

Early onset neonatal sepsis has been documented to result from unhygienic birth practices (Teshome *et al.,* 2022). For decades, hand washing has been reported as the most effective practice for the prevention of infection (Masanja *et al.,* 2020). Mothers who fail to observe appropriate hygiene and hand washing have increased chances of exposing their babies to pathogens during touch, breastfeeding, and even diaper changes. Polluted environments, such as dirty linens and unhygienic surfaces, such as beds and tables, likewise intensify the risk of infection (Ditai et al., 2018). Evidence shows that neonatal infections can be decreased by 40% with proper hand hygiene. Clean birth gear, clean surfaces, clean cord ties, and a bar of soap have been revealed to inhibit neonatal sepsis (Chhetri *et al*., 2019). Hand washing with soap and water at both household and individual levels is an important measure in decreasing incidences of NNS. However, this is not achievable due to the lack of available clean water and poverty, which prevents mothers from acquiring soap (Ditai et al., 2018).

According to Kalufya *et al*. (2022), about 48.9% of the mothers reported washing their hands using running water and soap before and after handling the baby, especially during cord care. The study did not focus on why some mothers do not wash their hands before and after handling the baby. According to a case-control study by Moraa *et al*. (2019) in Nairobi on the link between umbilical cord hygiene and the development of NNS, the study recorded that 35.3% of mothers have improper hygiene. The study focused mainly on those populations from the slam areas; hence, it cannot be generalized. Therefore, this study will establish hygiene practices in Embu County.

2.4.4 Cord Care Practice

Cord care practices are vital in the prevention of neonatal sepsis (Sacks *et al*., 2015). Chlorhexidine cleaning has reduced incidences of sepsis-related mortalities in neonates. It reduces mild and severe cord infections that lead to neonatal sepsis. Findings from case-control studies indicate that there is a relationship between neonatal tetanus and the use of cow dung and ash for cord care (Moindi *et al*., 2015). According to Kalufya *et al.* study in Tanzania, only 21% of the mothers showed good cord care practices that led to the prevention of NNS. However, the study did not capture other methods of cord cleaning adopted by the mothers, as some of them had poor practices (Kalufya *et al*., 2022).

A study in Zambia reported that Cord cutting was done using an unsterile blade, and the stump was tied with a thread, especially for home deliveries (Sandberg *et al*., 2014). Another study indicated that by (Sacks *et al*., 2015) indicated that various substances such as petroleum jelly, cooking oil, breast milk, and commercial baby lotion were applied to the newborns' skin and umbilical cord. Cord care was done using powders made from roots and ash. The use of traditional and non-medically approved substances in cord care increases the risk of neonatal sepsis. This is due to increased exposure from unhygienic products used, which act as a medium for microorganisms that cause the infection. However, this study utilized a qualitative research design; hence, the results cannot give the correct picture of what happens. Therefore, there is a need to utilize a mixed-method approach to the generalizability of the results (Sacks *et al*., 2015).

In Kenya, in a study by Kinanu *et al.* (2022) on the effectiveness of different cord care interventions in the prevention of neonatal sepsis, chlorhexidine was appreciated as the most effective compared to other interventions. Despite increased evidence on the effectiveness of umbilical cord care, an unsterile substance like oil or talcum powder ointment was applied to the cord and cord stump, out of which mothers commonly used mustard oil (Kinanu *et al.,* 2022). Another study by Moraa *et al*. (2019) indicated that most mothers reported using chlorhexidine or surgical spirit for cord care (64%). Only 10.6% of the participants reported using saliva and ash for cord care. Most of those who still practice improper cord care come from the slum areas of Nairobi, where there is limited water supply and poor environmental hygiene.

2.4.5 Breastfeeding Practices

Breastfeeding is an essential practice in the prevention of neonatal sepsis (Ochoa *et al.*, 2020). Initiating breastfeeding within the stipulated time of less than one post-delivery helps develop attachment, and the colostrum is important in infection inhibition (WHO, 2023). According to Ochoa et al. (2020), there is a positive relation between the intake of a mother's own milk and a reduction in the risk of neonatal sepsis. Breast milk provides protection since it contains essential nutrients and enzymes that help fight against the infection. It helps protect the gut and allows cognitive development of the neonates (Ochoa *et al.*, 2020).

In Kenya, according to the KDHS, 2022, only 60.1% of neonates born in the last two years preceding the survey were breasted in the first hour of life with 59.7 of them having exclusive breastfeeding. Therefore, unhealthy neonate feeding increases the risk of exposure to microorganisms that predispose to neonatal sepsis (KDHS, 2022).

The above-reviewed studies show that mothers have adopted various care practices to prevent neonatal sepsis. The attendance of antenatal care services, choosing an appropriate place of delivery, hygiene practices, and cord care practices. There are diverse practices utilized over the years in different parts of the world, especially in low-income countries such as Kenya. Some practices do not align with the WHO recommendation of dry cord care, early initiation, exclusive breastfeeding, and skin care (WHO, 2018). Therefore, the study seeks to establish care practices adopted in the prevention of neonatal sepsis among postnatal mothers in Embu County, addressing some gaps identified in the literature review.

2.5 Summary of Literature Review

The above reviewed studies come to a general consensus that the level of knowledge, care practices adopted by mothers, and home-based factors influence the practice of neonatal sepsis prevention. Neonatal sepsis is most predominant in developing countries such as Kenya, so more studies should focus on this area. However, most of the studies have focused on mothers' knowledge of danger signs, which is one aspect

of NNS. Additionally, most research work has focused on nurses' knowledge level, leaving out postnatal mothers, who play a crucial role in the life of babies from conception up to six weeks postpartum. This study will explore the level of knowledge on neonatal risk factors, causes, and prevention, which is an apparent gap in the literature review. Additionally, there are limited studies on the care practices adopted by mothers and home-based factors influencing the prevention of neonatal sepsis in Kenya. Most of the studies available have mainly focused on cities such as Nairobi and Nakuru, while other towns such as Embu have been limitedly studied. Therefore, this research aims to rectify such shortcomings, especially for the selected study site, Embu Referral Hospital, which is a representation of Embu County.

2.6 Theoretical Framework

Betty Neuman's System theory (1972) will be used to guide this study. The theory sees a client as a system with five sub-systems, including the physiological, spiritual, psychological, developmental, and socio-cultural systems. The theory sees a person as an entire being that must be protected from stressors. According to this theory, the neonate is the client. It emphasizes on the relationship between the client and stress and views how one reacts to them. The health status of the client is determined by their energy reserves. At optimum health, there is peak energy, and during ill health, there is a depletion of energy. The lines of defense and resistance monitor cellular function and client stability. Energy reduction results from the interaction between environmental stressors and the client, thus leading to interruptions in the lines of defense. Stressors can be intrapersonal, interpersonal, or extra personal. The environment may interfere with the client's health. Three levels of prevention must be employed by the client to achieve good health. Primary prevention deals with the normal line and toughens the malleable lines of defense. Secondary and tertiary levels of prevention occur after the disease's appearance and aim to reduce the reaction, increase resistance, and help the client readapt and stabilize. (Neuman & Fawcett, 1989).

Therefore, the neonate in this study is seen as an open system with lines of defense, which include the skin, mucus membranes, and immunoglobulins. These lines of defense protect it from stressors, including sepsis. The stressors within the neonate include Apgar score, meconium aspiration, invasive procedures, gestation, and age.

Factors such as maternal level of knowledge, care practices, and home-based factors such as culture form the external stressors. Betty Neuman identifies that environmental stressors are the central portion of a system, and increased stressors lead to poor health for the client. Stressors such as low levels of maternal knowledge, inadequate ANC attendance, home deliveries, inadequate hand hygiene, lack of family support, and traditional newborn care practices may individually attack the neonates' line of defense, thus predisposing them to neonatal sepsis (Neuman & Fawcett, 1989).

2.7 Conceptual Framework

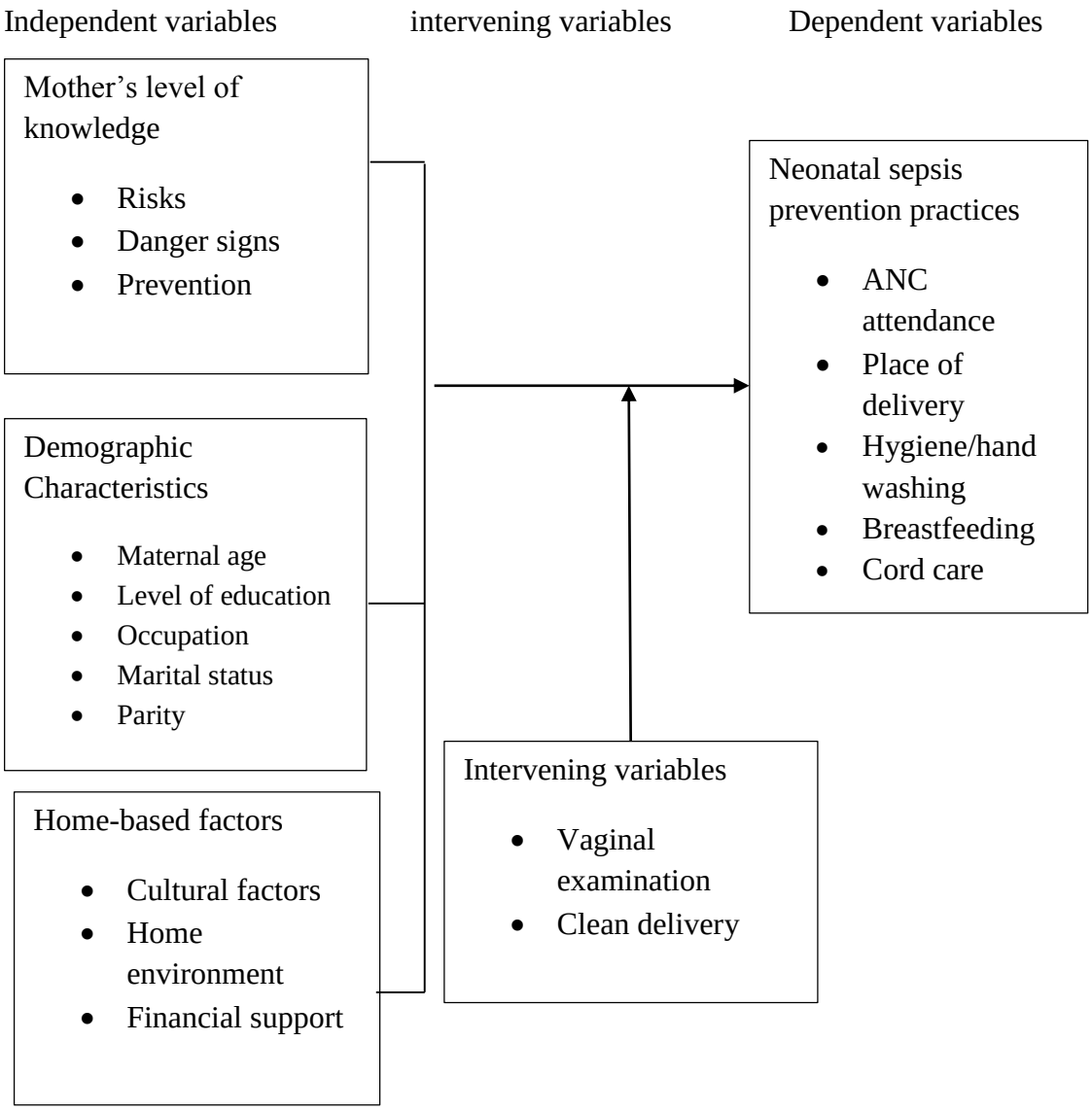

Figure 1: Conceptual Framework for a Study on Neonatal Sepsis at Embu

The conceptual framework illustrates cause-effect connections between the research variables. The dependent variable which is the effect and cannot be modified is neonatal sepsis preventive practice. The independent variables which are the cause and can be modified or manipulated include level of knowledge among postnatal mothers, demographic characteristics, and home-based factors that influence the prevention of neonatal sepsis. The intervening variables include hospital related factors such as number of digital vaginal examinations, clean and safe delivery.

Several factors play a role in determining the preventive practice for neonatal sepsis among postnatal mothers. The mother's level of knowledge on the risk, causes, danger signs, and prevention of sepsis helps determine the preventive practices that she will adopt to prevent neonatal sepsis. Additionally, practices which have always been deemed important and the mothers' awareness of them helps determine whether the mother will use them to prevent their neonates from contacting the infection. Furthermore, home-based factors such as culture, environment like housing and population, and support system play a key role in the implementation of practices that reduce the risk of neonatal mothers.

CHAPTER THREE
RESEARCH METHODS

3.1 Study Area

The study was conducted at Embu Level Five hospital, mother and child health clinic (MCH). Embu referral hospital is a level five teaching and referral hospital located in Manyatta Sub-county of Embu County, approximately 120km northeastern of Nairobi along Nairobi-Embu-Meru highway and approximately three kilometers from Embu town. The GPS coordinates are latitude of 0° 31' 52.03" N and longitude of 37° 27' 2.20" E. It serves as a referral hospital for facilities in Embu, Kirinyaga, Tharaka-nithi, Kitui, and Machakos counties. It is located opposite Izaak Walton Hotel. The institutions around include Embu Kenya Medical Training College, Embu University, and Embu Teachers Training College.

Embu referral hospital has a bed capacity of 618 and 97 baby cots, and average outpatient attendance of 11,000 with inpatient admission of 1200 patients per month. It has an average of 481workforce. This includes 10 specialists, 30 doctors, about 15 clinical officers, and 242 nurses assisted by varying number of medical and nursing interns posted each year. The MCH clinic is located opposite the main hospital. It serviced by 7 nurses, two clinical officers, and one nutritionist (Embu County Referral Hospital Strategic plan 2014-2018). Being a referral hospital, the facility serves the largest percentage of postnatal mothers with neonatal services in Embu County. Despite having practices put in place to reduce the risk of neonatal sepsis especially in the newborn unit and maternity unit, cases of neonatal sepsis are still being recorded in the MCH clinic and pediatric ward where neonates from home are usually admitted.

3.2 Study Design

The study adopted a descriptive cross-sectional survey study design. This design was the most appropriate in the study because it enabled the researcher to collect data from multiple participants at a particular point in time (Wang & Cheng, 2020). The descriptive cross-sectional survey helped provide data by describing the relationship between study variables such as level of knowledge and practices on neonatal sepsis as at the time of study (Wang & Cheng, 2020).

3.3 Study Population

The study involved postnatal mothers with neonates who visited Embu teaching and referral hospital for postnatal care services sampled as shown in Table 1.

Table 1: Sampling Frame Number of Postnatal Mothers Attended per Month

Month	December 2023	January 2024	February 2024	Total
No. of postnatal mothers	89	106	113	308

Source: Hospital records (2024)

An average of 103 postnatal mothers is attended to during the first month post-delivery.

The study also involved key informants who were nurses and midwives working in the maternity unity and MCH clinic within Embu level five hospital (Table 2).

Table 2: Sampling Frame for Health Care Providers (Key Informants)

Department	Cadre	Number	Sample
MCH	Nurses	7	1
Labor Ward	Nurses	14	2
Neonatal Unit	Nurses	11	2
Post C/s ward	Nurses	6	1
Postnatal ward	Nurses	8	1
Total		46	7

Source: Hospital (2024)

3.3.1 Eligibility Criteria

3.3.1.1 Inclusion Criteria

The study included all postnatal mothers with neonates.

The study included all nurses within the MCH and Maternity unit who were on duty and consented to participate within the period of study

3.3.1.2 Exclusion Criteria

Postnatal mothers who are sick or admitted the postnatal wards.

Postnatal mothers whose babies were admitted to the hospital unit (Newborn unit or pediatric ward)

Postnatal mothers unable or unwilling to give consent

Nurses who did not consent to participate in the study

3.4 Sampling Procedure

3.4.1 Sample Size Determination

The sample size of the study was determined using Cochran' formula (1977)

$n = Z^2pq/e^2$

Where;

n= is the sample size

Z = confidence level; considering the level of confidence of 95%, the z-value is read from the normal distribution table Z=1.96

p= proportion of the population which is 0.5 since the prevalence is unknown

q= 1-p

e= is the margin of error which is 0.05

Therefore;

$n = \frac{(1.96)2\ (0.5)\ (1-0.5)}{(0.05)2}$

$n = \frac{(1.96\times1.96)\ (0.5)\ (0.5)}{0.05x0.05}$

$= \frac{0.9604}{0.0025}$

384.16

n= 384

Since the target population is less than 10,000 per month, the sample size was calculated using the adjusted Cochran formula as follows with a sample population of 103 postnatal mothers attended each month.

$nf = \frac{n}{1+(n-1)/N}$

nf is the adjusted sample size

$$\frac{384}{1+(384-1)/103}$$

$$\frac{384}{4.718}$$

n= 81.390

Therefore, the sample size was 81.

3.4.2 Sampling Method

Embu Level Five Hospital was purposively selected and postnatal mothers who came to seek postnatal care services were identified. This method was applicable due to the

number of mothers who visit the facility compared to other facilities within Embu County. Systematic random sampling was employed to select the study participants. Systematic random sampling was appropriate in this study because mothers who came for postnatal clinic services reported at different times and were also registered systematically. The first participant was randomly selected from the postnatal register by blindly picking one of the two pieces of paper named for the first two mothers to arrive each day. Then, every second person that follows was recruited in the study. Since the study population was 103, it was divided by the sample population hence getting a sampling interval of 2(103/82=1.25). Key informants were purposively sampled from the nursing department especially those who were directly involved in providing newborn care services during the time of study and have greater perception of neonatal sepsis prevention. The study also included midwives and nurses involved in maternal and child health activities.

3.5 Data Collection Procedures

Quantitative information was at the Embu Level Five Hospital MCH clinic after obtaining a written permission from the hospital management. The researcher approached potential participants and introduced herself. The potential participants were then invited to participate by explaining the data collection procedure, the benefits, risks, and the freedom of declining and withdrawing from the study. Those who agreed to participate signed the informed consent after agreement. The researcher remained with the participant as she administered the researcher administered questionnaire and collected the questionnaire after it was filled by the participant. The researcher thanked the participant for agreeing to participate in the study and cooperating.

A qualitative in-depth interview with key informants was done to determine the practices they have employed to ensure neonatal sepsis prevention. The researcher approached eligible nurses in their respective units. She explained the purpose of the research and why they should participate in the study. The benefits and risks, and the freedom to participate and withdraw were also explained by the researcher. Those who consented signed an informed consent and were interviewed for a period ranging 30 minutes to one hour.

3.6 Pretesting

Pretesting of research tools was carried out to determine the practicability and achievability of the design selected. It involved trying out techniques to establish whether they are applicably and make any necessary changes. The research tool was pretested using 8 (10%) of the postnatal mothers preceding actual data collection. This was carried out at Chuka teaching and referral hospital to ensure reliability of the instrument. The pretest was carried in Chuka Hospital because the participants had similar characteristics with participants from the study area. After pretesting, relevant corrections were made focusing on the research objective.

3.6.1 Validity Test

Validity represents the accuracy of the research tool (Vu, 2021). The accuracy of the research instrument was ensured through review of the tool before data collection. Therefore, to determine whether the research tool used to collect data was valid, the researcher involved experts in this field and university supervisors to ascertain the completeness and relevance of the tool. The validity of the tool was established based on expert judgment method as stated by Gay (1996). Then, it was refined based on their advice.

3.6.2 Reliability Test

Reliability represents how the outcomes of the research can be a true representation of the general population (Vu, 2021). Reliability was assessed using a test-retest method since the study population was less than 10,000. A repeat pre-test was administered to the same group of people after one week. This determined whether similar results were obtained and then the correlation between the two results calculated. Therefore, to determine whether the instrument is reliable, Cronbach's alpha coefficient was used and the alpha coefficient of 0.80 was achieved in which more than 0.70 was considered good.

3.7 Data Analysis

Data was cleaned manually by checking for incomplete questionnaires and whether responses had been made on all questions. It was then coded using Microsoft Excel and

imported to Statistical Packages of Social Sciences (v.29) for statistical analysis. Data was summarized in proportion, percentages and frequencies (Table 3). Chi-square and a multivariate logistic regression analysis were employed to explain the connection between dependent and independent variables at 95% confidence interval. The results were presented in tables, figures, and narrations. Qualitative data was analyzed using a thematic approach. Emphasizes were placed on identification, analysis, and interpretation of qualitative data patterns. The data was transcribed verbatim from the tape recorders. During the analysis, the researcher first examined the data in broad themes by transcribing audio data to text. Then, the data was coded into themes by searching for coding patterns. The third part was reviewing the themes and subthemes; this includes evaluating the research questions to ascertain whether what needs to be covered has been covered. The next step was finalizing on the coded themes by editing and rethinking on the topics. The researcher confirmed that the themes match the research questions. Finally, the researcher then wrote report outcomes of the interview. The results of quantitative and qualitative data were then triangulated.

Table 3: Data Analysis Matrix

Objective	Indicators	Method of analysis
1. Level of knowledge on neonatal sepsis	Level of Knowledge was established through a score computed by adding all the components under level of knowledge; a total of 17, and then converted to percentage (x/17 *100). Knowledge was categorized as low ≤55.6% and high ≥56%	Percentages, frequencies, chi-square, multivariate regression analysis
2. Association between demographic characteristics and level of knowledge	Mothers demographic characteristics associated with knowledge scores calculated	Chi-square test, multivariate logistic regression analysis
3. Care practices adopted by mothers	Presence of selected care practices adopted to prevent neonatal sepsis	Percentages, chi-square, multivariate logistic regression analysis Thematic analysis
4. Home-based factors influencing neonatal sepsis prevention	Presence of selected home based factors Presence of cultural practices that influence neonatal sepsis prevention Influence of home-based factors on neonatal sepsis prevention	Percentages, frequencies, chi-square, logistic regression analysis Thematic analysis

Source (Author, 2024)

3.8 Ethical Considerations

Ethical approval was sought from Chuka University Ethics and Research Committee (appendix IV). The research permit was sought from National Commission for Science, Technology and Innovation (NACOSTI) and the permit number was NACOSTI/P/24/38269. Approval to collect data within Embu Referral hospital was sought from the management of Embu Hospital (appendix VI). Informed consent was obtained from selected participants. Informed consent was sought by explaining the aims and objectives of the study to the participants. They were informed to participate voluntarily without coercing them and no incentives were provided for their responses. Additionally, confidentiality and privacy of the responses from the participants was

maintained by avoiding writing names or any participant identification on the research tool. The obtained data was stored in a closed place awaiting analysis. The study maintained originality policy with an accepted margin of between 0-15% by ensuring that all information or knowledge obtained from other studies and materials are respectively recognized through in-text citation and correct APA referencing.

CHAPTER FOUR

RESULTS

4.0 Response Rate of the Participants

The study collected data on 81 postnatal mothers and 7 nurses, which is a 100% response rate.

4.1 Demographic Characteristics of Study Participants

The minimum age of the participants was 16, while the oldest was 42 years. The average age was 26.56 and an SD of ±6.905. Most, 29(35.8%) of the participants were aged 20 – 25 years. There were 13 (15.5%) teenage mothers, 21(25.9%) were aged between 26-31 years, and 18(22.2%) were more than 32 years. The age group was divided as shown in Table 4. The average age of key informants was 32 years with the youngest being 28 years and the oldest 54 years.

In regards to employment status, most of the respondents were self-employed, 30 (37%), while 27(33.3%) were unemployed, and 24 (29.4%) were formally employed. In addition, slightly above half, 42(51.9%) of the participants had tertiary education, 30.9% had secondary education, and 17.3 had primary education. Furthermore, 55(67.9%) of the participants were married, while 23 (28.4%) had never married, and 3(3.7%) were separated. The majority were multiparous. The average age of the neonates was 15.02 days with an SD of ±4.602, as shown in Table 4.

Table 4: Demographic Characteristics of Study Participants (n=81)

Variable	N=81	Percentage (%)
Age		
<20 years	13	15.5
20 – 25 years	29	35.8
26 – 31 years	21	25.9
≥32 years	18	22.2
Employment status		
Unemployed	27	33.3
Formally employed	24	29.6
Self-employed	30	37.0
Level of education		
Primary	14	17.3
Secondary	25	30.9
Tertiary	42	51.9
Marital status		
Never married	23	28.4
Married	55	67.9
Separated	3	3.7
Number of children		
Mean (SD) 1.98 (±1.162) Median 2 Mode 1 Range 1 – 6		
Age of the neonate in days		
Mean (SD) 15.02 (±4.602) Median 16 Mode 16 Range 1 – 28		

4.2 Knowledge on Neonatal Sepsis

The first objective of the study sought to determine the level of knowledge of post-natal mothers regarding neonatal sepsis. This was done through asking a number of questions on causes, signs and symptoms and the prevention methods of Neonatal sepsis

4.2.1 Awareness of Neonatal Sepsis

The participants were asked to indicate whether they had ever heard of neonatal sepsis and the source of information. The results are presented as below in Figure 2.

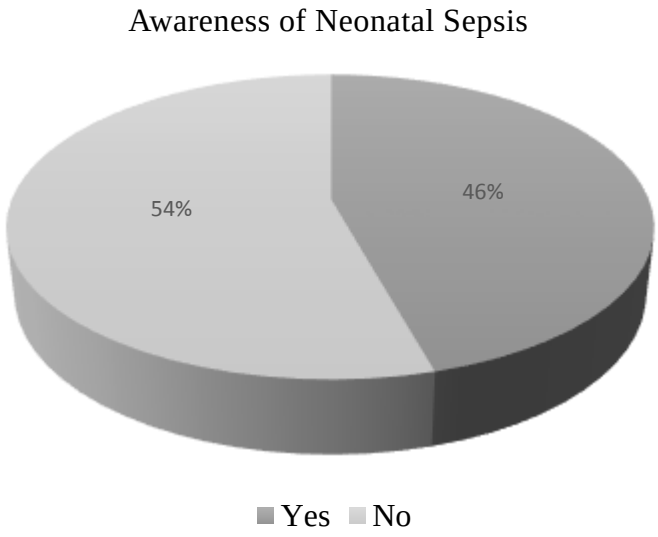

Figure 2: Awareness of Neonatal Sepsis

The participants were asked to indicate their source of information on neonatal sepsis and the resulted are presented in Figure 3.

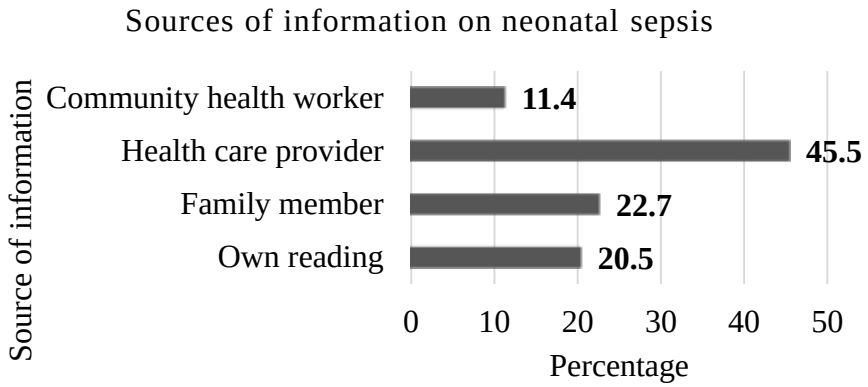

Figure 3: Sources of Information on Neonatal Sepsis

The results showed that less than half of the participants were aware of neonatal sepsis (46%), while 54% had never heard of neonatal sepsis. The results show that healthcare providers were the primary source of information on neonatal sepsis.

Results from the key informant interview indicated that nurses and midwives provided mothers with the necessary information regarding neonatal sepsis. This was also confirmed by one key informant who said:

"*Whenever I encounter a mother during the antenatal visits, I make sure I prepare her well for labor and delivery and complications that arise after that, including neonatal sepsis. I always tell them to ensure they deliver within the hospital and at least buy surgical spirit for cord care at home in case things do not go as planned. I mainly emphasize hygiene since it is the main practice in sepsis prevention.*" (KII, nurse 1)

4.2.2 Knowledge on Causes of Neonatal Sepsis

Respondents were asked the causes of neonatal sepsis. The results are summarized in figure 4

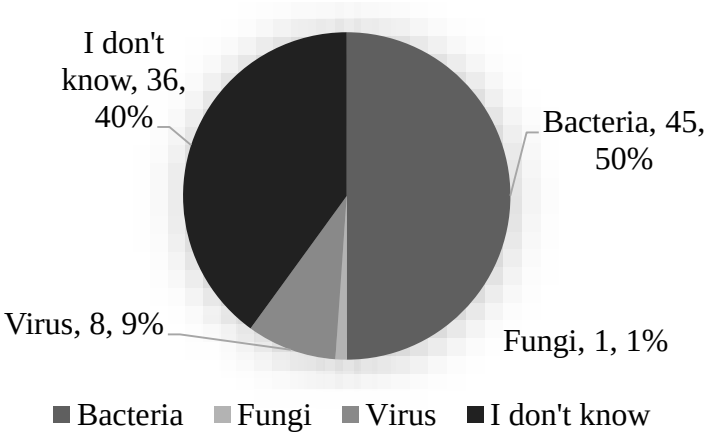

Figure 4: Knowledge on Causes of Neonatal Sepsis

It was observed from Figure 4 that 45 (50%) of the participants correctly identified that neonatal sepsis is caused by bacteria. However, 27 (40%) did not know the cause of neonatal sepsis. Other causes were identified by 10% of the participants.

4.2.3 Knowledge on the Risk Factors of Neonatal Sepsis

The study participants were asked to select the risk factors for neonatal sepsis they knew. The results are summarized in Table 5.

Table 5: Knowledge on Risk Factors to Neonatal Sepsis

Variable	Frequency n=81	Percentage (%)
Prematurity	15	18
Low birth weight	13	15.3
Early rupture of membranes	31	38.1
Prolonged labor	20	25.4
I don't know	2	2.0

The results from Table 5 show that the most frequently identified risk factor of neonatal sepsis was early rupture of membranes, while the least identified was low birth weight 13(15.3%). It also shows that 2 (2.0%) participants did not know the risk factors for neonatal sepsis.

Results from the in-depth interview with key informants indicated that some postnatal mothers do not know the risk factors for neonatal sepsis. This is seen in an assertion by one key informant who said:

"*In our unit, we have postnatal mothers whose babies are admitted due to prematurity, low birth weight, and also complications of labor such as prolonged labor leading to asphyxia. However, these mothers do not understand that their babies are at risk. They do not always follow instructions such as hygiene practices since the babies are at a greater risk of infection. Even after being taught, some of them will still repeat poor practices during cord care and feeding since they are unaware of the risk they pose to these babies."* (KII, nurse 2)

4.2.4 Knowledge on Sign and Symptoms of Neonatal Sepsis

The participants were asked to identify all the common signs and symptoms of neonatal sepsis that they are aware off and the results converted to a percentage based on how many could identify a specific sign out of the 81 participants. The results are presented in Table 6.

Table 6: Knowledge on Signs and Symptoms of Neonatal Sepsis

Variable	Frequency (n=81)	Percentage (%)
Failure to breastfeed	61	75.3
General body weakness	51	63
High body temperature/fever	74	91.4
Pus discharge from the umbilicus	39	48.1
Redness or discharge from the eyes	16	19.8
Difficulty in breathing	53	65.4
Yellow palms and eyes	51	63

It was observed from Table 6 that high fever/temperature was the most identified symptom by most of the participants 74(91.4%). Failure to breastfeed was identified by 61(75.3%), difficulty in breathing by 53(65.4%), yellow palms and eyes, and general body weakness by 51(63%) each, pus from umbilicus 39(48.1%), and lethargy or

unconsciousness 22(27.2%), while the least recognized was redness and discharge from the eyes.

4.4.5 Knowledge on Preventive Practices

The participants were asked to identify all the preventive practices of neonatal sepsis that they know by ticking all the appropriate choices provided. The results are presented in Figure 5.

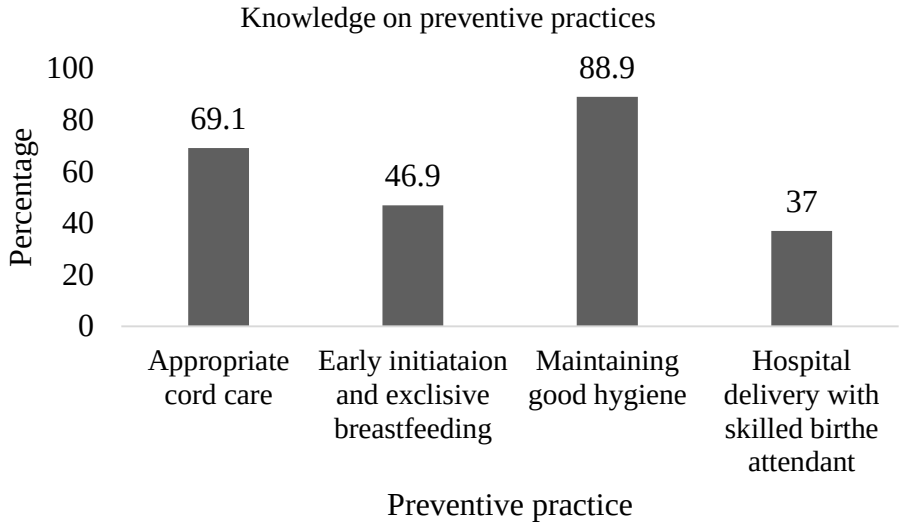

Figure 5: Knowledge on Preventive Practices of Neonatal Sepsis

The results from Figure 5 show that maintaining good hygiene (88.9%) was the most frequent way of preventing neonatal sepsis that was reported by the participants. On the other hand, hospital delivery with skilled birth attendant was the least recognized approach of preventing neonatal sepsis (37%).

4.2.4 Level of Knowledge on Neonatal Sepsis

Table 7: Level of Knowledge on Neonatal Sepsis

Variable	Frequency	Percentage (%)
Mean (SD) 55.54 (±23.977)		
Median 52.94		
Mode 41		
Range 18 - 100		
Knowledge level	41	(50.6)
<56 % Low knowledge level	40	(49.4)
≥ 56 High knowledge level		

The mean knowledge score was 55.54% and an SD ±23.977 as illustrated in Table 7. The least scored 18% while the highest had 100%. Level of knowledge was then categorized into low, moderate, and high knowledge level categories around the mean. It was observed from Table 7 that the two categories had almost equal number of participants; 50.6 % and 49.4% for low and high knowledge level respectively.

4.3 Home-based Factors Influencing Prevention of Neonatal Sepsis

The third objective of the study sought to establish the home-based factors related to the prevention of neonatal sepsis among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital. The participants were asked various questions relating the number of family members, caregivers, cord care practices at home, decision-makers, and cultural practices within the community. The results are presented in Table 8

Table 8: Home-based Factors Influencing Prevention of Neonatal Sepsis

Variable	Frequency(n=81)	Percentage
Size of family		
1 – 2	13	16
3 – 4	44	54.3
5 and above	24	29.6
Who else takes care of the neonate		
Spouse	17	21
Grandmother	23	28.4
Other family members	41	50.6
Cord care products at home		
Boiled water with salt	21	25.9
Use of 7.1% chlorohexidine	41	50.6
Surgical spirit	19	23.5
Decision making concerning the neonate		
I do	44	54.3
My husband	19	23.5
Mother-in-law	4	4.9
My mother	14	17.3
Cultural practices within the community		
None	30	37
Cutting the uvula when baby cries a lot	21	25.9
Weaning the baby before six weeks	18	22.2
Going to the TBAs	6	7.4
Use of glucose water for stomach upset/hiccups	6	7.4

The results from Table 8 showed that 44(54.3%) families had at least three to four members. Other than the neonate's mother, other family members 41 (50.6%) were also frequently involved in the care of the neonate, while 23(28.4%) of the neonates were cared for by grandmothers.

A significant number of the mothers used 7.1% chlorohexidine for card care while at home; 41 (50.6%), 21(25.9%) used boiled water with salt, and 19(23.5%) used surgical spirit.

The results from the in-depth interview with nurses indicated that postnatal mothers had adopted at least two cord care practices other than the use of chlorhexidine while at home. This was confirmed by one key informant who said:

"*Chlorohexidine has been out of stock for nine months since December 2023; therefore, we usually write to them to buy from outside chemists. Due to a lack of finance, others opt to buy surgical spirit, which they find relatively cheap. Additionally, as we teach them about cord care during postnatal examination, we advise them to at least wipe the cord area with boiled water and salt to reduce visible dirt before applying chlorohexidine. This is because some babies defecate and stool goes up to the umbilical region, making it dirty*. (KII, nurse 3)

The participants mainly made Decisions concerning the baby: 44 (54.3%). Many of the participants, 30 (37%), did not have any cultural beliefs within the community concerning neonatal care. However, from Table 8, it was observed that some participants believed that the uvula should be cut if the baby cries a lot (25.9%), while others believed that the baby should be weaned before six months (22.2%). During the key interview, all the informants mentioned;

"*In the communities within Embu County, some cultural beliefs affect the health of the newborns. During pregnancy, some mothers are encouraged to go for massage by the TBAs, especially those from remote areas* (KII, nurse 4).

If the baby cries a lot, some are advised to go for uvula cutting as they believe it is the cause of crying and high fever. They bring very ill babies for hospital admission due to the crooked uvula-cutting procedures using unsterile equipment." (KII, nurse 5)

"*Mothers still practice traditional methods of feeding their babies. Even here in the ward, if you are not vigilant, some will sneak in powdered milk or boiled cow milk from*

home to feed the neonates. They do so because they believe a mother has no breast milk for the first day after birth, and hence, the baby is weaned immediately. They carry this practice back home by introducing new feeds before six months of age. That is why the shops within the hospital have been banned from selling formula milk to postnatal mothers within the hospital premises." (KII, nurse 6)

4.4 Care Practices Adopted by Postnatal Mothers to Prevent Neonatal Sepsis

The third objective sought to evaluate the care practices adopted by postnatal mothers to prevent neonatal sepsis. Participants were asked question on practices such as attendance of antenatal care, place of delivery, cord care practices, initiation and exclusive breastfeeding, and hygiene.

4.4.1 Attendance of ANC

The participants were asked to state whether they attended ANC clinic and the number of visits attended. All the study participants (100%) reported to have attended the at least one ANC. The results on frequency of attendance are presented in Figure 6.

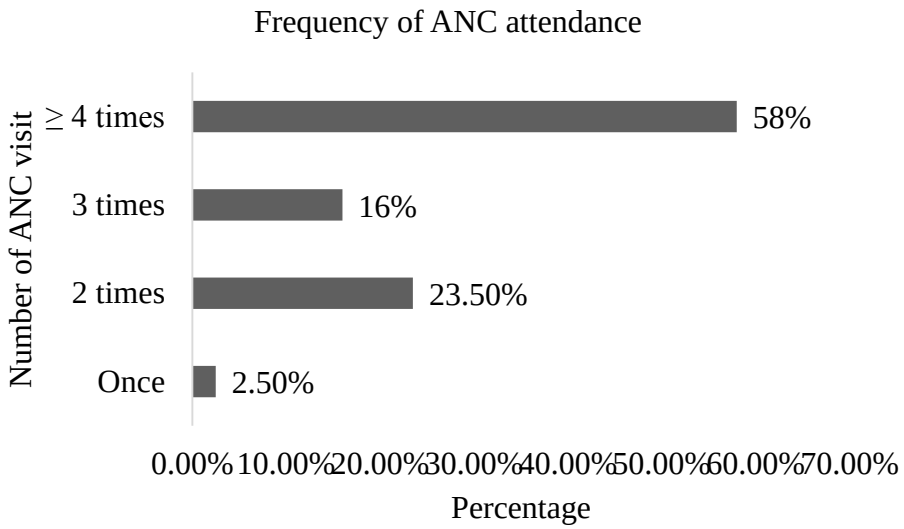

Figure 6: Frequency of attending ANC

The results in Figure 6 show that only (58%) participants adhered to the minimum four visits recommended by the WHO. Those who attended only one visit were (2.5%).

4.4.2 Place of Delivery

The participants were asked questions concerning their place of delivery, the personnel assisting in the delivery process, and the delivery surfaces. The results are presented in Table 9.

Table 9: Place of Delivery Care Practices

Variable	Frequency (n=81)	Percentage
Place of delivery		
Hospital	71	87.7
At home	10	12.3
Who assisted during the delivery		
Skilled Health care worker	71	87.7
Unskilled personnel/TBA	4	4.9
Family member	6	7.4
Surface for delivery		
Floor	9	11.1
Delivery bed	72	88.9

The above table shows that more than three-quarters of the postnatal mothers had a hospital delivery 71 (87.7%). It also indicates that the skilled healthcare workers 71 (87.7%) mainly assisted during delivery. However, family members 4(7.4%) and TBAs 4 (4.9%) were also reported to assist during delivery. In addition, majority of the mothers 72(88.9%) reported to have delivered on the delivery bed.

4.4.3 Cord Care Practices

Participants of the study were asked to identify cord care practices that have been adopted to prevent neonatal sepsis. The results are presented in table 10.

Table 10: Cord Care Practices (n=81)

Variable	Frequency	Percentage (%)
Material used to cut the cord at birth		
New blade	11	13.6
New scissors	70	86.4
Material used to tie the cord at birth		
String or thread	8	9.9
Cord clamp	73	90.1
Substance applied on the cord to aid healing?		
Surgical spirit	13	16
7.1% Chlorohexidine	34	42
Nothing	13	16

The results show that mainly new scissors (70 (86.4%) and cord clamps (73 (90.1%)) were used to cut and tie the cord. In addition, 7.1 chlorohexidine was applied on the cord after birth in 34 (42%) of the participants, while 16% reported having used surgical spirit and 16% did not apply anything.

The results from the in-depth interview with nurses indicated that high levels of aseptic technique are usually observed during labor and delivery to prevent neonates from neonatal sepsis. This is seen in an assertion by one key informant who said:
"*During labor and delivery, we ensure that mothers deliver on clean surfaces, especially on the delivery bed, for aseptic purposes. Sterile cord-cutting equipment such as scissors are used, and we usually have plastic cord clamps for tying the cord. There are those prophylactic procedures given to the baby immediately after birth, such as cord care with chlorhexidine. However, for the past few months, we have not been applying chlorhexidine since it is out of stock here in the hospital. We recommend they buy and, if possible, come with them to the hospital during admission"* (KII, nurse 7).

4.4.4 Neonate Feeding Practices

Participants were asked question on the time of initiation of breastfeeding and whether they neonates are still on exclusive breastfeeding practices. The findings are presented in Figure 8 and 9.

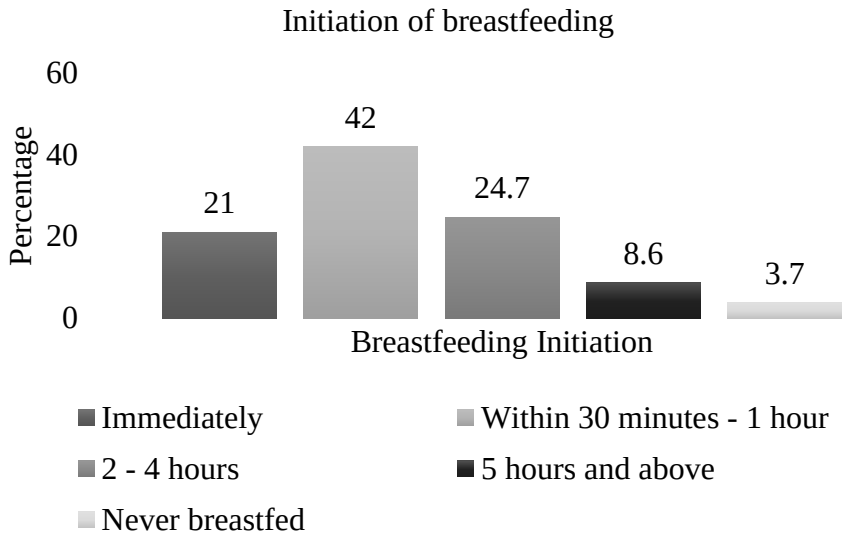

Figure 7: Initiation of Breastfeeding

Regarding initiation of breastfeeding, figure 8 shows that majority of the neonates were able to initiate breastfeeding within one hour of delivery (63%).

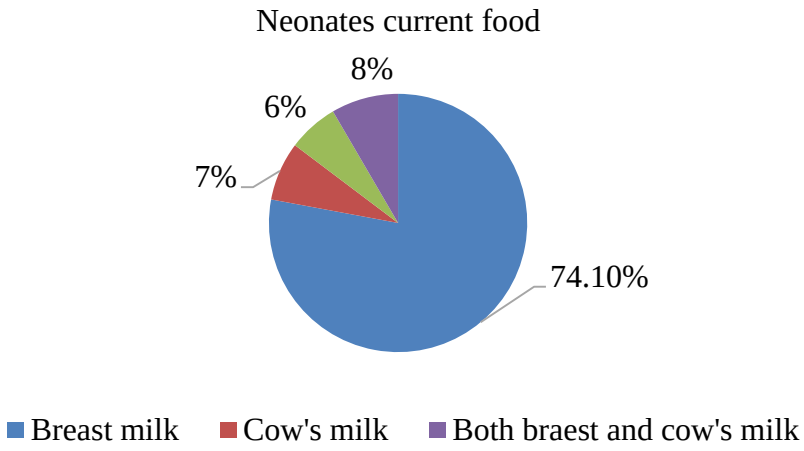

Figure 8: Neonate's Current Food

Furthermore, the results show that majority of the neonates were still on exclusive breastfeeding (74.1%). However, there are those who have been weaned with 7% being on cow's milk, 6% on formula milk, and 8% use combined breast milk and cow's milk.

4.4.5 Hygiene Practices

The participants were asked to identify the hygiene practices they had adopted to prevent neonatal sepsis. The results are presented in Table 11 below.

Table 11: Hygiene Practices Practiced by the Mothers

Variable	Frequency (n=81)	Percentage
Neonate's first bath		
Within 24 hours of delivery	7	8.6
After 24 hours of delivery	74	91.4

Neonate's number of baths per day		
Once	54	66.7
Twice	27	33.3
Mother washes hands while taking care of the baby		
Yes	71	87.7
No	10	12.3
Circumstances under which the mother washes hands		
Before and after breastfeeding the neonate	49	60.5
After changing the diaper/nappy	69	85.2
Before handling the baby	40	49.4
Products used in hand washing		
Water only	10	12.3
Water and soap	57	70.4
Hand sanitizer	14	17.3

It was observed from the Table 11 above that majority 74(91.4%) of the neonate had their first bath after 24 hours of delivery. The results also show that most of the neonates were given a bath once in a day, 55 (66.7%). Additionally, 71 (87.7%) of the participants washed their hands using water and soap. Majority of the participants practiced hand washing after changing nappies.

Results from the key interview with nurses indicated that postnatal mothers are encouraged to observe hygiene practices during postnatal period to prevent neonatal sepsis. This was confirmed by two informants who stated that:

"*We usually encourage mothers to delay first baby bath after delivery up to at least 24 hours. This prevents exposing the baby to cold and it is also helps prevent infections due to sharing of bath equipment while within the hospital.*" (KII, nurse 2)

"*There are hand-washing facilities within the wards where mothers can do so before taking care of their babies. But the main challenge with them is usually pain. Especially those with C/S scars, they are afraid to walk around. But we encourage them on importance of hand hygiene especially when they go home."* (KII, nurse 3)

4.5 Association of Study Variables

4.5.1 Association between Knowledge Level and Demographic Characteristics

The association between the level of knowledge of participants and their demographic characteristics was established. This is represented in the table (12) below.

Table 12: Association between Knowledge Level and Demographic Characteristics (n=81)

Demographic characteristics	Low knowledge level N=41 (%)	High knowledge level N=40 (%)	$\chi 2$	Df	*P* – value
Age group					
<20 years	11 (13.6)	2 (2.5)	20.727	3	<0.001*
20 – 25 years	20 (24.7)	9 (11.1)			
26 – 31 years	7 (8.6)	14 (17.3)			
≥32 years	3 (3.7)	15 (18.5)			
Employment status	24 (29.6)	3 (3.7)	32.993	2	<0.001*
Unemployed	2 (2.5)	22 (27.2)			
Formally employed	15 (18.5)	15 (18.5)			
Self-employed					
Level of education					
Primary	13 (16)	1 (1.2)	23.041	2	<0.001*
Secondary	17 (21)	8 (9.9)			
Tertiary	11 (13.6)	31 (38.3)			
Marital Status					
Never married	17 (21)	6 (7.4)	7.783	2	0.020*
Married	22 (27.2)	33 (40.7)			
Separated	2 (2.5)	1 (1.2)			

*Significant of association at 95% p<0.05

The results from the above table indicate that there was a statistically significant association between knowledge level and age group [$\chi^2 = 20.727$, df= 3 and $p = < 0.001$, employment status [$\chi^2 = 32.993$, df= 3 and $p = < 0.001$], level of education [$\chi^2 = 23.041$, df= 3 and $p = < 0.001$] and marital status [$\chi^2 = 7.783$, df= 2 and $p = 0.020$].

On establishing the relationship between demographic variables and level of knowledge on neonatal sepsis, there was a positive correlation between knowledge score and age of the mother, parity and age of the baby as shown in Table 13.

Table 13: Correlation between Demographic Variables and Level of Knowledge on Neonatal Sepsis

Demographic variable	Correlation coefficient (*r*)	*p* – value
Age of the mother	0.5413	<0.001*
Number of children	0.380	<0.001*
Age of baby in days	0.276	0.013*

*Significant at 95%

Table 14: Multivariate Regression Analysis Between Level of Knowledge and Demographic Characteristics

	Demographic variable	n (%)	AOR (95% CI) High level of knowledge	*p* – value
	Age group	13 (16)	2.581 (0.209 –	0.460
Low	<20 years	29 (35.8)	31.918)	0.231
knowledge	20 – 25 years	21 (25.9)	3.105 (0.486 –	0.251
level	26 – 31 years	18 (22.2)	19.858)	-
	≥32 years		3.403 (0.420 –	
			27.572) 1	
	Employment status	27 (33.3)	4.359 (0.810 –	0.086
	Unemployed	24 (29.6)	23.461)	0.062
	Formally	30 (37.0)	0.141 (0.018 –	-
	employed		1.103) 1	
	Self-employed			
	Level of education			
	Primary	14 (17.3)		0.064
	Secondary	25 (30.9)	9.825 (0.873	0.441
	Tertiary	42 (51.9)	11.052)	-
			1.799)0.405 –	
			7.997) 1	
	Marital Status			
	Never married	23 (28.4)	0.619 (0.016 –	0.798
	Married	55 (67.9)	24.385)	0.521
	Separated	3 (3.7)	0.322 (0.010 –	-
			10.287)	
			1	

The results of a Multivariate regression analysis, Table 14, to determine the relationship between level of knowledge and demographic characteristics shows that there was no statistically significant relationship between the knowledge level and the demographic variables ($p>0.05$).

4.5.2 Association between Home-based Factors and Practice of Neonatal Sepsis Prevention

The level of association between home-based factors influencing the prevention of neonatal sepsis and preventive practices for neonatal sepsis were established.

4.5.2.1 Association between Number of People in the Same House with the Neonate and Preventive Practices of Neonatal Sepsis

The level of association between the number of people living in the same house with the neonate and preventive practices of neonatal sepsis was established. The results are shown in the Table 15 below.

Table 15: Association between Number of People in the Same House with the Neonate and Preventive Practices of Neonatal Sepsis

Preventive practice	Household size (N=81) n (%)			$\chi 2$	Df	*p* - value
	1 – 2	3 – 4	≥ 5			
Number of ANC visits						
< Four visits	5 (6.2)	21	14	1.438	2	0.487
≥ Four visits	8 (9.9)	(25.9)	(17.3)			
		23	10			
		(28.4)	(12.3)			
Place of delivery						
Hospital	13 (16)	39	19	4.828	2	0.089
At home	0	(48.1)	(23.5)			
		5 (6.2)	5 (6.2)			
Substance applied on cord						
Nothing	6 (7.4)	19	9 (11.1)	1.239	4	0.872
Surgical spirit	3 (3.7)	(23.5)	4 (4.9)			
7.1% chlorohexidine	4 (4.9)	6 (7.4)	11			
		19	(13.6)			
		(23.5)				
Initiation of breastfeeding						
Within 1 hour after delivery	2 (2.5)	9 (11.1)	6 (7.4)	8.494	4	0.075
>1 hour after delivery	11(13.6)	35	15			
Never breastfed	0	(43.2)	(18.5)			
		0	3 (3.7)			
Neonate's current food						
Exclusive breastfeeding	10 (12.3)	38	12	10.342	2	0.006*
Others	3 (3.7)	(46.9)	(14.8)			
		6 (7.4)	12			
			(14.8)			
Washing hands before handling the baby						
No	6 (7.4)	21	14	0.822	2	0.663
Yes	7 (8.6)	(25.9)	(17.3)			
		23	10			
		(28.4)	(12.3)			
Neonate's number of baths/day						
Once	9 (11.1)	31	14	1.0073	2	0.585
Twice	4 (4.9)	(38.3)	(17.3)			
		13 (16)	10			
			(12.3)			

The results of the analysis from Table 15 above show that there was a statistically significant relationship between number of people in the same house with the neonate and neonate's current food, [$\chi^2 = 10.342$, df= 2 and $p = 0.006$].

4.5.2.2 Association between Decision Making Concerning the Neonate and Preventive Practices

The association between the person making decisions concerning the neonate and preventive practice for neonatal sepsis was established. The results are shown in table 16.

Table 16: Association between the Person who makes Decisions Concerning the Neonate and the Preventive Practices

Preventive practice	Who makes decisions concerning the neonate n (%)		$\chi 2$	Df	*p* - value
	Neonate's mother	Others			
Number of ANC visits					
< Four visits	25 (30.9)	15 (18.5)	2.130	1	0.144
≥ Four visits	19 (23.5)	22 (27.2)			
Place of delivery					
Hospital	42 (51.9)	29 (35.8)	5.416	1	0.020
At home	2 (2.5)	8 (9.9)			
Substance applied on cord					
Nothing	11 (13.6)	23 (28.4)			0.003*
Surgical spirit	8 (9.9)	5 (6.2)	11.941	2	
7.1% chlorohexidine	25 (30.9)	9 (11.1)			
Initiation of breastfeeding					
Within 1 hour after delivery	9 (11.1)	8 (9.9)			0.905
>1 hour after delivery	33 (40.7)	28 (34.6)	0.199	2	
Never breastfed	2 (2.5)	1 (1.2)			
Neonate's current food					0.004*
Exclusive breastfeeding	27 (33.3)	33 (40.7)	8.103	1	
Others	17 (21)	4 (4.9)			
Washing hands before handling the baby	2 (2.5)	8 (9.9)	5.416	1	0.020*
No	42 (51.9)	29 (35.8)			
Yes					
Neonate's number of baths/day					
Once	28 (34.6)	26 (32.1)	0.398	1	0.528
Twice	16 (19.8)	11 (13.6)			

The above Table 16 determined that there that was a statistically significant relationship between who makes decisions concerning the neonate and substance used on the cord, [χ^2 = 11.941, df= 2 and p = 0.003], neonate's current food, [χ^2 = 8.103, df= 2 and p = 0.004] and washing hands before handling the baby, [χ^2 = 5.416, df= 1 and p = 0.020].

On carrying out a multivariate regression analysis, it was observed that there was a statistically significant relationship between who makes decision concerning the neonate and place of delivery (p =0.041). Mothers who made decisions concerning the neonate were 0.12 more likely to have delivered in the hospital as compared to cases where the decisions were made by others (AOR 0.120; 95% CI 0.016, 0.921). The study also established that there was a statistically significant relationship between who makes decision concerning the neonate and neonate's current food (p=0.014). Neonates whose mothers made decisions about them were 0.125 more likely to be on exclusive breastfeeding as compared to those whose decisions were made by other people (AOR 0.125; 95% CI 0.024, 0.655) as illustrated in Table 17.

Table 17: Multivariate Regression Analysis on Decision making Concerning the Neonate and Preventive Practices

	Preventive Practice	N=81 (%)	AOR (95% CI) Neonate's mother	*df*	*p* – value
Others	Number of ANC visits				
	< Four visits	40 (40.9)	1.863 (0.640 –	1	0.254
	≥ Four visits	41 (50.6)	5.427)		
	Place of delivery				
	Hospital	71(87.7)	0.120 (0.016 –	1	0.041*
	At home	10 (12.3)	0.921)		
			1		
	Substance applied on cord				
	Nothing	34 (42)	0.292 (0.092 –	1	0.035
	Surgical spirit	13 (16)	0.919)	1	0.307
	7.1% chlorohexidine	34 (42)	0.443 (0.093 –		-
			2.116)		
			1		
	Neonate's current food				
	Exclusive breastfeeding				
	Others	60 (74.1)	0.125 (0.024 –	1	0.014*
		21 (25.9)	0.655)		
			1		
	Washing hands				
	No	41 (50.6)	0.832 (0.282 –		
	Yes	40 (49.4)	2.438)	1	0.737
			1		

4.5.2.3 Association between the Person who takes Care of the Neonate and Preventive Practice

The association between the alternative caregiver for the neonate and the preventive practice for neonatal sepsis was established. The results are presented in Table 18.

Table 18: Association between the Person who takes Care of the Neonate and Preventive Practice

Preventive practice	Who else takes care of the neonate N=81 (%)			$\chi 2$	Df	*p* - value
	Grandmother	Other family members	Spouse			
Number of ANC visits						
< Four visits	10 (12.3)	23 (28.4)	7 (8.6)	1.518	2	0.468
≥ Four visits	13 (16)	18 (22.2)	10(12.3)			
Place of delivery						
Hospital	18 (22.2)	2 (2.5)	3 (3.7)	4.430	2	0.109
At home	5 (6.2)	39 (48.1)	14(17.3)			
Substance applied on cord						
Nothing	9 (11.1)	14 (17.3)	11(13.6)			
Surgical spirit	5 (6.2)	7 (8.6)	1 (1.2)	5.457	4	0.244
7.1% chlorohexidine	9 (11.1)	20 (24.7)	5 (6.2)			
Initiation of breastfeeding						
Within 1 hour after	1 (1.2)	8 (9.9)	8 (9.9)	12.521	4	0.014*
delivery	20 (24.7)	21(26)	9 (11.1)			
>1 hour after delivery	2 (2.5)	1 (1.2)	11(13.6)			
Never breastfed						
Neonate's current food						
Exclusive breastfeeding	16 (19.8)	29 (35.8)	15(18.5)	2.257	2	0.323
Others	7 (8.6)	12 (14.8)	2 (2.5)			
Washing hands before handling the baby						
No	8 (9.9)	2 (2.5)	7 (8.6)	15.207	2	<0.001*
Yes	15 (18.5)	39 (48.1)	10 (12.3)			
Neonate's number of baths/day			11			
Once	18 (22.2)	25 (30.9)	(13.6)	2.018	2	0.365
Twice	5 (6.2)	16 (19.8)	8 (7.4)			

The above results show that there was a statistically significant relationship between who else is involved in taking care of the neonate and initiation of breastfeeding [χ^2 = 12.521, df= 4 and p = 0.014] and washing of hands before handling the baby [χ^2 = 15.207, df= 2 and p = <0.001]. However, none of these was a significant predictor (p>0.05) in the multivariate analysis.

Table 19: Multivariate Regression Analysis between who else takes Care of the Neonate and Preventive Practices

	Preventive Practice	N=81 (%)	AOR (95% CI) Grandmother	*df*	*p* – value
Spouse	Place of delivery				
	Hospital	71 (87.7)	0.742 (0.124 – 4.456	1	0.744
	At home	10 (12.3)	1		
	Neonate's current food				
	Exclusive breastfeeding	60 (74.1)	0.321 (0.056 – 1.844)	1	0.203
	Others	21 (25.9)	1		
	Washing hands before handling the baby				
	No	41 (50.6)	2.220 (0.551 – 8.950	1	0.737
	Yes	40 (49.4)	1		
	Preventive Practice	n (%)	AOR (95% CI) Others	*df*	*p* – value
Spouse	Place of delivery				
	Hospital	71 (87.7)	0.146 (0.018 – 1.157)	1	0.068
	At home	10 (12.3)	1		
	Neonate's current food				
	Exclusive breastfeeding	60 (74.1)	0.281 (0.053 – 1.496)	1	0.137
	Others	21 (25.9)	1		
	Washing hands before handling the baby				
	No	41 (50.6)	1.802 (0.512 – 6.339)	1	0.359
	Yes	40 (49.4)	1		

4.5.2.4 Association between Cultural Beliefs and Preventive Practices

The association between cultural beliefs and preventive practice for neonatal sepsis was established. The findings are presented in Table 20.

Table 20: Association between Cultural Beliefs and Preventive Practices

Preventive practice	Cultural Beliefs n (%)		$\chi 2$	Df	P – value
	Absent	Present			
Number of ANC visits					
< Four visits	13 (16)	27 (33.3)	0.698	1	0.404
≥ Four visits	17 (21)	24 (29.6)			
Place of delivery					
Hospital	8 (9.9)	2 (2.5)	9.030	1	0.003*
At home	22 (27.2)	49 (60.5)			
Substance applied on cord					
Nothing					
Surgical spirit	17 (21)	17 (21)	5.122	2	0.077
7.1% chlorohexidine	5 (6.2)	8 (9.9)			
	8 (9.9)	26 (32.1)			
Initiation of breastfeeding					
Within 1 hour after delivery	4 (4.9)	13 (16)	1.755	2	0.416
>1 hour after delivery	25 (30.9)	36 (44.4)			
Never breastfed	1 (1.2)	2 (2.5)			
Neonate's current food					
Exclusive breastfeeding	22 (27.2)	38 (46.9)	0.014	1	0.907
Others	8 (9.9)	13 (16(			
Washing hands before handling the baby					
No	6 (7.4)	4 (4.9)	2.580	1	0.108
Yes	24 (29.6)	47 (58)			
Neonate's number of baths/day					
Once	23 (28.4)	31 (38.3)	2.144	1	0.143
Twice	7 (8.6)	20 (24.7)			

When the cultural beliefs were associated with preventive practices, there was a statistically significant relationship between cultural beliefs and place of birth [χ^2 = 9.030, df= 4 and p = 0.003], Table 20.

Table 21: Multivariate Regression Analysis between Cultural Beliefs and Preventive Practices

	Preventive Practice	n (%)	AOR (95% CI) Present	*df*	*p* – value
Absent	Place of delivery				
	Hospital	71 (87.7)	5.842 (1.014 – 33.670)	1	0.048*
	At home	10 (12.3)	1		
	Substance applied on cord				
	Nothing	34 (42)	2. 078 (0.678 _6.365)	1	0.200
	Surgical spirit	13 (16)	2.153 (0.498 – 9.304))	1	0.305
	7.1% chlorohexidine	34 (42)	1		-
	Number of neonate's bath/day				
	Once	54 (66.7)	2.085 (0.666 – 6.527)	1	0.207
	Twice	27 (33.3)	1		
	Washing hands before handling the baby				
	No				
	Yes	41 (50.6)	1.836 (0.656 – 5.140)	1	0.247
		40 (49.4)	1		

As illustrated in Table 21, neonates born to communities with some form of cultural beliefs were 5.842 more likely to have been delivered in the hospital as compared to those with no cultural beliefs (AOR 5.842; 95% CI 1.014, 33.670).

Table 22: Summary of Qualitative Data

Main areas of focus for KII	Main and common findings on neonatal sepsis preventive practice among postnatal mothers.
Sepsis prevention activities carried by the key informants to prevent sepsis on neonates	Educating postnatal mothers on neonatal sepsis, prevention practices, hand hygiene
Cultural practices/beliefs detrimental to sepsis prevention in neonates	TBAs, beliefs on cord care, beliefs of food, beliefs on illness
Challenges faced by postnatal mothers while preventing neonatal sepsis	• Inadequate finances or of Financial support, • Lack of support system, • pain, • Inadequate resources for infection prevention practices
Recommendations on how to improve neonatal sepsis preventive practices	• Increasing awareness on neonatal sepsis and preventive practices through printed media or printing the information in the mother child booklet • Health facilities to ensure they incorporate topics on neonatal sepsis and prevention practice in their routine educational services to mothers • Health facilities to ensure cord care products such as chlorohexidine are always available to improve cord care.

CHAPTER FIVE
DISCUSSION

5.1 Demographic Information

The findings of the study showed that most of the postnatal mothers were aged 20-25 years, with 13 teenage mothers, which indicates the increased number of teenage pregnancies within the community. The average age was 26.56 ± 6.905 SD years. Most participants were self-employed. Slightly above half of the participants had tertiary education. Furthermore, most participants were married and had more than one child. Studies show that maternal age greatly influences the knowledge and practice of neonatal sepsis preventive practices. Advancements in age and parity lead to increased knowledge and better practice due to previous exposure over the years (Kebede, 2019). Moreover, employment status also plays a significant role in the care of the newborn, as employed mothers finance their care with dependency on their spouses (Muthwii *et al.*, 2020).

5.2 Level of Knowledge on Neonatal Sepsis

The study findings revealed that more than half of the participants had never heard of neonatal sepsis. This is an agreement with a study by Murthy *et al.* (2019), which revealed that postnatal mothers have had varied knowledge levels on neonatal sepsis across different countries. The low level of awareness of neonatal sepsis could impact knowledge on neonatal sepsis preventive practices, thus increasing mothers' risk of adopting poor care practices. Most respondents indicated that healthcare workers were their source of information. This was nearly consistent with another study conducted in Kenya, which reported that healthcare professionals were the primary source of information on neonatal sepsis and danger signs (Getachew et al., 2022). Having healthcare professionals as the primary source of information on neonatal sepsis indicates that most postnatal mothers within Embu County rely on healthcare workers rather than other sources of information such as their own reading and family members.

This was also in agreement with a study by Berhea et al. (2018), which showed that health information received from healthcare professionals improves newborn care practices in preventing neonatal sepsis.

Most of the postnatal mothers (50%) identified that bacteria are the leading cause of neonatal sepsis, while a significant number of them reported having never heard of the causes of neonatal sepsis. These findings are slightly lower than those of Kalufya *et al*. (2022) that reported that more than half of the postnatal mothers had adequate knowledge on neonatal sepsis and this influenced their practice. Inadequate knowledge on the causes of neonatal sepsis predisposes neonates to the risk of neonatal sepsis.

The study has demonstrated that most postnatal mothers have good knowledge of at least one sign and symptom of neonatal sepsis. These findings were higher than those of Dongre *et al.* (2019), which indicated that 67.2% of mothers were aware of at least one sign and symptom. Most postnatal mothers (91.4%) identified high fever/temperature as one of the signs and symptoms of neonatal sepsis. However, lethargy or unconsciousness, redness, and discharge from the eyes were the least identified. This was in agreement with Gathoni et al. (2017) on mothers' knowledge of danger, which indicated fever and failure to breastfeed as the main danger signs identified by mothers. However, this study was in contrast to a study conducted in western Uganda (Sandberg et al., 2014), which indicated that mothers had inadequate knowledge of neonatal danger signs.

The study further revealed that 41 (50.6) respondents had low knowledge of neonatal sepsis, while 40 (49.4) had high knowledge of neonatal sepsis. This was similar to a study by Jemberia (2018), which indicated low maternal knowledge of neonatal danger signs. However, the study contrasts with Gathoni (2014), who indicated a high maternal knowledge of neonatal illness. The difference in these studies could be due to differences in knowledge scores used by the researchers. Therefore, having an almost equal number of postnatal mothers with high and low levels of knowledge showed that there is a need to put more efforts on health education. The neonates are at greater risk of neonatal infection, which can go unrecognized by the mothers if they have low level of knowledge.

5.3 Home-related Factors Related on Prevention of Neonatal Sepsis

The study revealed that the majority of respondents lived in a household with around 3 – 4 members. This is comparable to the KDHS (2022) which indicated that the average household size in Kenya is 3.8 people per household. A comparable to a study by Mitra et al. (2018), indicated that those living in overcrowded places are more prone to infection due to a lack of preventive measures such as hygiene (Mitra *et al.*, 2018). It is also similar to a study conducted by Moraa *et al*. (2019) in Nairobi indicated that neonates from slum areas of Nairobi have an increased risk of neonatal sepsis in comparison to their counterparts. A highly densely populated household with more than three people increases the risk of infection transmission from the family members to the neonates. Ventilation and sharing of personal effects between the neonate and members of the family may also increase the risk of neonatal sepsis.

The study also revealed that other than the neonate's mother, slightly above half of the neonates are cared by other family members. This is similar to a study carried out in coastal Kenya among the Giriama community by Ombere et al (2021), which reported that women in labor and the neonates post-delivery are cared by women who have ever given birth and the grandmothers. Other family members' care of the neonate may deter implementing the care practices since they might not be knowledgeable enough. It may also bring other ideas on neonatal care that they deem important. However, this may also be an indication of a good support system. This is slightly similar to a study by Kayom et al., 2018, which indicated that having a sound support system determines labor and delivery outcomes and the neonatal period (Kayom *et al.*, 2018). As a result, better care practices are put in place, reducing the risk of sepsis.

Furthermore, the study reported that the mother was the sole decision maker concerning the neonate. The findings differ from the findings of Ombare et al (2021) in coastal Kenya, which revealed that the husband is the solitary decision-maker in the place of delivery and neonatal care. Postnatal mothers have no say in the care of newborns as this is the sole responsibility of the husband. The differences observed may be due to different study settings and differences in culture among the Giriama and Embu communities. The decision-making process plays a great role in the prevention of

neonatal sepsis. This also differs from a study by Kayom *et al*. (2018), which revealed that babies whose mothers receive financial support from their spouses and family members are four times more unlikely to contract NNS. Mothers are the ones who usually know when the baby is feeling unwell, and even when they go for check-ups, they become educated on neonatal sepsis. Therefore, they have a great responsibility to make decisions on neonatal care.

Most mothers used 7.1% chlorohexidine to care for the cord at home. This is similar to other studies, which indicated that most postnatal mothers used chlorhexidine for cord care at home (Abegunde et al., 2017; Kalufya *et al*., 2022). However, some mothers still practice unclean and non-recommended practices. The use of unclean procedures, such as boiled water with salt, is a likely route of infection since it might be contaminated with bacteria (Goel et al., 2015). Other such non-recommended practices have been observed among postnatal mothers in different studies. A study in Pumwani maternity hospital in Kenya indicated that applying nothing (air drying) is common. The use of saliva, water, and surgical spirit was observed in that study (Kinanu et al., 2016). The difference might be due to cultural influences in which many postnatal mothers have tried to drop the norms on cord care, which are still detrimental.

A significant number of participants, (37%), had no cultural beliefs within the community concerning neonatal care. However, some participants believed that the uvula should be cut if the baby cries a lot (25.9%), while others believed that the baby should be weaned before six months (22.2%). This was similar to a study by Simane-Netshisaulu et al (2022), which reported that in most African settings such as South Africa, Kenya, Zambia, and Senegal, indigenous newborn care practices are still practiced within the community. This includes use of boiled water mixed with herbs to soothe abdominal colic, bathing with herbs among other practices.

5.4 Care Practices Adopted by Postnatal Mothers to Prevent Neonatal Sepsis

5.4.1 ANC Attendance

The study revealed that all (100%) participants reported to have attended ANC. However, only 58% of the participants achieved a minimum of fourth antenatal visits as recommended by the WHO. This corresponds with KDHS (2022) findings in Embu

County which revealed that on antenatal care, 100% of mothers interviewed attended antenatal clinics, but only 62% adhered to the fourth antenatal visit as recommended by the WHO. This is not in line with the WHO recommendations that state that all pregnant women should attend eight antenatal care visits (ANC) (WHO, 2022. In addition, is lower than the national average, which was 66% in KDHS (2022). Therefore, there is a need to package educational messages on neonatal sepsis during every contact with pregnant mothers, hence capturing even those who come for a single visit. As a result, good preventive practices will be employed during the neonatal period.

5.4.2 Place of Delivery

The study findings indicate that more than three-quarters had a hospital delivery 71 (87.7%). However, family members (7.4%) and TBAs (4 (4.9%) were also reported to have assisted them during delivery. This was lower than the national average hospital delivery rate, which was 89% according to KDHS (2022). These findings correspond with a study in Ethiopia by Regassa *et al*. (2022) which indicated that a significant number (22%) of deliveries occur at home. Furthermore, the study revealed that majority of the respondents was assisted by skilled healthcare workers during labor and delivery. This was higher than the national delivery by skilled birth attendant, which was 82% according to KDHS (2022). Hospital delivery and delivery assisted by skilled birth attendants is essential in the prevention of neonatal sepsis since hygiene and aseptic measures are put in place to decrease transmission of infectious agents into the neonates and the mother.

5.4.3 Cord Care Practices

This study revealed that new scissors 70 (86.4%) were mainly used to cut the cord while the cord clamp 73 (90.1%) was used for tying. These findings differ from the findings by Ombare et al (2021) among the Giriama community, which revealed that most mothers delivered at home new razor blades and a threat were used by the TBAs for cutting and tying the cord. Using new sterilized scissors in the hospital helps reduce the risk of neonatal sepsis by ensuring no microorganisms causing disease are transferred from the environment of the surface to the neonate. The findings disagree with a study in Zambia that reported that Cord cutting was done using an unsterile blade, and the stump was tied with a tread, especially for home deliveries (Sands *et al*., 2019).

In addition, 7.1 chlorohexidine was applied on the cord after birth in 34 (42%) participants, while 16% applied surgical spirit. This corroborates with Kalufya *et al.* (2022) study in Tanzania, that revealed that 21% of the mothers; which is less than 50% of the participants; showed good cord care practices that led to the prevention of NNS through chlorhexidine use. In other studies, a high percentage of mothers use the combined products as the principal substances used for cord care (Abegunde et al., 2017; Afolaranmi et al., 2018). The study corresponds with another study by Moraa *et al*. (2019) which indicated that most mothers reported using chlorhexidine or surgical spirit for cord care (64%). This agrees with WHO recommendations on chlorohexidine for cord care, hence reducing neonatal sepsis rates due to cord infection (WHO, 2022).

5.4.4 Neonate Feeding Practices

Regarding breastfeeding initiation, the study found that the most neonates were initiated breastfeeding within one hour of delivery (63%). Most neonates were still on exclusive breastfeeding (74.1%). This was higher than the national level, at 60% of neonates, who were breastfed within the first hour, according to KDHS, (2022). Early initiation of breastfeeding is beneficial to both the mother and the neonate. The first breast milk contains colostrum, which is highly nutritious and has antibodies that protect the newborn from 45 infections. This study agrees with a study by Chhetri *et al*. (2019), which recorded a majority of good breastfeeding and newborn care practices. Most mothers (40%) commenced breastfeeding an hour after birth, and 45% of the participants practiced exclusive breastfeeding. It is also congruent with a study by Ochoa et al. (2020), which revealed a positive relation between the intake of a mother's milk and a reduction in the risk of neonatal sepsis.

5.4.5 Hygiene Practices

Regarding hygiene and ensuring the cord is dry and healing, neonate bathing is essential. More than half, 74(91.4%) of neonates had their first bath after 24 hours of delivery through full water immersion. Similarly, such practices have been reported in a study by Moraa et al. (2019). In addition, the findings reveal that most neonates are given a bath once daily, 55 (66.7%). This helps reduce the risk of hypothermia among the neonates due to variations in temperature in the study area. The WHO recommends that a baby’s first bath should be after 24 hours, and the umbilical cord should be kept

dry and clean (WHO, 2018). Early bathing of the neonates within 24 hours increases susceptibility to infection. Exposure to infections occurs through wet and dump cords, and washing away of the vernix caseosa which usually acts as a protective media for the neonate.

Interestingly, more than two-thirds of postnatal mothers reported washing their hands frequently. This is supported by a study in Kenya, which revealed that more than 52% of mothers washed their hands under running water (Kinanu et al., 2016). A study in Benin also indicated that 73% of the mothers wash their hands before and after caring for the neonate (Agossou et al., 2016). Concerning the substance used, most mothers reported using water and soap. These findings can related to the study conducted by Moraa et al.,(2019) in Kenya, which revealed that the most mothers used water and soap, while those who used water only 37%. It was also validated by a study in Nigeria, which indicated that most (47%) of the mothers washed their hands with soap and water (Afolaranmi et al., 2018). Additionally, another study in Tanzania by Kalufya *et al*. (2022), reported that about 48.9% of the mothers reported washing their hands using running water and soap before and after handling the baby, especially during cord care. Washing of hands with soap and water by mothers is recommended to achieve hygiene and reduce the risk of infection transmission from the mother to the neonate.

Those who reported frequently washed their hands, did so, especially after changing their nappies. Those who washed their hands before and after handling the baby were 49(60.5%), and those after breastfeeding were 40.4%. This study contrasted with a study in Uganda among the Karamoja community, which reported that most (90%) of the mothers did not wash their hands before and after changing their baby's nappies, predisposing them to signs of neonatal sepsis (Hopp, 2017). The variations in the studies could be because this community lives in a semi-arid area with limited water supply compared to the setting of this study.

5.5 Association of Variables

5.5.1 Association between Knowledge Level and Demographic Characteristics

The study revealed maternal age influenced knowledge level on neonatal sepsis (age group [$\chi 2 = 20.727$, df= 3 and $p = < 0.001$). These findings were consistent with other

studies that found poor neonatal sepsis preventive practices to be high among mothers aged less than 20 years (Singe et al., 2019). This is because mothers who become pregnant at 20 and above years are more likely to be knowledgeable on neonatal sepsis and preventive practices due to previous exposure as opposed to those of a younger age.

The findings revealed that most of the postnatal mothers had tertiary education and had been associated with the level of knowledge on neonatal sepsis ($\chi 2$= 23.041, df= 3 and p = < 0.001]. These findings were consistent with other studies (Getachew et al., 2022), which indicated that mothers' education level greatly influenced on level of knowledge neonatal sepsis, such as knowledge of signs and symptoms. Those with an education level above secondary education had more knowledge due to their exposure. Maternal education enhances mothers' knowledge of neonatal sepsis and the care of neonates. It also improves hygiene practices to prevent neonatal sepsis.

More than half (67.9%) of the participants were found to be married. Marital status was found to associated the postnatal mothers' level of knowledge on neonatal sepsis and preventive practices [$\chi 2$ = 7.783, df= 2 and p = 0.020]. This study concurred with other studies which revealed that married women are more aware of neonatal sepsis, thus employing good neonatal care practices that prevent neonatal sepsis (Berhea et al., 2018; Misgna et al., 2016). These findings could be due to a positive support system provided by the husbands during pregnancy, labor, and delivery, as well as the improved socioeconomic status of the mother during such periods.

The findings showed that most of the respondents were self-employed 30 (37%). There was a statically significantly association between the employment status and mothers' level of knowledge on neonatal sepsis ($\chi 2$ = 32.993, df= 3 and p = < 0.001]. This contrasts with other studies from Kariuki et al. (2022) and Berhea et al. (2018), which indicated that there is no statically significance between employment and level of knowledge. However, the findings were comparable with a study by Sanjel et al. (2019), which showed that postnatal mothers can demand quality neonatal care as they become more exposed to information regarding neonatal sepsis and preventive practices. Having an occupation including self-employment allows postnatal mothers to access healthcare education, which directly impacts neonatal sepsis preventive practices.

Maternal parity is greatly significant in determining preventive practices and the level of knowledge in neonatal sepsis. The study revealed that there is a positive correlation between knowledge score and parity. This indicates that an increase in the level of knowledge on neonatal sepsis is influenced by the increase in parity. This study is comparable to a case-control study of maternal risk factors associated with neonatal sepsis by Salama & Tharwat (2023). It revealed that maternal parity was significantly related to newborn sepsis, with primiparous mothers more likely to have neonates with sepsis compared to their counterparts. Therefore, having more than one child enhances mothers' knowledge of neonatal sepsis, hence employing good neonatal sepsis preventive practices during the neonatal period.

5.5.2 Association between Home-based Factors and Practice of Neonatal Sepsis Prevention

The study showed a statistically significant relationship between the number of people in the same house with the neonate and the neonate's feeding practices. These findings corroborate a study by Medhat et al. (2017), which revealed that a highly densely populated household increases the risk of infection transmission from the family members to the neonates (Medhat *et al*., 2017). The number of people dictates the food availability for all, including the postpartum mother. Therefore, there is an increased risk of weaning the neonate early to meet their nutritional needs if the mother is not nutritionally stable and, hence, unable to produce enough breast milk for the neonate. Additionally, the number of people living in the same house with the neonate may not be well educated on exclusive breastfeeding, hence, play a role in decisions leading to the weaning of the neonates.

Additionally, there was a statistically significant relationship between who makes decisions concerning the neonate and place of delivery (p =0.041). Mothers who made decisions concerning the neonate were 0.12 (AOR 0.120; 95% CI 0.016, 0.921) more likely to have delivered in the hospital than in cases where others made decisions. These findings contrast with a study by Kayom et al. (2018), which revealed that having a sound support system in decision-making determines the place of delivery and the neonatal period (Kayom *et al.*, 2018). Mothers make decisions on the place of delivery

based on the health education they receive during antenatal visits and on choosing the place of delivery and skilled birth attendants. Additionally, previous experience with places of delivery may influence where they go for the next delivery.

The study also reported a statistically significant relationship between who makes decisions concerning the neonate and the neonate breastfeeding (p=0.014). Neonates whose mothers made decisions about them were 0.125 (AOR 0.125; 95% CI 0.024, 0.655) more likely to be on exclusive breastfeeding than those whose decisions were made by other people. Most mothers have already been taught exclusive breastfeeding before being discharged from the hospital. The findings differ from a study by Ombare et al (2021) in Coastal Kenya, which revealed that husbands are the solitary decision makers on the place of delivery and newborn care.

Furthermore, there was a statistically significant relationship between who else is involved in taking care of the neonate and initiation of breastfeeding [$\chi 2 = 12.521$, df= 4 and $p = 0.014$] and washing of hands before handling the baby [$\chi 2 = 15.207$, df= 2 and p= <0.001]. However, none was a significant predictor (p>0.05). These findings corroborate a comparative study by Ditai *et al*. (2018), which showed that NNS is a disease-connected with the home environment. Neonates who are taken care of by other people have increased chances of neonatal sepsis compared to their counterparts (Ditai *et al*., 2018). This can be due to delayed initiation of breastfeeding as they try to care for the baby. Some might not even wash their hands, thus increasing the risk of sepsis.

There was a statistically significant relationship between cultural beliefs and the neonate's place of birth [$\chi 2 = 9.030$, df= 4 and p= 0.003]. Neonates born to communities with some cultural beliefs were 5.842 (AOR 5.842; 95% CI 1.014, 33.670) more likely to have been delivered in the hospital than those with no cultural beliefs. These findings contrast with the findings of a study by Simane-Netshisaulu et al., (2022), which revealed that most women from African communities with cultural beliefs prefer home deliveries because pregnancy is perceived as a normal family matter. The in-laws and husband are the solitary decision makers on the place of delivery, and determined whether the woman should go to the hospital. Therefore, women delivered at home with assistance of TBAs and family members. This could be due to differences in study settings between these two studies.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary of Findings

Most postnatal mothers who participated in this study were 20 – 25 years old while key informants were 28-54 years. A substantial number were self-employed, with most having tertiary education. Additionally, more than half of the participants were married, with the majority being multiparous. In addition, the average age of the neonates was 15.02 days SD ±4.602, since most came for routine postnatal care check-ups. Demographic characteristics that influenced mother's knowledge of neonatal sepsis included maternal age, level of education, marital status, and employment status.

In this study, less than half of the participants were aware of neonatal sepsis. Most of those who were aware reported obtaining information from healthcare professionals. Half of the participants correctly identified that bacteria cause sepsis. The most

frequently identified risk factor of neonatal sepsis was early rupture of membranes. Most participants reported high body temperature as one of the signs and symptoms of neonatal sepsis. Maintaining good hygiene was the most frequent way of preventing neonatal sepsis, as reported by the participants. The knowledge score between those with high and low knowledge was almost equal for the number of participants: 50.6 % and 49.4% for low and high knowledge levels, respectively.

Regarding home-based factors for neonatal sepsis, the majority of the families had 3 – 4 members, and other family members 41 (50.6%) were also frequently involved in the care of the neonate. Most mothers used 7.1% chlorohexidine for cord care at home. The mother mainly made decisions concerning the baby. A significant number of the participants, 30 (37%), did not have any cultural beliefs within the community concerning child care. However, those who believed that the uvula should be cut if the baby cries a lot, while others believed that the baby should be weaned before six months.

Care practices adopted by mothers to prevent neonatal sepsis included ANC attendance, place of delivery, cord care, early and exclusive breastfeeding, and hygiene. All participants reported to have attended at least one ANC visit. More than three-quarters had a hospital delivery 71 (87.7%), with Skilled healthcare workers 71 (87.7%) mainly assisted during delivery. New scissors (70 (86.4%) and cord clamps (73 (90.1%)) were used to cut and tie the cord. In addition, 7.1 chlorohexidine was the primary cord care substance applied to the cord after birth.

Regarding the initiation of breastfeeding, the majority of the neonates were able to initiate breastfeeding within one hour of delivery, with a significant number of them being exclusively breastfeeding. More than half of the neonate had their first birth after 24 hours of delivery. Furthermore, most of the neonates are given a bath once a day, 55 (66.7%). Also, most mothers wash their hands while caring for the baby, using water and soap, especially after changing diapers/nappies. It is important to note that this study found out that who decides on neonate care influences the breastfeeding practice, hand washing, and substance used for cord care. When cultural beliefs were associated

with preventive practices, there was a statistically significant relationship between cultural beliefs and place of birth.

6.2 Conclusion of the Findings

i. The findings in objective one revealed that there is an equal number of those with low and high knowledge level on neonatal sepsis
ii. The findings in objective two revealed that maternal demographic characteristics play a role in influencing the level of knowledge and practice on neonatal sepsis
iii. Findings in objective three indicated that some home-based factors such as culture, support system, and home environment influence the neonatal sepsis preventive practice
iv. Findings in objective four indicated that postnatal mothers have adopted recommended care practices to prevent neonatal sepsis. However, there is still a small percentage of those who still use outdated practices that could predispose neonates to neonatal sepsis.

6.3 Recommendations of the Study

6.3.1 Policy Recommendations

i. All experts in the area of midwifery, pediatrics, and neonatology should draft a clear strategy at national level on prevention of neonatal sepsis and be disseminated into counties to be adopted by healthcare professionals as they attend to mothers.
ii. The stakeholders should ensure increased follow-up of mothers during pregnancy, labor, and delivery to ensure they access the necessary information required for neonatal sepsis prevention.

6.3.2 Recommendation for Practice

i. Encourage peer to peer outreach
ii. Involvement of community health volunteers on health education and awareness on neonatal sepsis and preventive practice
iii. Vigorous engagement and health education of mothers on neonatal sepsis during pregnancy, delivery, and postnatal period.

6.3.3 Recommendations for Further Research

Similar or comparative studies should be carried out in different counties for generalization purposes.

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APPENDICES

Appendix I: Informed Consent Form

Title of the Study

Determinants of Neonatal Sepsis Preventive Practice among Postnatal Mothers Attending Mother and Child Health Clinic at Embu Level Five Hospital

Principal investigator

Alemun Elizabeth Mukade

Institutional affiliation

Chuka University (School of Nursing and Public Health)

Introduction

This consent form gives the information needed for the participant to decide whether or not to participate in this study. You are allowed to seek for clarification about the purpose of the study, your rights as a participant in this study, and any risks and benefits or any other thing that seem unclear to you. If you agree to participate in this study, you will sign your name in this form. You should understand that this study is guided by the general ethical principal for medical research which include voluntary participation and the right to opt out without victimization.

Objective of the study

This study on "Determinants of Neonatal Sepsis Preventive Practice among Postnatal Mothers Attending Mother and Child Health Clinic at Embu Level Five Hospital" aims to investigate the determinants of neonatal sepsis prevention practice among postnatal mothers attending mother and child health clinic at Embu Level Five Hospital, Embu County, Kenya.

Approximately 90 participants will be systematically selected to participate in this study. Therefore, your consent will be considered to participate in the study.

What happens if you agree to participate in this study?

If you resolve to participate in this study, the following will happen;

The researcher will interview you in an isolated area. The interview will take approximately 10-15 minutes. You will be asked questions and you will be required to respond.

Voluntariness of participation

Your participation in this study is voluntary and if you wish to withdraw from the study at any point, then you are free to do so.

Confidentiality

The information gathered here will remain confidential and I will not write down your name or any information that can identify where you live or who you are. Your participation in the study is voluntary and you will not be affected in any way if you decide not to participate. You do not have to answer any questions that you do not want to. You can stop the interview at any time. The relevancy of this study will depend so much on your honest response to the questions asked.

Benefits and risks

There will be no risks for yours safety as you participate in this study.

There will be no incentives given if you participate in this study, or anything of monetary value.

However, this study will be beneficial to you and the community at large because the findings of the study will help in findings solutions to increase neonatal sepsis prevention practice.

Rights to withdrawal

Participation in this research is voluntary. You are at liberty not to participate and can withdraw at any time without victimization.

CONSENT FORM (STATEMENT OF THE CONSENT)

I have read this consent form or it has been clarified to me by the researcher. My questions have been answered in a manner that I can comprehend. I understand the objective of the study. I understand there are no risks that it will cause to me. I understand that my contribution in this research is deliberate and that I am free to opt out of the study freely and at any point. I therefore freely accept to participate in this study.

I understand that any information regarding my private identity is confidential.

Participants

Signature…….. Date…….

Researcher's statement

I, the undersigned below, has entirely clarified the significant details of this study to the respondent named above and believe that she has understood and liberally given her consent.

Researcher' Name…….

Signature …….. Date…….

For any Inquires you may contact the following:

Elizabeth Mukade (Researcher)

Cell phone: 0726771491/ P.O box 293-50400, Busia

Email: lizmukade@gmail.com

Appendix II: Questionnaire

Serial number ……

Title of the Study

Determinants of Neonatal Sepsis Preventive Practice among Postnatal Mothers Attending Mother and Child Health Clinic at Embu Level Five Hospital

Principal investigator

Alemun Elizabeth Mukade

Instructions

Dear respondent, please tick the appropriate response.

Section A: Demographic information

1. What is your age in completed years?

……

2. Employment status?

Un employed [ ]

Formally Employed [ ]

Self-employ [ ]

3. What is your level of education?

Primary education [ ]

Secondary education [ ]

Tertiary education [ ]

Others (specify) ----------

4. Marital status?

Never married [ ]

Married [ ]

Separated [ ]

Divorced [ ]

5. Number of children ----------

6. Age of the baby in days ----------

SECTION B: Level of knowledge of postnatal mothers at Embu referral hospital about prevention of neonatal sepsis

1. Have you ever heard of neonatal sepsis?

Yes [ ]

No [ ]

2. From where did you learn of neonatal sepsis?

Healthcare provider [ ]

Community health worker [ ]

Family members [ ]

Own reading [ ]

Others (specify) ----------

3. What causes neonatal sepsis?

Bacteria [ ]

Virus [ ]

Fungi [ ]

I don't know [ ]

4. What are the risks associated with neonatal sepsis? (Tick all that apply)

Prematurity [ ]

Low birth weight [ ]

Early rapture of membranes [ ]

Prolonged labor [ ]

5. What are the signs and symptoms of neonatal sepsis? (Tick all that apply)

Failure to breastfeed [ ]

General body weakness [ ]

High temperature/fever [ ]

Lethargy/ unconsciousness [ ]

Pus discharge from the umbilicus [ ]

Redness/eye discharge [ ]

Difficulty breathing [ ]

Yellow palms and soles [ ]

6. How is neonatal sepsis prevented? (Tick where appropriate)

Appropriate cord care [ ]

Early initiation and exclusive breastfeeding [ ]

Maintain good hygiene [ ]

Hospital delivery with skilled birth attendant [ ]

SECTION C: Home-related factors influencing neonatal sepsis prevention practice

1. How many people do you live with in the same house?

1-2 [ ]

3-4 [ ]

5 and above [ ]

2. Apart from you, who else takes care for the neonate?

Grandmother [ ]

Other family members [ ]

3. While at home, what do you use for the care of baby's cord?

Boiled water with salt [ ]

Just boiled water [ ]

Application of local herbs [ ]

Use of saline water [ ]

Applying powder [ ]

Use of 7.1% bought from hospital [ ]

Others (specify)…..

4. In your home, who makes decisions concerning neonate care?

I do ( )

My husband ( )

Mother in law ( )

Others ……

5. Identify some of your cultural beliefs about a neonatal, neonatal care, neonatal period? List them

SECTION D: Care practices adopted by postnatal mothers to prevent neonatal sepsis

ANC attendance care practices

1. Did you attend to antenatal services during pregnancy?

Yes [ ]

No [ ]

2. If yes, how many times?

Once [ ]

2 times [ ]

3 times [ ]

3 times [ ]

More than four times [ ]

3. Which services did you receive during the antenatal visits? Tick all which are appropriate

Screening for HIV and syphilis [ ]

Urinalysis [ ]

Tetanus toxoid injection [ ]

Place of Delivery care practices

4. What was your Place of delivery?

At home [ ]

Hospital [ ]

5. Who assisted you during delivery?

Skilled healthcare worker [ ]

Unskilled personnel/TBA [ ]

Family member [ ]

6. At which surface did you deliver?

Floor [ ]

Deliver bed [ ]

Cord care Practices

7. What material for cord cutting was used after delivery of the neonate?

New blade [ ]

New scissors [ ]

Others (specify)…….

8 What material was used to tie the cord?

String or thread [ ]

Cord tie [ ]

Cord clamp [ ]

I don't know [ ]

9. What was applied to the cord stump to aid healing?

Nothing applied [ ]

Surgical spirit [ ]

7.1% chlorohexidine [ ]

Others (specific)…….

Initiation and exclusive breastfeeding practices

10. After delivery, how long did it take to initiate breastfeeding?

Immediately [ ]

30minutes to1 hour [ ]

2-4hrs [ ]

Days [ ]

Other (specify)….

11. What do you feed your baby as at now?

Breast milk [ ]

Porridge [ ]

Cow's milk [ ]

Packaged (nun) milk [ ]

Others (specify)…….

Hygiene practices

12. After how long did you bath you neonate after delivery?

Within 24 hours of delivery [ ]

After 24 hours of delivery [ ]

13. How many times do you bath your Neonate in a day?

Once ( )

Twice ( )

Others ….

14. Do you always wash your hands while taking care of the neonate?

Yes [ ]

No [ ]

15. If yes, what are the circumstances that lead to washing of hands? **Tick all that apply**

Before and after breastfeeding the baby [ ]

After changing the baby's nappy/diapers [ ]

Before handling the baby [ ]

16. What products do you use for hand hygiene/washing?

Water only [ ]

Water with soap [ ]

Hand sanitizer [ ]

Appendix III: Key Informant Interview Guide

Date……/……. /…….

Venue…….....

Interviewer's name……

Designation of the Key informant.....

Time: Start……. Finish……..

Time for discussion: 60 minutes

.

INSTRUCTIONS

1. Introductions.
2. Explain purpose of study.
3. Assurance of confidentiality.
4. Obtain informed consent from key informants to participate in the discussion.

QUESTIONS

1. 1. Tell me a little bit about yourself; a. What is your role at the department?
2. One of the prominent services given in the nursing department is infection prevention program. Have you ever been involved in the neonatal infection prevention program to prevent neonatal sepsis? (probing; please explain further)

3. In your own opinion, do you think postnatal mothers have adequate knowledge of neonatal sepsis and prevention practices to reduce the risk? (please expand)
4. In your opinion, are postnatal mothers provided with adequate knowledge on practices to prevent neonatal sepsis before they are discharged from hospital after delivery? (probing) kindly specify the practices taught
5. In your own opinion, what are some of the cultural practices in this community that are detrimental to neonatal sepsis prevention practice among postnatal mothers?
6. In your opinion what are the challenges faced by postnatal mothers as they provide neonatal sepsis prevention practices?
7. What do you think should be done to improve neonatal sepsis prevention practices among postnatal mothers who seek care services within this facility and also within the community?
8. What would you recommend to postnatal mothers regarding neonatal sepsis prevention?

Appendix IV: Chuka University Research Authorization

CHUKA UNIVERSITY

Knowledge is Wealth *(Sapientia divitia est)* Akili ni Mali

CHUKA UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE

Telephones: 020-2310512/18
Direct Line: 0772894438
Email: info@chuka.ac.ke,
P. O. Box 109-60400, Chuka
Website: www.chuka.ac.ke

12th July, 2024

REF: CUIERC/ NACOSTI/583
TO: **Alemun Elizabeth Mukade**

RE: Determinants of Neonatal Sepsis Preventive Practice Among Postnatal Mothers Attending Mother and Child Clinic at Embu Level Five Hospital, Kenya

This is to inform you that *Chuka University IERC* has reviewed and approved your above research proposal. Your application approval number is *NACOSTI/NBC/AC-0812*. The approval period is 12th July, 2024 – 12th July, 2025.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by *Chuka University IERC*.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to *Chuka University IERC* within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to *Chuka University IERC* within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to *Chuka University IERC*.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Dr. Benjamin Kanga
SECRETARY

CHUKA UNIVERSITY

Knowledge is Wealth *(Sapientia divitia est)* Akili ni Mali

OFFICE OF THE DIRECTOR
BOARD OF POSTGRADUATE STUDIES

Telephones: 020-2310512/18
Direct Line: 020-268 7625
postgraduate@chuka.ac.ke
P. O. Box 109-60400, Chuka
Website: www.chuka.ac.ke

REF: SM20/45808/20 **15th July, 2024**

Director
National Commission for Science Technology and Innovation
Off Waiyaki Way, Upper Kabete
P O Box 30623, 00100
Nairobi.

Dear Sir / Madam,

Alemun Elizabeth Mukade,

The above-named person is a *bona fide* student of Chuka University pursuing Master of Science in Nursing proposal titled: **"Determinants of Neonatal Sepsis Preventive Practice Among Postnatal Mothers attending Mother and Child Clinic at Embu Level Five Hospital, Kenya."**

Ms. Alemun. has defended at the Faculty level and is now expected to conduct research.
Any assistance accorded will be highly appreciated

Yours sincerely,

Prof. Moses Muraya, Ph.D.

DIRECTOR
BOARD OF POSTGRADUATE STUDIES

Appendix V: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **820912**

Date of Issue: **24/July/2024**

RESEARCH LICENSE

This is to Certify that Ms.. ELIZABETH MUKADE ALEMUN of Chuka University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Embu on the topic: Determinants of Neonatal Sepsis Preventive Practice Among Postnatal Mothers Attending Mother and Child Clinic at Embu Level Five Hospital, Kenya for the period ending : 24/July/2025.

License No: **NACOSTI/P/24/38269**

820912

Applicant Identification Number

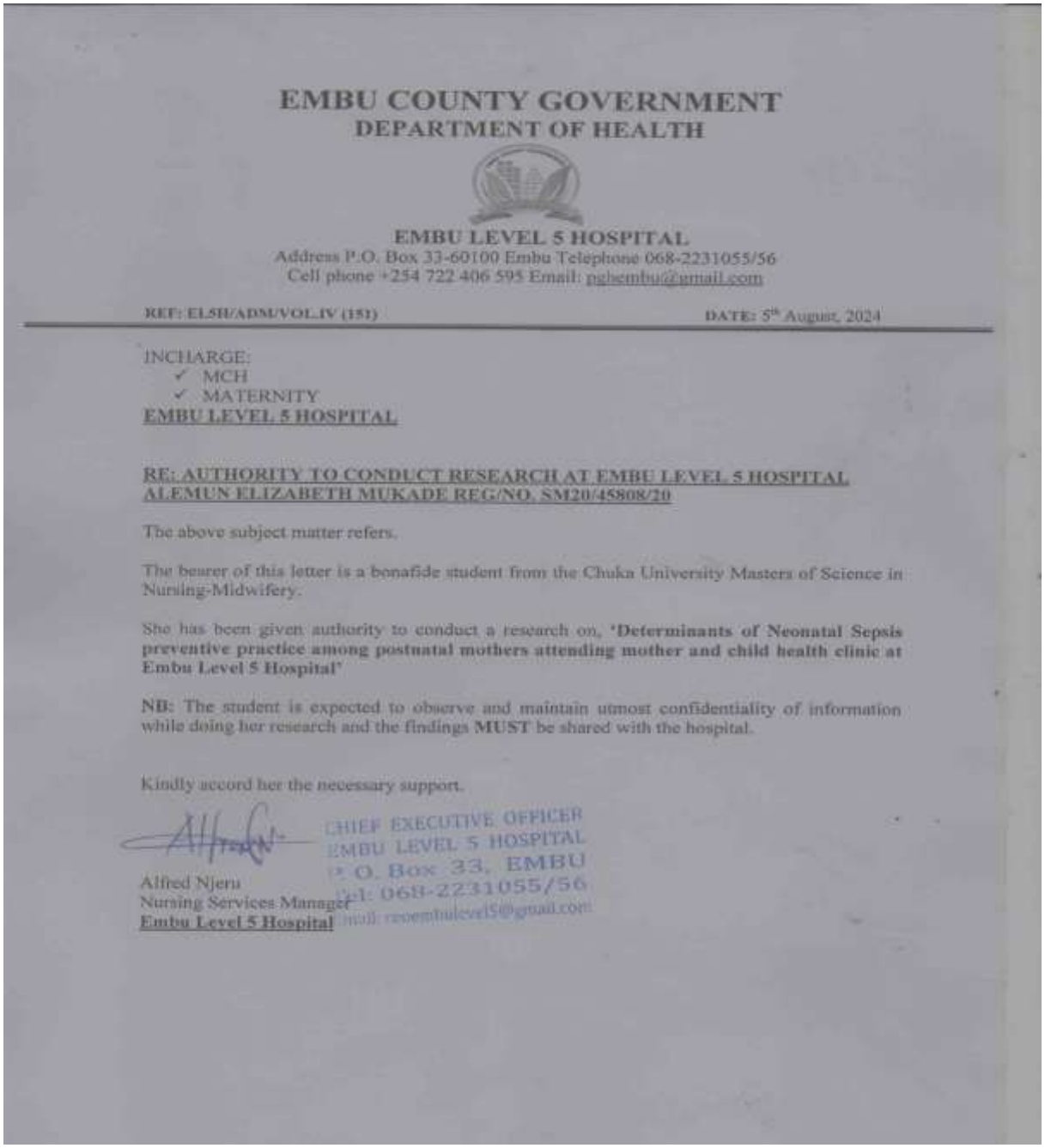
Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix VI: Embu Teaching and Referral Hospital Research Authorization



EMBU COUNTY GOVERNMENT
DEPARTMENT OF HEALTH

EMBU LEVEL 5 HOSPITAL
Address P.O. Box 33-60100 Embu Telephone 068-2231055/56
Cell phone +254 722 406 595 Email: pghembu@gmail.com

REF: EL5H/ADM/VOL.IV (151) DATE: 5th August, 2024

INCHARGE:
- ✓ MCH
- ✓ MATERNITY

EMBU LEVEL 5 HOSPITAL

RE: AUTHORITY TO CONDUCT RESEARCH AT EMBU LEVEL 5 HOSPITAL ALEMUN ELIZABETH MUKADE REG/NO. SM20/45808/20

The above subject matter refers.

The bearer of this letter is a bonafide student from the Chuka University Masters of Science in Nursing-Midwifery.

She has been given authority to conduct a research on, **'Determinants of Neonatal Sepsis preventive practice among postnatal mothers attending mother and child health clinic at Embu Level 5 Hospital'**

NB: The student is expected to observe and maintain utmost confidentiality of information while doing her research and the findings **MUST** be shared with the hospital.

Kindly accord her the necessary support.

CHIEF EXECUTIVE OFFICER
EMBU LEVEL 5 HOSPITAL
P. O. Box 33, EMBU
Tel: 068-2231055/56
mail: rsembulevel5@gmail.com

Alfred Njeru
Nursing Services Manager
Embu Level 5 Hospital