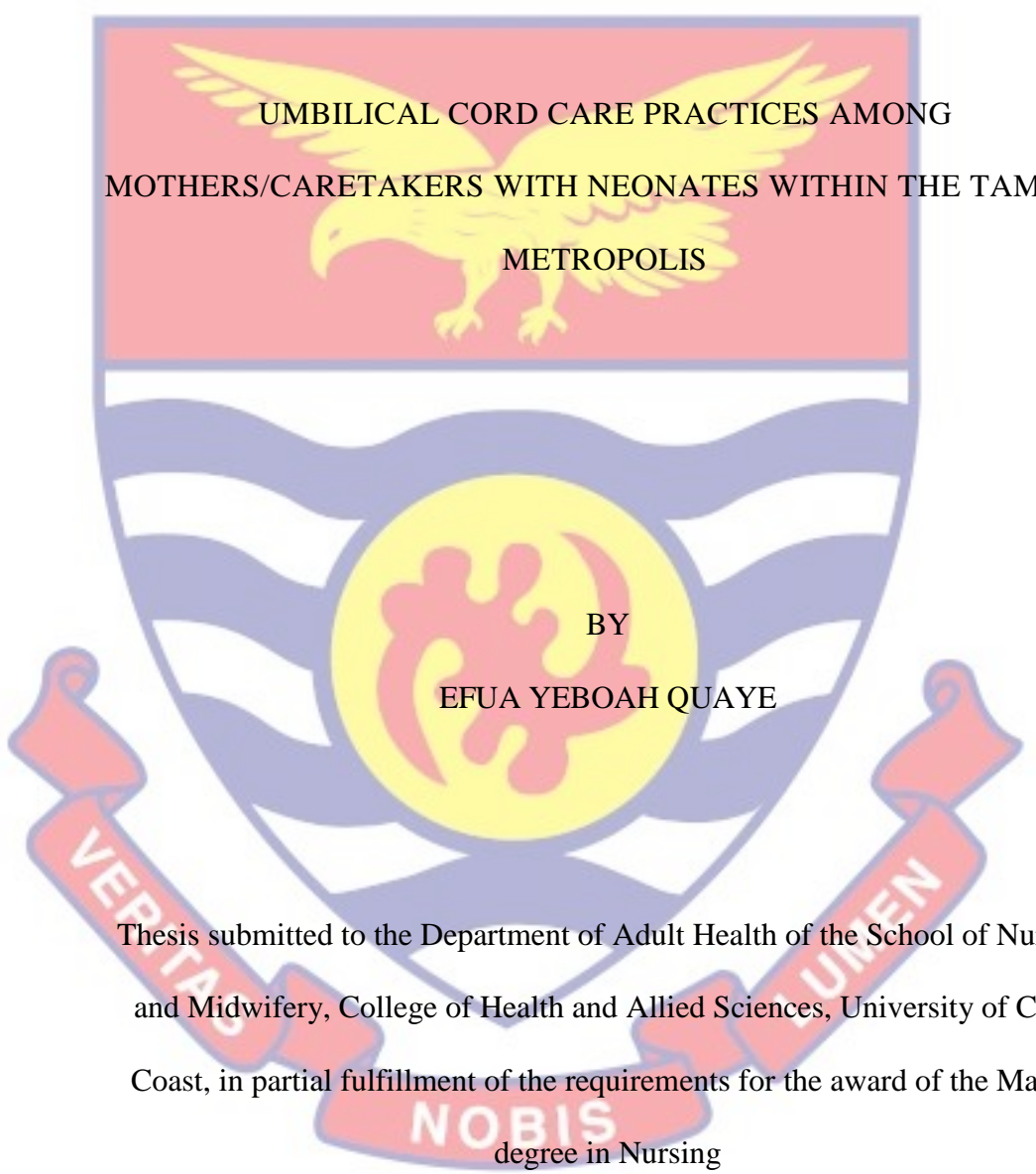UNIVERSITY OF CAPE COAST

UMBILICAL CORD CARE PRACTICES AMONG

MOTHERS/CARETAKERS WITH NEONATES WITHIN THE TAMALE

METROPOLIS

BY

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Thesis submitted to the Department of Adult Health of the School of Nursing

and Midwifery, College of Health and Allied Sciences, University of Cape

Coast, in partial fulfillment of the requirements for the award of the Master

degree in Nursing

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature: …………………………Date: ……………………

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Supervisor's Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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Co-Supervisor's Signature: ……………………………Date: ……………………

Name: Dr. Evelyn Asamoah Ampofo
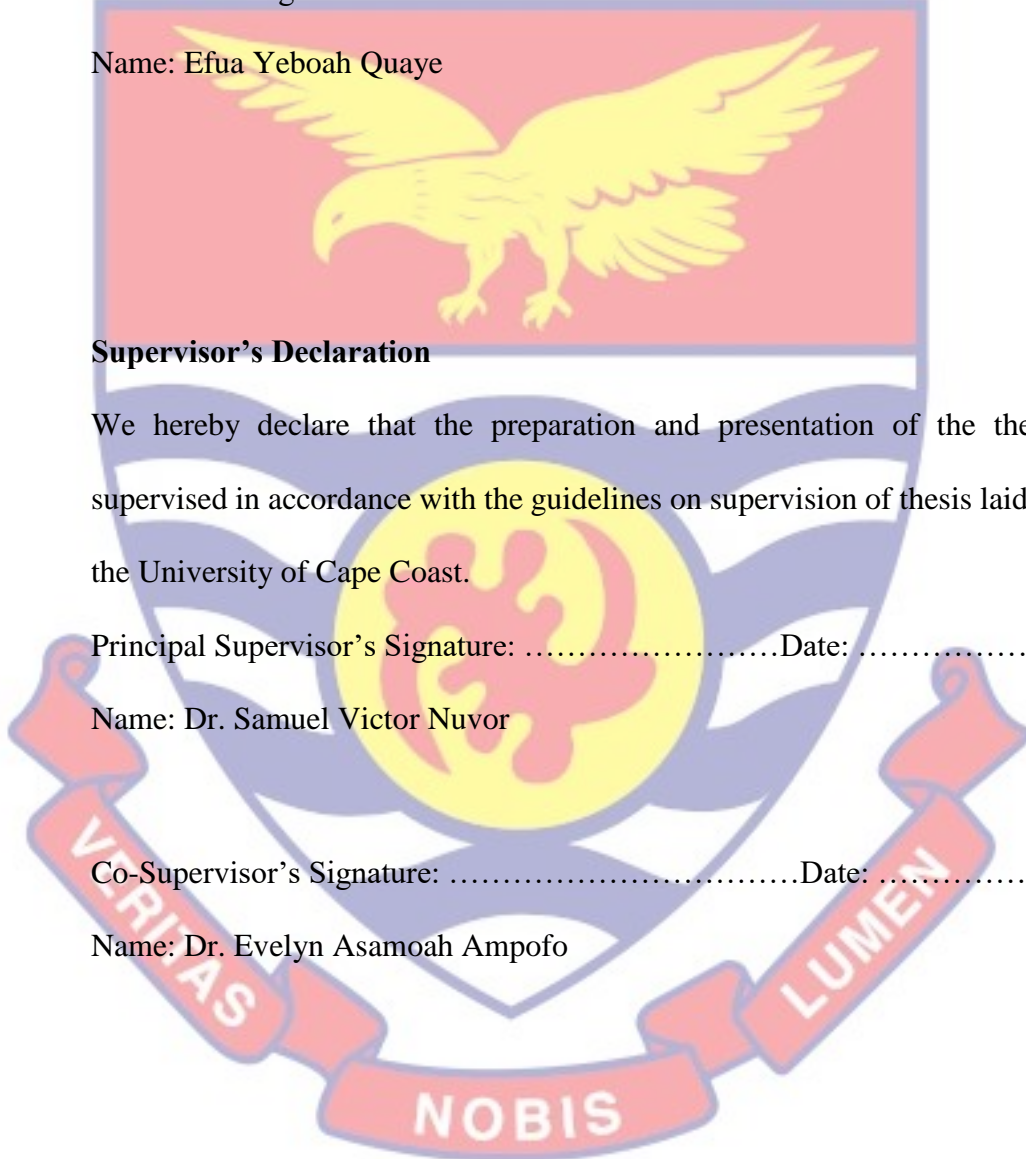
ABSTRACT

Varied practices adopted for umbilical cord care are dependent on cultural and religious beliefs, educational level and availability of resources. Poor umbilical cord care practices have been linked with infections, neonatal mortality and morbidity as a result of pathogenic entry. An assessment of current trends in umbilical cord care will enable the institution of best practices to reduce associated mortality and morbidity in neonates. This descriptive cross-sectional study was conducted within four selected health facilities (TTH, TWH, TCH and RCH clinic) within the Tamale metropolis. Mothers with infants aged 3 to 28 days seeking postnatal care services from the study sites were eligible to enroll in the study. A total of 358 mothers were selected using a simple random sampling technique: A semi-structured pre-tested questionnaire was used for data collection. Data was analyzed using SPSS version 23.0. Risk variables associated with umbilical cord infection were analyzed using logistic regression. The mean age of the mothers was 27.2 ± 5.1 years with majority (58.1%) being within the 25-33 years age group. 10.6% of the mothers had their deliveries at home. Umbilical cord infection was observed in 15.4% of the neonates with 49.4% having their cord separation time within 2 to 7 days (5.8±2.6 days). Scissors (47.2%) and razor blade (26.2%) were the most preferred cord cutting materials with methylated spirit (62.8%) and shea butter (24.3%) being the preferred topical agents applied to the cord. Although improved cord separation times was observed in this study, there is the need for the Ministry of Health and Ghana Health Service to review policy documents on cord care .

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DEDICATION

This work is specially dedicated to my father Mr Kojo Akaa Aidoo and to my

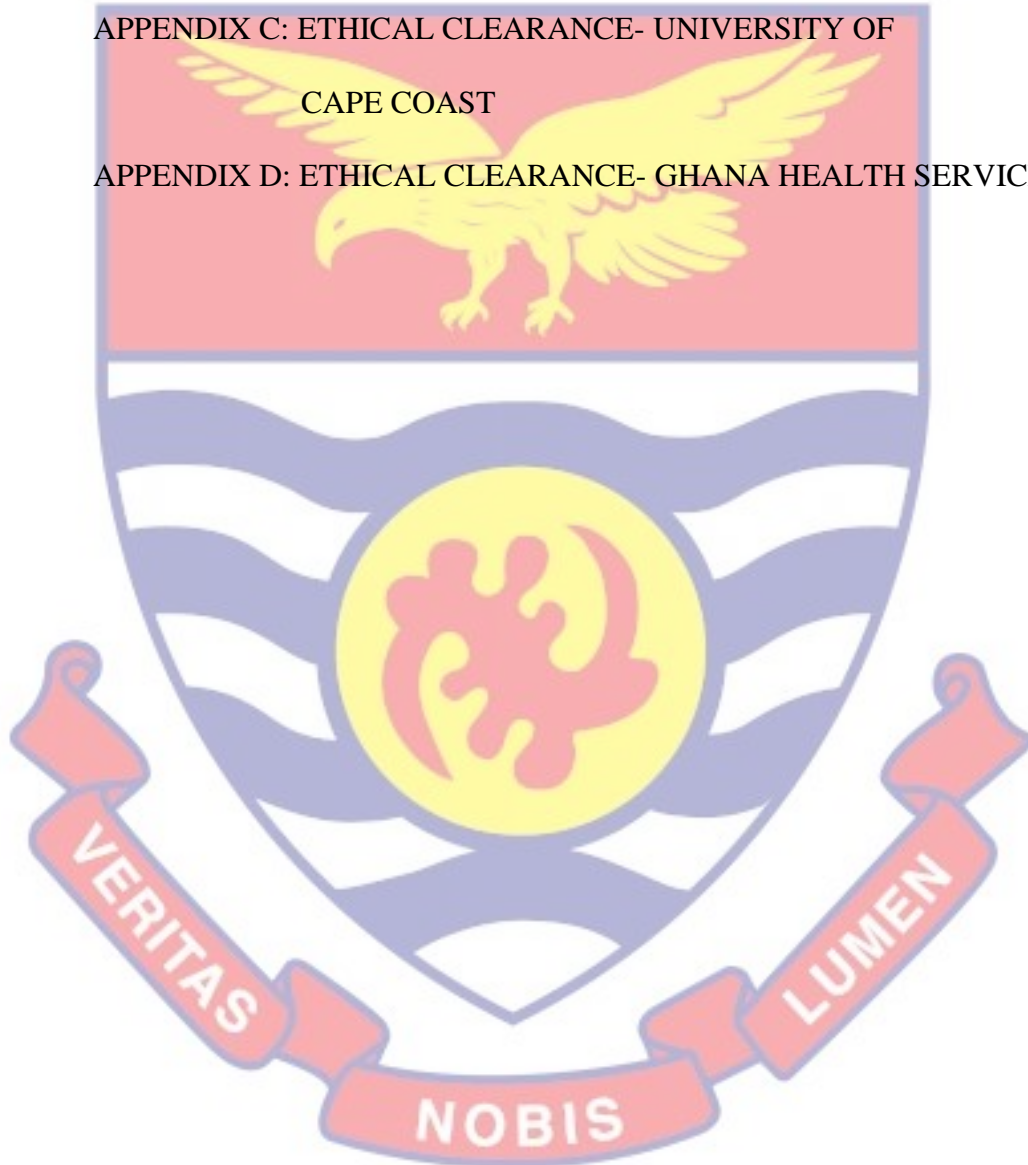husband and our girls: Vera, Vyra and Valerie.

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LIST OF ACRONYMS

ANC	Antenatal Clinic
CHPS	Community-based Health Planning Services
ERC	Ethical Review Committee
GHS	Ghana Health Service
GSS	Ghana Statistical Service
HEW	Health Education Workers
IRB	Institutional Review Board
MCH	Maternal and Child Health
MoH	Ministry of Health
RCH	Reproductive and Child Health
SDA	Seventh Day Adventist
SPSS	Statistical Package for Social Sciences
TCH	Tamale Central Hospital
TTH	Tamale Teaching Hospital
TWH	Tamale West Hospital
WHO	World Health Organization
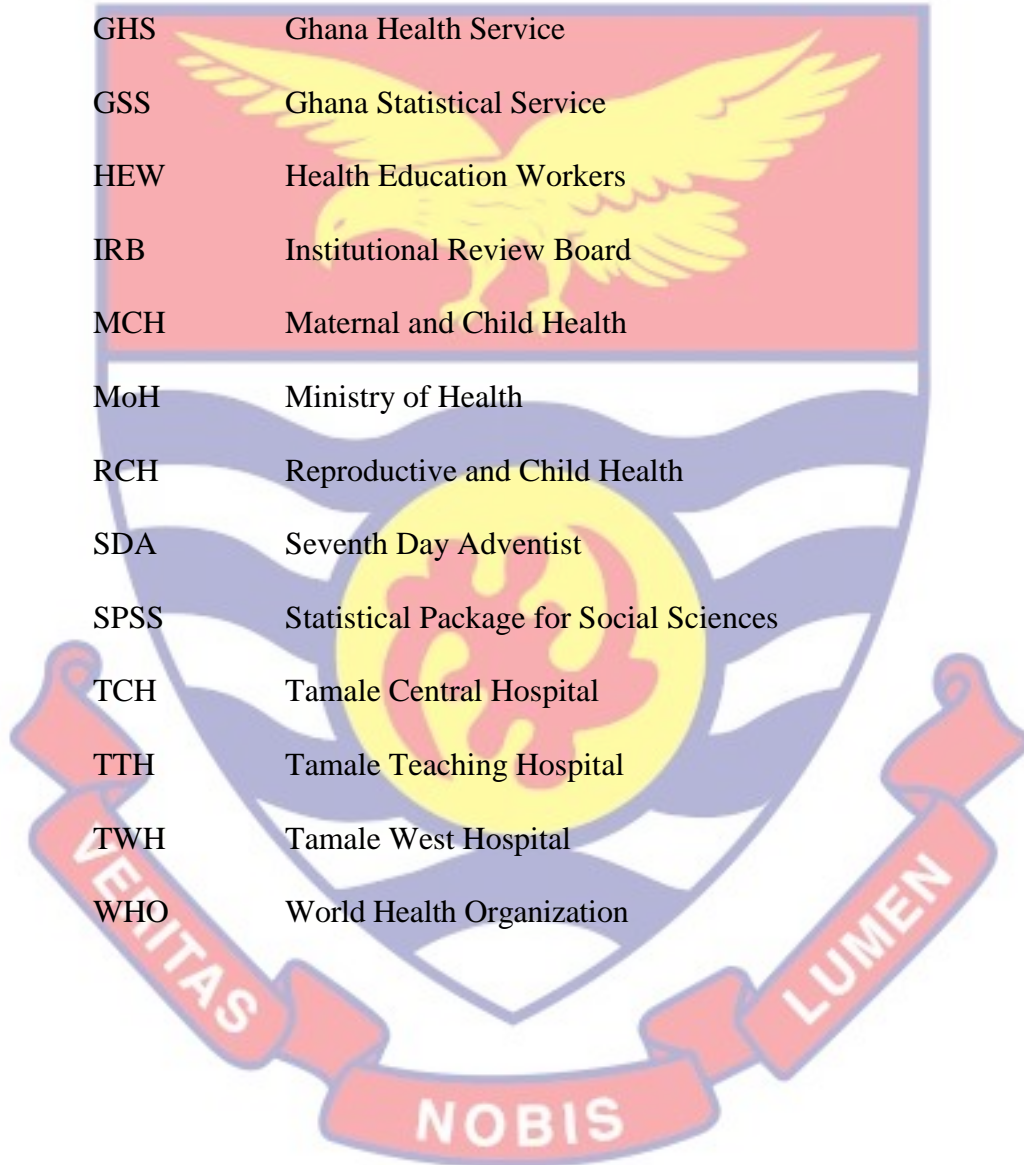
CHAPTER ONE

INTRODUCTION

Background to the Study

The umbilical cord serves the prime purpose of connecting the growing foetus to the maternal placenta. It plays a vital role in the development of a foetus by supplying nutrients and oxygen for growth while carrying away metabolic waste and carbon dioxide (Coyne *et al.*, 2010). The umbilical cord is normally translucent due to Wharton's jelly but can be stained green due to meconium or yellow if the baby has hyperbilirubinemia (Levene *et al.*, 2008). After delivery of the newborn, the umbilical cord is clamped and cut using a sterile technique and the cord is clamped or tied tightly in order to keep the umbilical vessels occluded to prevent bleeding. This single action ushers the newborn through the essential transition to extra-uterine life (Whitmore, 2010).

Newborns develop their own protective flora after 24 hours of life through the colonization of the umbilical cord stump by bacteria which prevent them from pathogens from environmental sources such as the mother's birth canal, skin flora and the hands of caretakers (Whitmore, 2010). The unhealed umbilical cord is an important route for local and invasive infections through the patent vessels which provide direct communication of microorganisms. Such local and invasive colonization could lead to infection of the umbilical cord stump which is termed as omphalitis. Omphalitis is defined by the presence of discharge of pus with erythema of the abdominal skin or severe redness with or without pus (Sawardekar, 2004; Mullany *et al.*, 2006b).

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Globally, roughly 1 million infants die of infections as a result of pathogen entry through the umbilical cord (Vural and Kisa, 2006). The incidence of omphalitis in low-income countries is generally scarce with estimated risk ranging between 2 to 77 per 1000 live births in hospital settings with fatality rates between 1% to 15% (Mir *et al.*, 2011). Higher estimates have been reported in community-based settings with indications of 105 per 1000 live births in Nepal, 217 per 1000 live births in Pakistan and 197 per 1000 live births in India (Mir *et al.*, 2011). Strikingly, there is no readily available data on omphalitis within the West African sub-region where neonatal mortality is still a public health concern with deliveries being conducted at home (Gras-Le Guen *et al.*, 2017).

With advanced nursing practice, cord infections should be preventable in most cases by intervention through best cord care practices to reduce neonatal mortality and morbidity (Mallick *et al.*, 2019). This practice will offer an alternative to widespread and potentially harmful traditional practices. Traditional practices include the use of traditional herbs mixed with cooking oil or water that has been used to wash an adult woman's genitals or application of ash, breast milk, fluid from pumpkin flowers, powder ground from local trees, cow dung, ghee and saliva which may be applied to the cord area in different localities and settings mostly Asia and West Africa have been reported (Mrisho *et al.*, 2008). Following the standard or hygienic practices to care for the cord will go a long way to reduce neonatal mortality and morbidity. The World Health Organization (WHO) recommends for dry umbilical cord care and application of topical antiseptics

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(chlorhexidine 4%) in areas where hygienic conditions are poor or neonatal sepsis and mortality rates are high (WHO, 2014; Bhatt *et al.*, 2015).

The Ministry of Health has adopted daily application of chlorhexidine 4% gel for umbilical cord care in Ghana (MoH, 2018). In the Northern Region of Ghana, though there is no readily available information on the prevalence of omphalitis, it is presumed to be a problem because of the significant increases in home deliveries and the practices of potentially harmful traditional cord care. Neonatal deaths in Ghana have been reported to decline from 41 per 1,000 live births to 29 per 1,000 live births from 1993 to 2014 (Ghana Statistical Service, 2015) and a regional neonatal mortality rate of 35 per 1,000 being quoted for the Northern Region (Ghana Statistical Service, 2015). With such enumerated neonatal mortality rates, it is relevant to assess the knowledge levels of mothers in umbilical cord cutting and the practices adopted for cord care. This will enable the adoption of hygienic practices in newborn cord care in order to curb neonatal deaths. There is also paucity of knowledge on umbilical cord care practices in the Tamale metropolis. This study therefore sought to assess the practices of umbilical cord care among mothers/caretakers in the Tamale metropolis to help elucidate the antecedents and formulate policies which can bring lasting solution to such practices.

Statement of the Problem

Globally, about 130 million babies are delivered annually with 4 million (3.1%) dying within the first four (4) weeks of life. Twenty-five percent (25%) of these deaths are as a result of umbilical cord infection (Adatara *et al.*, 2019). In

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low-income communities, omphalitis occurs in up to 8% of infants born in hospitals and in as many as 22% of infants born at home, in whom omphalitis is moderate to severe in 17% and associated with sepsis in 2% (Mir *et al.*, 2011). In developing countries, most of the cord care is home based since two thirds of births take place at home (WHO, 1996). Adatara *et al.* (2019) posited that, about 150,000 neonates are buried worldwide annually from omphalitis.

Studies shows that, home delivery or septic delivery among others are the common risk factors for developing neonatal omphalitis. The risk of omphalitis may be six times more for babies born at home than those born in the hospitals (Stewart and Benitz, 2016). In developing countries, majority of births occur outside the healthcare facility without skilled obstetric care (Güvenç *et al.*, 1997; Mullany *et al.*, 2006a). In Ghana, only about 45% of births are conducted by skilled birth attendants (a doctor, physician assistant, midwife or nurse). This implies that, an estimated 55% of women give birth without skilled or trained attendants and mostly at home by either the traditional birth attendants or relatives and friends (Nakua *et al.*, 2015). Home birth, a common practice in Tamale the biggest city in the Northern Region of Ghana has been associated with poor cord care practices. Currently, there is dearth in reliable data on cord care practices among mothers in the Tamale metropolis. In addition, earlier studies on this subject in the West African sub-region mainly focused on knowledge rather than the actual management practices that will help reduce mortality associated with poor cord care. Thus, this study assessed cord care practices among mothers/caretakers in the Tamale metropolis.

Purpose of the Study

The purpose of this study was to assess umbilical cord care practices among parents with neonates in the Tamale metropolis. Specifically, this study sought to;

1. Determine the umbilical cord care practices adopted by mothers/caretakers.

2. Estimate the prevalence of omphalitis in neonates using the classical signs of redness, swelling, pus and foul smell.

3. Identify the various materials used by mothers/caretakers for umbilical cord management.

Research Questions

The following research questions guided the conduct of the study:

1. What are the umbilical cord care practices adopted by mothers/caretakers in the Tamale metropolis?

2. What is the prevalence of omphalitis among the neonates in the Tamale metropolis?

3. What are the various materials used by mothers/caretakers?

Significance of the Study

Findings from this work will serve as rich information to healthcare providers on the various substances or materials used by mothers/caretakers for umbilical cord care, reasons why they use those materials or substances and the bases of their health decisions concerning the umbilical cord. These will help to plan specific intervention(s) in terms of health education to mothers/caretakers to emphasize on evidence-based strategies for effective cord management in order to

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improve neonatal outcome. It is hoped that, findings from this study will add up to nursing literature and help address existing deficiencies associated with cord care. This information will update the knowledge of health care providers on the modern methods of cord care. Furthermore, the results from this study would help draft policies which will provide strategies to improve care. This work will serve as reference to other researchers in related field.

Delimitations

The study was conducted at the Tamale metropolis. Tamale is the capital city of the Northern Region of Ghana with a population of 233, 252 according to the 2010 population and housing census. There are three main Government hospitals, three private hospitals, ten private clinics and ten Community-based Health Planning and Services (CHPS) compounds sited within the metropolis delivering maternal and child health services to the public in the Metropolis for this study only the three public hospitals and one reproductive and child health clinic were selected. The study was intended to assess the umbilical cord care practices among mothers/caretakers. The variable that was assessed was the cord care practices among mothers/caretakers in their homes, the reasons for their choice and the source of their information concerning cord care.

Limitations

1. Umbilical cord care was documented as per reports taken from respondents and was not based on direct observations.

2. Language barrier was a limitation considering the illiteracy levels of mothers in this part of the northern part of the country which might affect the reliability of participants' responses to the questionnaire. This was dealt with by translating the questionnaire into the local language (Dagbani) for mothers/caretakers who were not able to read and write English.

3. Information on maternal conditions e.g. sepsis which can predispose neonates to umbilical cord infection was not solicited in the questionnaire design and this could also serve as a limitation.

Definition of Terms

Mothers/caretakers: refers to anybody who has a baby or is taking care of a baby who is three (3) days to twenty-eight (28) days old attending postnatal clinic during the data period.

Omphalitis: the infection of the umbilical cord of the baby or the redness of the base of the umbilical stump with or without pus.

Cord care: the way mothers/caretakers handle the umbilical cord of the neonates at home.

Neonates/Newborn: is a newborn infant or baby from a day to 28 days old.

Reproductive and Child Health Clinic: health care unit where the reproductive issues of women are addressed (family planning, pregnancy related issues, child birth and the survival of the babies are taken care of by health care providers mostly nurses and midwives).

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Organization of the Study

This study is organized into five chapters:

Chapter One covers the introduction to the study including the background, statement of problem, objectives of the study, research questions and significance of the study.

Chapter Two covers the review of literature categorized under subtopics.

Chapter Three describes the methods that was employed in conducting the study. This includes the study area, research philosophy, research design, data and source, study population, sampling procedure, data collection method, research instrument, methods of data analysis, experiences from the fieldwork and ethical consideration.

Chapter Four presents the findings of this study.

Chapter Five concludes the study with the summary of the findings, conclusions and some recommendations.
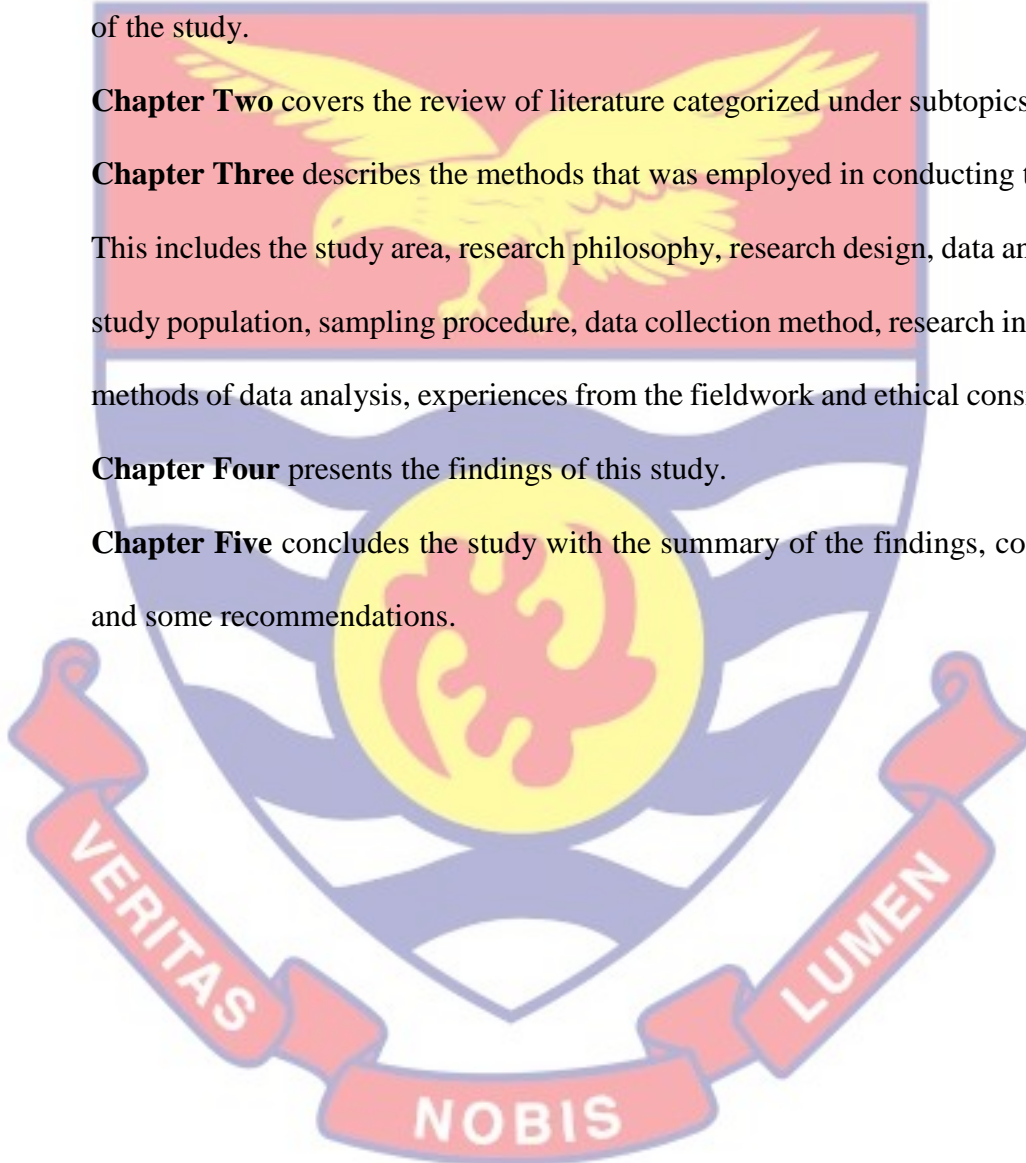
CHAPTER TWO

LITERATURE REVIEW

Introduction

The study seeks to assess umbilical cord care practices among mothers with neonates in the Tamale Metropolis. This chapter reviewed literature related to the study objectives by primarily evaluating the influence of socio-cultural, economic and institutional factors on cord care practices and their related outcomes.

Conceptual Review

The conceptual review expatiated on some key concepts around which the study is built. Concepts reviewed included concept of umbilical cord care and concept of omphalitis.

Concept of Umbilical Cord Care

The umbilical cord plays an essential role in foetal development by connecting the growing foetus with the maternal placenta (Joseph, 2015). After delivery of the newborn, the umbilical cord is cut using a sterile procedure and the newborn must make the important transition to extra-uterine life. The devitalized umbilical cord often serves as an ideal path for bacterial growth and also provides direct access to the bloodstream of the neonate. The WHO (1998) advocated for the use of dry umbilical cord care which involves keeping the cord clean without application of any solution or substance and leaving it exposed to air or loosely covered by a clean cloth. In case the cord becomes soiled it is only cleaned with water. Topical antiseptics e.g. chlorhexidine, have been recommended in situations where hygienic conditions are poor and/or infection rates are high (WHO, 1998).

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Zupan *et al.* (2004) in a comparative study of the impact of antiseptic or antibiotics application to the cord stump against dry cord care found no benefit on neonatal mortality or rates of disseminated or localized infection. The low incidences of neonatal mortality recorded in the developed countries reflect higher standards of the healthcare with increased health facility-based births where neonates are less exposed to conditions or practices associated with infections. Anecdotal evidence and experience suggest variations in the practices of health care providers in the use of alcohol, methylated spirit or povidone iodine to clean the cord (Karumbi *et al.*, 2013). Safe and effective topical umbilical cord care for prevention of mortality and cord infections in newborn infants is, therefore highly recommended (Joseph, 2015).

The WHO (1996) report on the concept and nature of umbilical cord care reiterates the fact that umbilical cord stump remains the major means of entry for infections after birth. Hence, the principles of clean cord stump care require keeping the cord dry and clean with nothing being applied on it, neither at home nor in the health facility. The report further indicated that cord stump will dry and mummify if opened to air without any dressing, binding or bandages. Also, it will remain clean if it is protected with clean clothes and is kept from urine and soiling. If soiled, the cord can be washed with clean water and dried with clean cotton or gauze. Local practices of putting various substances on the cord stump whether in health facilities or homes should be carefully examined and discouraged if found harmful and substituted with acceptable ones (WHO, 1996). There are several signs that indicate cord infections. If the umbilical stump becomes red, drains pus with the

redness extending to the skin around it, the baby stops suckling well, appears sleepy, does not wake up or has difficulty breathing, this may be a sign of serious infection and with that, the mother/caretaker should seek help from a health facility (WHO, 1996).

In a study conducted in two communities of Plateau State (Afolaranmi *et al.*, 2018) reported the use of salt solution with saliva, hot water and herbal preparations as substances applied to the umbilical cord in a study in North Central Nigeria. Other studies have reported care of the umbilical cord to revolve around bathing, skin massage with mustard oil and heat massage with the principal provider for such unhygienic processes being mothers/caretakers (Alam *et al.*, 2008).

Concept of Omphalitis

Newborns are a vulnerable group and therefore need more attention and care. Globally, two thirds of total infant deaths comprise newborns and 99% of these deaths are concentrated in Sub-Saharan Africa and the South East Asian Region (Knippenberg *et al.*, 2005). Bacteria which causes neonatal sepsis are acquired shortly before, during and after delivery. They can also be obtained directly from mother's blood, skin, or vaginal tract before or during delivery or from the environment during and after delivery (Edmond and Zaidi, 2010; Zaidi *et al.*, 2011). The unhealed umbilical cord, therefore, is an important portal for local and invasive infections (Joseph, 2015).

Infections are the single most important cause of neonatal mortality accounting for half of neonatal deaths in regions with high mortality rates (Lawn *et al.*, 2005). A substantial proportion of neonatal deaths from infection are treatable (Mullany *et al.*, 2006a). Contamination of the umbilical cord can lead to omphalitis with Winani *et al.* (2007) reporting a 28% neonatal omphalitis prevalence in neonates admitted to a Paediatric ward in Tanzania. Omphalitis is an infection of the umbilical stump, explained as either pus discharge with erythema of the abdominal skin or severe redness with more than 2cm extension from the cord stump with or without pus (Sawardekar, 2004). Omphalitis can spread to the abdominal wall, the peritoneum, or through the portal vessels leading to systemic sepsis, which if untreated has a high case-fatality (Blencowe *et al.*, 2011). In cases of omphalitis, *Staphylococcus aureus* is the most frequently reported organism in cases of omphalitis (Janssen *et al.*, 2003). Mir *et al.* (2011) reported a high incidence of omphalitis in developing countries with higher incidence rates in communities that practice application of non-sterile home remedies to the cord.

The most encountered risk factors for development of omphalitis in babies are obstructed labour, non-sterile delivery, septic delivery as suggested by prolong rupture of membrane or maternal infection, umbilical catheterization, prematurity, low birth weight (<2.5 kg) and male sex (Fraser *et al.*, 2006). According to Whitmore (2010) new born infants do not start to develop their own protective flora until after the first twenty-four (24) hours of life. The umbilical cord is a significant site for bacterial colonization from environmental sources such as the mother's

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birth canal, skin flora as well as the hands of care givers can greatly increase morbidity and mortality for infants in developing countries.

Newborn susceptibility to infection may be attributable to the low immunity and the patency of the umbilical cord resulting in easy accessibility of microbial entry to the blood stream or system of the neonate (Mullany *et al.*, 2006b). Cord infections should be preventable in most cases (Capurro, 2004). It is therefore important to identify best cord care practices to reduce neonatal mortality and morbidity and offer an alternative to widespread potentially harmful traditional practices. Studies in rural Tanzania and Nepal reported some harmful practices of cord management which include: use of traditional herbs mixed with cooking oil, water that has been used to wash an adult woman's genitals, application of ash, breast milk, fluid from pumpkin flowers, powder ground from local trees, cow dung, ghee and saliva (Mrisho *et al.*, 2008; Mullany *et al.*, 2009).

Umbilical Cord Care Practices

The WHO (2014) reported that daily chlorhexidine (7.1% chlorhexidine digluconate aqueous solution or gel, delivering 4% chlorhexidine) application to the umbilical cord stump during the first week of life is recommended for newborns who are born at home in settings with high neonatal mortality (≥30 neonatal deaths per 1000 live births). For newborns delivered in health facilities and at home in low neonatal mortality settings, clean, dry cord care is recommended. Studies in Sri Lanka have reported that mothers had poor knowledge about umbilical cord care and recommended the need for such mothers to be empowered with the right knowledge to enable them offer the right practices since they are the principal

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providers for skin and cord care during the neonatal period (Quddus *et al.*, 2002). Castalino *et al.* (2014) further reported gaps in awareness and attitudes mainly in postnatal mothers from low socio-economic status.

In order to learn about knowledge of health workers and mothers on umbilical cord care in the Volta region of Ghana, Nutor *et al.* (2016) showed that the most commonly used practice for cord care was methylated spirit (68%) with a significant number of mothers using non-recommended practices including shea butter (18%), toothpaste (4%), oil (2%), water (2%) with 6% applying nothing. Opara *et al.* (2012) in their study revealed that cord care was done primarily by grandmothers and mothers. Maternal education, social class of parents and place of delivery were significantly associated with application of potentially harmful substances to the cord, with the commonest sources of information on cord care being given by nurses and grandmothers. With health workers forming the primary source of information on basic cord handling procedures, it is relevant for all health workers to participate in educating mothers and grandmothers about optimal cord care practices.

Materials used for Umbilical Cord Management

Alam *et al.* (2008) studied the application of antiseptics on umbilical cord for preventing sepsis and death among newborns and recommended that maintenance of clean and dry cord care as umbilical cord management will help in early slough of the cord and prevent infection. Mivšek *et al.* (2017) conducted a study with the aim of examining first-care procedures for the newborn's umbilical cord at maternity hospitals in Slovenia and Croatia. The findings of the study

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revealed that health workers employed delayed umbilical cord clamping in line with good practice according to WHO guidelines which emphasizes delayed cord cutting.

The study findings further showed the application of disinfectants such as 6% potassium permanganate and a combination of octenidine and phenoxyethanol in Slovenia and Croatia respectively. In most Croatian maternity wards, the cord stump was covered but this was not a regular practice in Slovenia. These findings suggest that health care providers in varied facilities have adopted ways of caring for the umbilical cord in spite of the fact that the WHO (1998) recommends dry cord care which includes cord cleaning with only water when soiled and leaving uncovered for air drying. These findings provide foundational evidence for policy making institutions to provide needed education and training which seeks to impart knowledge and improve varied cord care practices.

Ambe *et al.* (2009) reported that in rural areas, materials such as cow dung, herbal preparations, ash, mud, coconut oil and many more which are usually unhygienic and serves as sources for cord contamination and infection are used as traditional cord dressings. Trotter (2002) stated that apart from clean water, the use of other products for cord cleaning may interrupt the natural healing process and similarly Mullany *et al.* (2006b) added that the use of sterile cotton wool soaked in either methylated spirit, chlorhexidine or gentian violet (1%) to clean the cord is still being practiced widely especially in developing countries where infection rates are high. The suggested WHO recommendations for developing countries impresses upon the promotion of dry cord care under routine circumstances with

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acknowledgement of the use of antiseptics when harmful, unhygienic, traditional practices place newborns at increased risk for omphalitis (WHO, 1998; Waiswa *et al.*, 2008).

Afolaranmi *et al.* (2018) in a study to assess knowledge and practice of cord care within a contemporary African setting observed that methylated spirit was the most important material being used for cord care while hot water and salt solution followed up close. The responses from mothers showed they were aiming at quick cord separation and the prevention of infections. Golombek *et al.* (2002) compared the effectiveness of alcohol versus triple dye application in umbilical cord care management and reported that the alcohol group had a cord separation of about three days sooner than the triple dye group without an increase in infection. They further emphasized on the monetary merits of alcohol use versus triple dye and showed a non-significant difference in the colonization of the cords with microorganisms when comparing treatment with triple dye, alcohol, povidine-iodine, silver sulfadiazine and bacitracin.

In Ethiopia, Amare (2014), conducted a study to investigate practices and perspectives related to umbilical cord care and reported the application of topical agents soon after cord cutting or few days after birth. Butter was universally applied in some communities whereas some mothers reported using petroleum jelly and hair lotion. Health Education Workers (HEW) mostly did not apply anything to the cord with some claiming they applied Iodine and Gentian Violet. The most frequently mentioned reason for the application of the named topical agents was to soften or moisturize the cord at its base where it is expected to break off.

Clinical Signs of Omphalitis among Neonates

The umbilical cord stump is colonized by bacteria from environmental sources such as the mother's birth canal, skin flora, and the hands of caregivers (Nourian *et al.*, 2009). The unhealed umbilical cord is an important portal for local and invasive infections through the patent vessels that provide direct communication of microorganisms (Sawardekar, 2004; Mullany *et al.*, 2009). According to WHO (1996), the mother should be aware of danger signs of umbilical cord infection which includes pus discharge, reddening around umbilical stump and the surrounding skin and other signs of infection such as fever, lethargy and difficulty in breathing. Mohamed (2018) stated that substances such as ashes, oil, butter, spice pastes, herbs and mud are often contaminated with bacteria and bacterial spores that increase the frequency of complications like omphalitis cord, sepsis, septicemia, umbilical cord granuloma, excessive bleeding and tetanus.

In a case report, Broom and Smith (2013) studied late presentation of neonatal omphalitis following dry cord care. The umbilical cord had fallen off 5 days prior to presentation, coinciding with a visit to the Pediatrician's office for a 2-week newborn visit. One day prior to presentation, the umbilicus and surrounding skin were becoming erythematous. Additionally, a pustular lesion was noted on the infant's thigh. The child had been afebrile and was feeding well. The baby was born via spontaneous vaginal delivery at 38.3 weeks. The pregnancy was complicated by preeclampsia and gestational diabetes. A maternal Group 'B' Streptococcus culture was negative, and the rupture of membranes was not prolonged. The infant transitioned well with a normal newborn course. The baby was fussy on

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examination, mildly tachycardic, and without fever. His abdomen was soft and nondistended with normal bowel sounds. Tenderness to palpation around the umbilicus was noted. A 2.5 cm × 3 cm area surrounding the umbilicus was erythematous, and the skin was taut with an interior edge of desquamation. The umbilicus itself was crusted and contained 2 discrete areas of subcutaneous purulence at the 3 and 7 o'clock positions. On the proximal, anterior superior right thigh, there was an 8-mm purulent bulla present. No other lesions were noted on the skin. The infant was neurologically intact". The relevant of this study is that it highlights the significance of enlightening parents on what signs and symptoms of omphalitis that may initiate early evaluation for their infants.

In a quasi-experimental study in Egypt, Mohamed (2018) evaluated the effect of umbilical cord care intervention programme on mothers' performance and occurrence of cord problems among their newborn infants. The findings of the study revealed that minority of newborns in intervention mothers' group (0.5%) developed umbilical cord infection signs (clinical signs of omphalitis) while majority of newborns in intervention mothers' group (99.5%) had their cord sloughed off before the end of the two weeks. Such findings are relevant in clinical practice as it propels health professionals to implement educational interventions regarding neonatal cord care practice during the period of antenatal visit. Appropriate cord care contributes largely to the well-being of the newborn and therefore such conditions if not checked, will contribute significantly to neonatal morbidity and mortality (Mahrous *et al.*, 2012).

Stewart and Benitz (2016) investigated umbilical cord care in newborn infants. Findings indicated that a high percentage of umbilical cord infections stem from bacterial colonization of the umbilicus, because cord care practices vary in reflection of cultural traditions within communities and disparities in health care practices globally. The study further revealed that after birth, the devitalized umbilical cord often proves to be an ideal substrate for bacterial growth and also provides direct access to the bloodstream of the neonate. They further submitted that various topical substances continue to be used for cord care around the world to mitigate the risk of serious infection with high-resource countries shifting the paradigm toward dry umbilical cord care.

Harmful Cord Care Practices among Mothers/Caretakers

Abhulimhen-Iyoha *et al.* (2011) conducted a study to ascertain the factors that influence cord care practices among mothers in Benin City and reported that the use of harmful cord care practices was more common among mothers who delivered outside the Teaching hospitals. They recommended that proper hygiene including proper hand washing techniques while caring for newborns as well as vaccination of infants and their mothers will help prevent infections including tetanus while prompt health-seeking behaviour was advised to improve result should such umbilical cord infections occur. To confirm the validity of the findings reported by Abhulimhen-Iyoha and Ibadin (2012), a cross-sectional study was also conducted by Opara *et al.* (2012) using mothers attending three primary health care facilities with their infants Bayelsa State, Nigeria. It was revealed that maternal education, social class of parents and place of delivery were significantly associated

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with application of potentially harmful substances to the cord. This implies that low level of education, poor social class as well as poor place of delivery have high potential to predict harmful cord care practice.

Theoretical Foundation of the Study

Over the last century, nursing has made substantial and meaningful achievement that has led to the acknowledgment of nursing as a profession. A move towards theory- based practice has made modern nursing more significant by shifting nursing focus from vocation to an organized profession.(Taylor, 2014).A theory is defined as a systematic explanation for observation that relate to a particular aspect of life .(Wagenaar &Babbie,2010).The need for knowledge- base theory to guide professional nursing practice had been realized in the recent times and many theoretical works have contributed by nurses ever since ,with primarily focusing on delivering care to patient professionally.(Elmore, 2010).

Further, nursing theories are important because they help define what nursing is, provide foundational support for gathering and creating nursing knowledge and providing direction for the future of the profession. (Smith &Lieht,2008).

On the account evidence above, the researcher reviewed to support this study. The literature reviewed quite a number of theories. however, the two models that were in line with this work will be reviewed as follows: health believe model and the information motivation behavior model. Nevertheless, the latter theoretical model will be discussed in the conceptual framework for this work.

The health believe theory was developed by Hochbaum, Leventhal, Kegeles, and Rosenstock in   1950 (Akhigbe, A., & Akhigbe, K. (2012).The theory concentrates on the degree of fear of illness related to the entail benefits of taking health action.(Janz et al,2002).This model a method used to access and explain individual differences in preventative health behavior (Frankenfield,2009). The main components of the health believe model were Perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, and cues to action. Latter Bandura in 1977 added self-efficacy (Frankenfield,2009).

As the foundation of the HBM, value and expectancy are linked to health-related behaviors. The desire to avoid illness and the belief that a specific health action would prevent that illness can be interpreted and explained through various diseases. Further analysis can estimate perceived susceptibility, severity, and cues to action to reduce risk for a specific illness. The HBM has expanded to include preventative actions, illness behaviors, and sick-role behavior. Action for prevention, Action for prevention, screening, and health management will occur if the individual perceives herself as susceptible to the condition, if potentially serious consequences are present, if a particular action is beneficial in decreasing susceptibility or severity of the condition, and if the benefits for the action outweigh the barriers (Janz et al., 2002).

Perceived Susceptibility

This is the first component of the HBM. Perceived susceptibility is defined as a subjective perception of the risk of an illness (Janz, Champion, & Strecher, 2002). One's belief regarding the chances of being diagnosed with a medical

condition can be applied by defining populations at risk and risk levels (Janz et al., 2002). Individual risk may be based on personal behavior. Comparisons of perceived susceptibility with action risk can also be conducted (Janz et al., 2002). Relating to cord care practices, perceived susceptibility will be the risk of infection of the neonates.

Perceived Severity

Perceived severity is the second construct of the HBM. Perceived severity is one's belief about the seriousness of a medical condition and the sequence of events after diagnosis and personal feelings related to the consequences of a specific medical condition (Janz, Champion, & Stretcher, 2002).

Perceived Benefits

Perceived benefits are one's belief in the efficacy of the advised action to reduce health risk (Janz et al., 2002). Also termed as perceived benefits of taking health action, the attitudes of health behavior changes are reliant on one's view of the health benefits for performing a health action (Janz et al., 2002). Also termed as perceived benefits of taking health action, the attitudes of health behavior changes are reliant on one's view of the health benefits for performing a health action.

Perceived Barriers

Perceived barriers refer to the potential negative aspects of or obstructions to taking a recommended health action (Janz, Champion, & Strecher, 2002). This is the belief about physical and psychological costs of taking health action (Janz et

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al., 2002). An internal cost-benefit analysis occurs, weighing the health action's expected effectiveness against perceptions that it may become an obstacle. Potential barriers may include financial expense, danger, pain, difficulty, upset, inconvenience, and time-consumption (Janz et al., 2002).

Cues to Action

Cues to action are the strategies taken to activate one's readiness to take health action (Janz, Champion, & Strecher, 2002). Cues to action, formerly known as motivation, refers to internal incentive for living a healthy lifestyle (Janz et al., 2002).

Self-Efficacy

Self-efficacy was introduced in 1977 by Bandura, defined as the conviction or confidence to take health action and perform a health action (Janz, Champion, & Strecher, 2002). In 1988, Rosenstock, Strecher, and Becker suggested that self-efficacy be added to the HBM as a separate construct from the original concepts of susceptibility, severity, benefits, and barriers (Janz et al., 2002). The self-efficacy construct states that confidence in lifestyle alteration is essential before successful change is possible. Thus, as the HBM claims, behavior change can only be successful if the individual feels threatened by her current behavioral patterns through perceived susceptibility and severity and believes that a specific behavioral change will result in a valued outcome at acceptable cost. Individuals must also feel competent or self-efficacious to overcome perceived barriers in taking action (Janz et al.,200).

Information, Motivation and Behavioural Skills Model

The information, motivation, behavioural skills (IMB) model was developed by Fisher et al. (1994). The constructs of IMB model provide a platform to design interventions that help to induce change in the pattern of health behaviour and plan preventive public health programmes (Joseph, 2015). The model conceptualizes psychological determinants of the performance of behaviours that have the capacity to impair or to improve health status. It incorporates and addresses three concepts; information, motivation and behaviour.

According to Fisher et al. (1994) and Fisher and Fisher (2000), information component targets understanding of the concepts that lead to behaviour change and the ways and means of achieving the change. The authors maintained that information is a critical determinant of health behaviour performance and includes, relevant research data, health promotion information, preventive or risk details about the disease or behaviour in consideration and information on positive outcomes from behavioural change. This means the type of umbilical cord care practiced as well as materials used by mothers and caretakers for umbilical cord management is dependent on the previous information acquired by such parents. Furthermore, this explains that through education, misinformation can be replaced with healthy and appropriate information and this can in turn lead to healthy umbilical practices among mothers with neonates.

The motivation aspect of this model deals with individual effects and favourable attitude towards positive health behaviors and utilizing existing social support systems to reinforce motivation which is also enhanced by recognizing the

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possible barriers and finding ways to overcome them (Joseph, 2015). According to

this model, motivation acts as a catalyst to health-related behaviors and determines

whether even well-informed individuals will be inclined to undertake health

promotion actions (Fisher and Fisher, 2000). This implies that ability of

mothers/caretakers in Tamale Metropolis to practice a particular type of umbilical

cord care as well as use a particular material can be inferred from the positive

outcome, emotions and favorable attitude received in the Metropolis.

The behavioural aspect of the IMB model reflects the psychomotor or action

component that allows learning of skills required to bring about change in

behaviour (Fisher and Fisher, 2000). Behavioural skills for performance of health

promotion actions are critical determinant of whether, people who adopted

information and are motivated towards healthy behaviour change, would be capable

of effectively bringing about that change, which is dependent on individual self-

efficacy in carrying out a health related behaviour (Fisher and Fisher, 2000).

Information and motivation act as tools to develop these behavioural skills.

According to Fisher and Fisher (2000), the ability of mothers/caretakers to practice

favourable learned skills on umbilical cord care practices is fueled by the combined

effect of motivation and information acquired.

Interrelationships among the three constructs are used to translate the IMB

model into health promotion interventions. It is worth noting that information and

motivation are potentially independent constructs. This implies that well informed

individuals are not necessarily motivated to engage in health promotion behaviors

or well-motivated individuals are not necessarily well informed about health

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promotion practices (Joseph, 2015). In stating the relevance of this theory, Joseph

(2015) indicated that IMB model brings about a stepwise transition in society for

effective execution of public health intervention. Thus, research data and surveys

help to determine the information, motivation and behavioural skill required for the

promotion of health interventions and the care of the umbilical cord (Fisher and

Fisher, 2000). Once data is available, behaviour specific interventions are designed

and implemented with respect to target health behaviour (Fisher and Fisher, 2000).

Hence this model suggests that mothers who are knowledgeable about umbilical

cord infection and prevention, are motivated to prevent infection and perceive

themselves as capable of enacting preventive behaviours will act to reduce

umbilical cord infection (Fisher and Fisher, 1998).

Figure 1: **Information motivation behavior model of health**
(J.D. Fisher & Fisher, 1992; W.A. Fisher et al., 2003, 2009)

Conceptual Framework

The conceptual framework for this study as shown in figure 2. depicts how

information, motivation and the place of birth influence the state of the cord. (the

main factors that will contribute to the umbilical cord to either become infected or

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not infected. The conceptual framework was adapted from the information motivation behavior skill model (1998) as shown in figure 2. A few changes were made to suit this study which are; the self-efficacy which is the central part of the original model has been replaced by place of birth.

The frame work is made up of four component, the first one which is the information ,second is motivation ,the third is place of birth and the last is the state of the cord .From the framework, there is a thin line with arrow directing to the information component this describes how well the mothers/caretakers are informed about newborn care through ANC attendance ,the level of education of the mothers/caretakers and socioeconomic status of the mothers/caretakers affect the motivation for cord care practices.

From the diagram there is another arrow from the information to the place of birth this imply that the quality of information or knowledge the mothers/caretakers, the educational level is likely to influence the choice of where to have her baby delivered (home or facility). As safe cord care is defined as the use of a clean thread to tie the cord, sterile cutting instrument such as scissors and new razor blade to cut the umbilical cord plus no substance applied to the cord in facility birth and 4% chlorhexidine application in countries with high neonatal mortality rate to replace the unhygienic substances likely to be used on the cord stump. (W.H. O,2015; Osuchuku ,2017). So the higher the level of education of the mother/caretaker the higher the chances of delivering at the health facility and verse versa which is likely to influences the state of the umbilical cord positively or otherwise. Also, there is another arrow from the motivation to the place of delivery,

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this indicate that the geographical area of the mother/caretaker will affect the place of birth, access to health facility, the believe of the people in the area about child are the motivation factors that will have an effect on the choice of place of birth (home or hospital). Further, there are three arrows all directing to the state of the cord. Thus, arrow from information to the state of the cord, arrow from motivation to the state of the cord as well as arrow from the place of birth to the state of the cord. This implies that, all the three factors may influence the state of the cord being clean or infected. This means that ,the information the mother has about newborn care, the educational level of the mother, the geographical area, the cultural practices and the believes plus the rituals of the area as well as the place the baby is born either home or at a health facility and the person who conducted the delivery(skilled or unskilled attendant) all may affect the state of the cord (clean or infected).This is synergy with Afolaranmi et al (2018)who stated that, the state of the umbilical cord could be affected by varying educational levels of the mothers/caretakers, ease of access to health information, place of delivery, cultural affiliations, and place of residence.
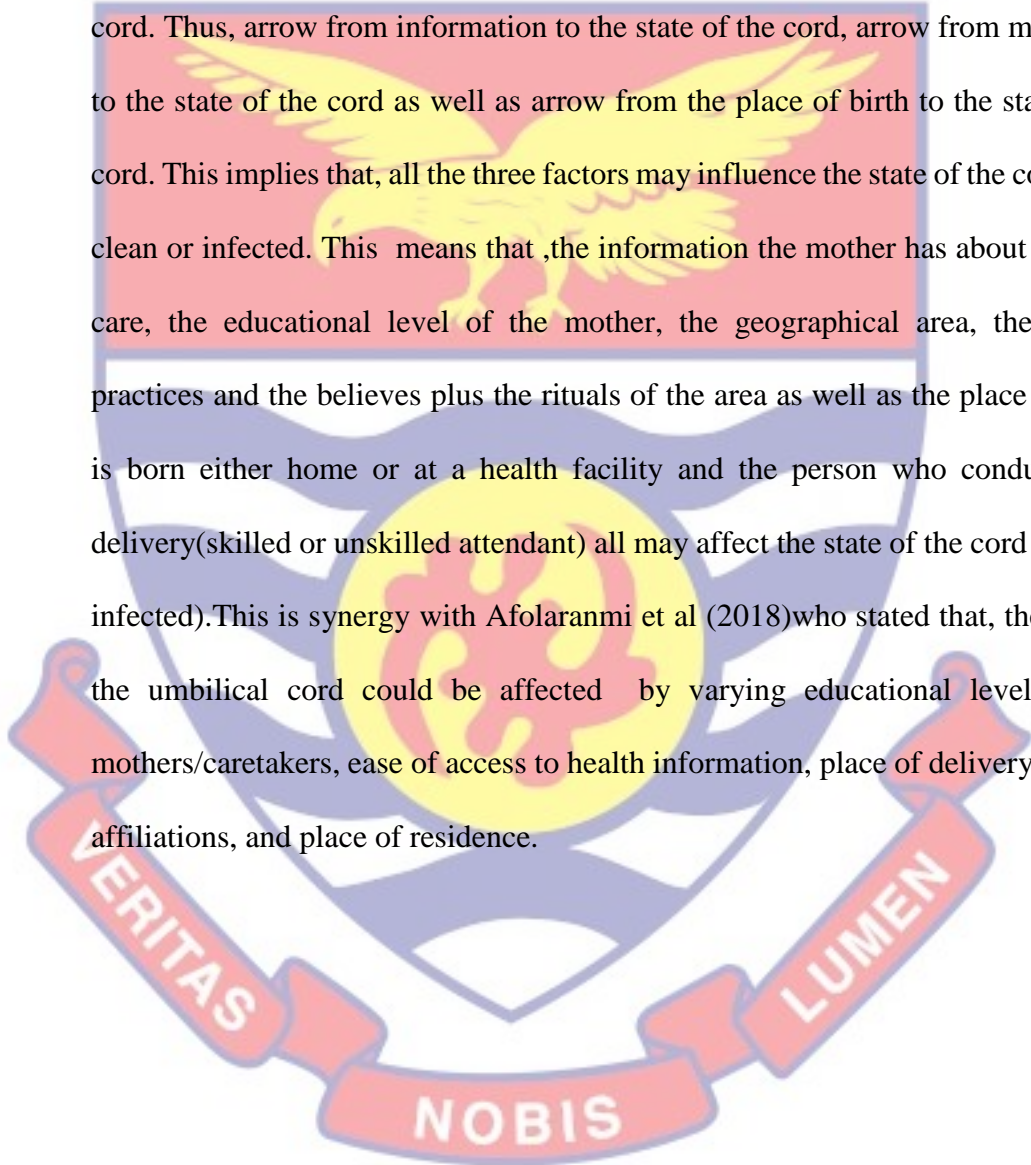
(Figure 2)
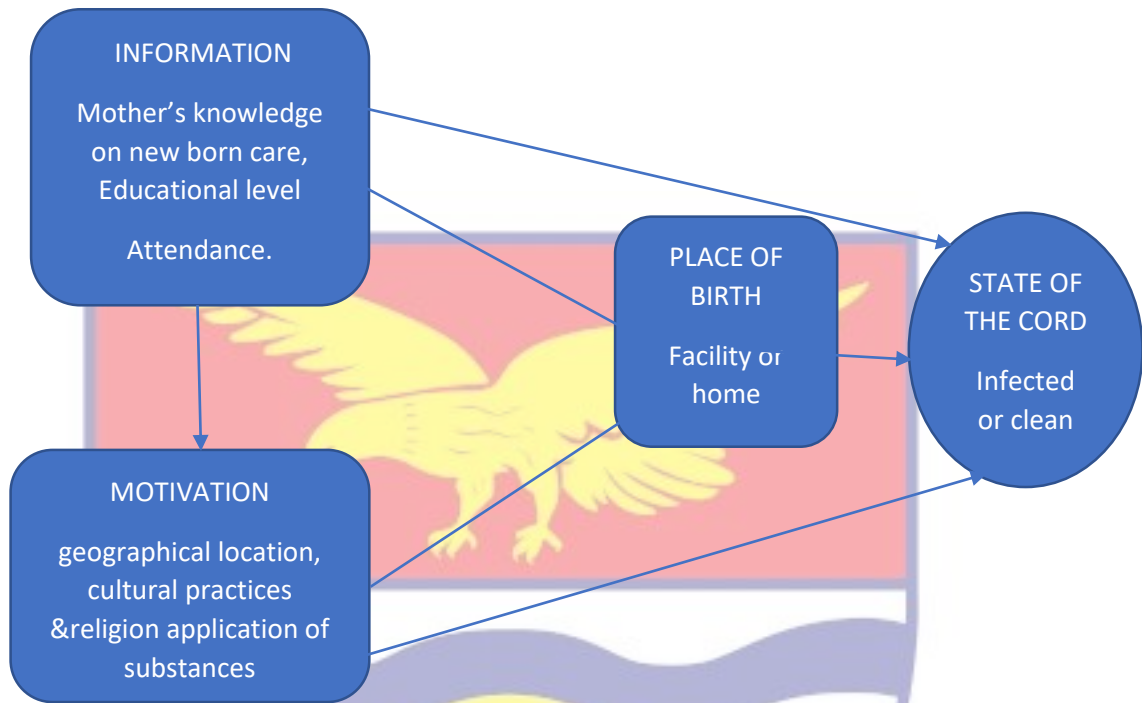
Figure 2: **Conceptual framework of the study (adapted from the information motivation behavioural health model (1998).**

Geographical Location

The geographical location of the mothers/caretakers influence the state of the umbilical cord, the traditional beliefs, cultural practices of the area and the accepted substances used to apply to the cord can influence the state of the cord that is either clean or infected. Socio-cultural orientation could play a key role in individual beliefs and practices. The place of birth, either in a health facility or at home and the presence or otherwise of a skilled birth attendant can directly influence the type of cord care a neonate will receive. In a setting where home delivery becomes the preference with relatives and friends assisting with child birth, a large proportion of neonates will be exposed to unclean and unhygienic cord care at birth and consequently during the neonatal period. Many cultures believe

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that the cord should not be dry hence the practice of applying substances to the cord stump with the aim of making it soft, allowing for easy separation and healing (Hill et al., 2010). People believe and attribute causes of disease or death to supernatural powers. This is what prompts mothers to use various forms of materials for umbilical cord management to hasten cord separation and prevent neonatal deaths which unfortunately may result in cord infection. These materials are mostly recommended by the elders, mothers, mother in-laws and traditional birth attendants. A study conducted in Egypt by Degefie et al. (2014) revealed that cultural beliefs and newborn care practices which includes cord care practices do not conform to recommended standards and recommended that local perspectives regarding newborn care practices should inform behaviour change messages targeting mothers, grandmothers, traditional birth attendants, other female family members and fathers as well.

Information

The mothers' knowledge on new born care at the antenatal level or from the health care provider or any other source greatly influence the condition of the cord. Studies show that, mothers who are the major providers of umbilical cord care during the neonatal period had poor knowledge about cord care (Quddus et al., 2002). This implies that these mothers will rely on the harmful practices handed over by their grandmothers and mother in handling the umbilical cords of their infants. Socio-economic factors and the educational level of the mother can contribute immensely to the state of the umbilical cord. One of the traditional measures used to assess social structure is education.

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The social structure also relates to the socio-economic status of the individual. Higher educational attainment increases knowledge of standard umbilical cord management. Further, increased educational attainment could also increase mothers' power in decision making that can promote hygienic cord care and reduction in umbilical cord infection (Obimbo et al., 1999). Additionally, an individual financial capacity is influenced by the level of education as well as the type of occupation the person is engaged in. Availability of funds to access health service may influence the choice of source from which care is sought by mothers. Without money, mothers cannot make independent choice about their health nor the health of their babies (Sharan, 2010). Cost of cord care has been noted to influence the kind of cord care practiced by mothers. A study conducted in Zambia by Herlihy et al. (2013) reported that nearly all respondents referred to the use of razor blade as the toll of choice due to its affordability. Waiswa et al. (2010) further reported that the cost of cord care may indirectly arise from cost associated with health facility deliveries as reported by respondents in his study in Uganda.

Place of Birth

The place of delivery also influences the state of the cord as well as the person who conducted the delivery. Delivery conducted by skilled personnel at the health facility is safer than the delivery at home by a relative or an untrained traditional birth attendant who uses used blade or unsterile knife to cut the cord. Babies delivered at home may have a greater risk of being exposed to unhealthy care practices, compared to babies delivered in health facilities. Most neonatal deaths occur at home, unattended by skilled health professionals (Lawn et al.,

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2005). Women have avoided health care facilities for myriad of reasons. In a study conducted by Waiswa et al. (2008), the respondents reported they prefer to deliver in health facilities, but usually do not do so due to barriers such as expensive delivery kits required in health facilities for delivery, labour starting at night in the absence of transportation and inaccessible health facilities which do not operate at night. Other barriers notably cited were health workers' rudeness, corrupt tendencies and absenteeism from work.

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Furthermore, this explains that through education, misinformation can be replaced with healthy and appropriate information and this can in turn lead to healthy umbilical practices among mothers with neonates.

The motivation aspect of this model deals with individual effects and faviourable attitude towards positive health behaviors and utilizing existing social support systems to reinforce motivation which is also enhanced by recognizing the possible barriers and finding ways to overcome them (Joseph, 2015). According to this model, motivation acts as a catalyst to health-related behaviors and determines whether even well-informed individuals will be inclined to undertake health promotion actions (Fisher and Fisher, 2000). This implies that ability of mothers/caretakers in Tamale Metropolis to practice a particular type of umbilical cord care as well as use a particular material can be inferred from the positive outcome, emotions and faviourable attitude received in the Metropolis.

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favourable learned skills on umbilical cord care practices is fueled by the combined effect of motivation and information acquired.

Interrelationships among the three constructs are used to translate the IMB model into health promotion interventions. It is worth noting that information and motivation are potentially independent constructs. This implies that well informed individuals are not necessarily motivated to engage in health promotion behaviors or well-motivated individuals are not necessarily well informed about health promotion practices (Joseph, 2015). In stating the relevance of this theory, Joseph (2015) indicated that IMB model brings about a stepwise transition in society for effective execution of public health intervention. Thus, research data and surveys help to determine the information, motivation and behavioural skill required for the promotion of health interventions and the care of the umbilical cord (Fisher and Fisher, 2000). Once data is available, behaviour specific interventions are designed and implemented with respect to target health behaviour (Fisher and Fisher, 2000). Hence this model suggests that mothers who are knowledgeable about umbilical cord infection and prevention, are motivated to prevent infection and perceive themselves as capable of enacting preventive behaviours will act to reduce umbilical cord infection (Fisher and Fisher, 1998).

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CHAPTER THREE

MATERIALS AND METHODS

Introduction

This chapter presents an overview of research methods and procedures that were applied in the study. It describes the overall approach and principles that guided the collection and analysis of data of the study. The following areas would be discussed; research design, study area, study population, sampling procedure, sampling size calculation, sample instrument, data collection instrument, validity and reliability, ethical consideration, data collection procedure, data management, data analysis and expected outcome of the study.

Research Design

A research design is the conceptual structure within which research is conducted. It is made up of the plan for collection of data, measurement and analysis of the data. It includes the outline of what the researcher intends to do from hypothesis and its operational implications to the final analysis of data (Kothari and Garg, 2014). Researchers use different research design depending on the aims and objectives of their study, for example; case study design, causal design, cohort design, cross sectional design, descriptive design, experimental design etc.to conduct their studies. The researcher adopted one of the quantitative methods considering the aims and objectives.

This study adopted a descriptive cross-sectional method to assess umbilical cord care practices among mothers/caretakers, at a particular point in time. A descriptive study is concerned with collecting data to explain or predict the

conditions or relationships that exist, opinions that are held by respondents as well as practices that are going on. In this design, attempt is made to describe the existing conditions and also analyzes relationships among variables (Cresswell, 2012; Best and Kahn, 2016; Mills and Gay, 2019). Accordingly, data are usually collected in order to test hypotheses or answer research questions concerning the current status of a phenomenon. The descriptive study design was the preferred design for this study because it enabled easy observation, description and interpretation of the practices of umbilical cord care in the Tamale metropolis. It also helped in describing the various ways and substances used to clean the cord among the parents in the Tamale metropolis.

The design was also considered because it permitted the intake of information about the practices of umbilical cord care from Tamale Metropolis. Tamale is generally one of the areas with the highest delivery rate in Ghana (Ghana Statistical Service, 2013) and a descriptive study has the potential of providing a lot of information from quite a large number of individuals in a study. Again, this research design also helped to bring to bear the different reasons why mothers/caretakers chose the substances applied to the umbilical cords of the neonates.

Study Area

The study was conducted in the Tamale metropolis. The Tamale Metropolis is one of the 26 districts in the Northern Region. It is located in the central part of the Region and shares boundaries with the Sagnarigu District to the West and North, Mion District to the East, East Gonja to the South and Central Gonja to the

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South-West. The Metropolis has an estimated land size of 646.90180 sq km (Ghana Statistical Service, 2015). Tamale is the capital city of the Northern Region of Ghana mostly inhabited by the Mole-Dagomba linguistic group. The city has a population of about 350,000. Most occupants of the area are civil servants, businessmen, traders and farmers. It is predominantly a Muslim City with a small percentage being Christians and there are also traditionalists. The common language spoken is Dagbani.

In all, four (4) health facilities are situated within the Tamale Metropolis comprising: Tamale Teaching Hospital (Child Welfare Clinic), Tamale West Hospital (Postnatal Clinic), Tamale Central Hospital (Child Welfare Clinic) and the Reproductive and Child Health Clinic (RCH). There are also ten (10) private clinics and about seven Community-based Health Planning and Services (CHPS) compounds across the length and breadth of the metropolis. There are six (6) maternity birth homes, two polyclinics and one mission hospital. The study was conducted within selected health facilities operating child welfare clinics within the Tamale metropolis.

Study Sites

Tamale Teaching Hospital

Tamale Teaching Hospital is the only referral center serving the three Northern Regions of Ghana namely the Upper East, Upper West, the Northern Regions and the newly created savanna region. The hospital has specialized units like Urology, Internal Medicine, Neurology, Ear Nose and Throat, General

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Surgery, Eye, Dental, Thoracic, Plastic, Paediatric and Obstetrics and Gynaecology departments.

Tamale West Hospital

Tamale West Hospital is sited at the Western part of the Metropolis and is made up of the Male and Female Medical wards, Paediatric ward and the Maternity ward as well as the Maternal and Child Health unit.

Tamale Central Hospital

Tamale Central Hospital is found at the central area of the Tamale metropolis has a Fistula Center, Paediatric, Male and Female wards, Maternity ward and Child Welfare unit and recently Surgical ward.

Reproductive and Child Welfare Clinic

Reproductive and child welfare clinic is also located at the Eastern part of Tamale the facility provides services such as Family Planning, Antenatal Clinic and Postnatal Care.

Study Population

Population is a well-defined collection of individuals or objects which is the focus of a researcher, they often have a similar traits or characteristics. The population of interest of this study was the mothers/caretakers who delivered or taking care of neonates within the stated study period. These were infants aged 3 to 28 days and attending child welfare clinics within the selected facilities over the study period. Such mothers/caretakers play a direct role in caring for the neonate and most likely practice what has been taught at the antenatal care clinic. The estimated average deliveries conducted per month were: 600 for Tamale Teaching

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Hospital; 450 for Central Hospital; 300 for SDA Hospital with the Maternal and

Child Health offering services to an average of 400 mothers with newborns.

Sample Size Calculation

The sample size was determined using a formula developed by Snedecor

and Cochran (1989). Using a proportion of 74%, reported from the demographic

health survey as proportion of deliveries attended to by skilled health staff (Ghana

Statistical Service and Ghana Health Service, 2018), the minimum sample size was

estimated as follows:

The formula is expressed as:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:

n_0 = sample size

Z = standard normal variable at 5% type one margin of error (1.96)

p = the expected proportion in the population with the attribute in question

(74%)

q = 1-p

e = desired level of precision

$$n_0 = \frac{(1.96)^2 (0.74)(1 - 0.74)}{(0.05)^2}$$

$$n_0 = \frac{(3.8416)(0.1924)}{2.5 \times 10^{-3}}$$

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$$n_0 = \frac{0.7391}{2.5 \times 10^{-3}}$$

$$n_0 = 296$$

The minimum sample size estimated for the study was 296. A factor of 30% was added to the minimum sample size estimate taking cognizance of non-response from some mothers/caretakers and submission of incomplete and unevaluable questionnaires. Therefore, the total estimated sample size for the study was:

$$n_0 = \frac{30}{100} \times 296$$

$$n_0 = 88.8 \approx 89$$

$$n_0 = 296 + 89$$

$$n_0 = 385$$

Sampling Procedure

Sample and sampling refer basically to the process of learning about a population of a study on the basis of a part drawn from it (Nsowah-Nuamah, 2005; Cohen *et al.*, 2008). A simple random sampling technique was used to select study participants.

The sample size estimated was divided by four (4) representing the number of study sites from which respondents was drawn to give an estimate of the minimum sampling from each facility. Using an approximate total of 1,350 deliveries conducted per month within the region, an approximate sampling interval of 4 (1,350/385) was used to select participants into the study at the study sites. The first mother/caretaker with a new born to be included in the sample was chosen randomly by blindly picking one of two pieces of paper indicated with 'Yes' and

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'No' for the first two clients in each day. The one who picked the 'Yes' paper became the first participant of the day and was drawn into the study. After that, every fourth mother/caretaker with a new born who consented to partake in the study were included in the study. Participants were accessed by the help of the heads of the selected health facilities as well as the in-charges organized the participants for the data collection. Written informed consent was also sought from mothers who could read and write and those who were unable to read, translations were made in the local language (Dagbani) by study enumerators and were made to thumb print.

Inclusion Criteria

1. Mothers/caretakers attending postnatal clinic who had neonates between ages 3 days to 28 days.

2. Mothers/caretakers who chose "Yes" blindly and were willing to take part in the study.

3. Neonates who were not receiving specialist care or undergoing medical procedures at the time of the study.

Exclusion Criteria

1. Mothers with neonates less than 3 days and above 28 days

2. Mothers/caretakers with neonates diagnosed with medical conditions e.g. septicaemia which could influence the outcome of this study.

3. Mothers/caretakers who had infants within the age range but were not willing to take part in the study.

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Data Collection Instrument

The instrument for data collection was a questionnaire that was developed based on the objectives of the study, as well as other useful resources identified from the literature reviewed. It was a semi-structured questionnaire which assumed both open and close-ended format (Joseph, 2015). The closed form provided responses whiles the open format allowed the mothers to describe in their own words with regards to the practices of umbilical cord care. The combination of both formats invariably created an opportunity to collect greater depth of information on the practices of cord care among mothers/caretakers in the metropolis. Although the questionnaire did not offer any opportunity for probing and motivation on the part of respondents, the instrument tended not to be "affected by problems of no contact"

The questionnaire which was adopted and modified from an existing one by Joseph (2015) was composed of six sections which included data on respondents' biographic characteristics and explore the three thematic areas of the study: the influence of the obstetric history of the mother to umbilical cord care, the influence of the knowledge of the mother or caretaker on umbilical cord care and the influence of their spouses in the care of the umbilical cord. Other thematic areas included how the adopted practices affect cord separation time and the condition of the umbilical stump. 'Section One' of the questionnaire sought the biodemographic data and 'Section Two' of the instrument was on spousal socioeconomic information. The 'Third Section' of the questionnaire was on the obstetric history of the mother and 'Section Four' was on the baby's report where the presence of

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signs such redness, swelling, pus and bad or foul smell was used as a proxy to infer infection of the cord. 'Section Five' was composed of the practice of the umbilical cord care. This was to help answer the questions and the final section on the assessment of the umbilical cord was to enable the assessment of any signs of omphalitis among the neonates.

Data Collection Procedures

An introductory letter was presented to in-charges of the selected facilities to obtain permission to access the respondents. A staff nurse and a student nurse were trained for two days on the nature of the questionnaire and how to approach the mothers in order to get them to respond to the questions. The questionnaires were administered personally with the two trained research assistants at the selected facilities in attendance. The participants were met individually and the consent form was read to them as well as the procedures on how to answer the questionnaires. They were made to understand that they were free to stop at any point if they felt uncomfortable by some of the questions before the questionnaire were given to them. Ample time was given to them to complete the questionnaire before collection with the guidance of the researcher or the research assistants for mothers/caretakers who were able to read and write in English. For mothers/caretakers who could not read or write, the research assistants helped to translate the questions into the local dialect (Dagbani) to enable them respond appropriately as practiced during the pre-test process.

Validity and Reliability of Instrument

Validity is the strength of the researcher's conclusions, inferences or propositions (Kothari &Garg, 2014). The questionnaire was designed in line with objectives and literature reviewed. A preliminary copy of the instrument was sent to research supervisors and scholars for 'face validity.' Reliability was ensured by randomly repeating the instrument measurement the same way each time, and it was used under the same condition with the same subjects. The questionnaire was administered to ten (10) mothers/caretakers at the Seventh Day Adventist Hospital and the New Life Community Clinic for pre-testing of the instrument. The data from the pre-test were analyzed for reliability and consistency by using Cronbach's alpha with coefficient of 0.71 which was deemed valid.

Ethical Issues

According to Polit and Beck (2009), researchers must deal with ethical issues when their intended research involves human beings. A letter to seek for approval, coupled with a detailed research proposal was sent to the Institutional Review Board (IRB) of the University of Cape Coast (UCC) through the dean of school of nursing. The study was conducted after obtaining approval from the Institutional review board (IRB) of University of Cape Coast (UCC). Ethical approval was obtained from the ethics committee of the Tamale Teaching Hospital. Additionally, clearance was sought from the Ghana Health Service Ethical Review Committee (GHS ERC). Access to the participants was obtained through the Heads of Department of Nursing and Midwifery at the selected facilities. The objectives and design of the study were explained to all potential participants and written

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informed consent was sought from the research participants and signed ensuring confidentiality of all data. Information about their freedom to withdraw at any stage was also emphasized. The study did not expose the participant to any harm since there were no interventions to the participants.

Data Processing and Analysis

Data analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data-groups. Thus, in the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to statistical tests of significance to determine with what validity data can be said to indicate any conclusions (Kothari & Garg, 2014). The answered questionnaires were kept in a sealed envelope and stored in a locked cabinet throughout the study and accessed only by authorized persons to ensure confidentiality and to avoid data loss. The responses were entered in Microsoft Excel®, checked for double entry to avoid duplications and reviewed for clerical errors to maintain data accuracy. During data entry, individual questionnaire that has been entered was marked as 'entered' to avoid duplications of data. All soft copies of the data were passed worded and protected to avoid access by third parties and unauthorized persons. A copy of the finalized and cleaned electronic data were backed-up onto an external hard drive and stored in a locked cabinet with access only being granted to authorized persons.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 23 (www.ibm.com). Continuous data was analyzed using t-tests and categorical data analyzed using Chi-square tests. Logistic regression analysis was

employed to evaluate risk variables associated with cord infection. For all statistical comparisons, a p-value less than 0.05 was considered significant. Demographic characteristics were summarized using frequency distribution tables and bar charts. For the outcome variables, the bar chart was used to descriptively summarize the relative frequency prevalence of umbilical infections in the Tamale metropolis.

Chapter Summary

This section is about the methodological approach that was adopted to ensure that findings of the study are well grounded. This study employed a descriptive cross-sectional research design to help collect responses from study participants. The population consisted of mothers/caretakers who had neonates aged 3 to 28 days and were attending postnatal clinics at four healthcare facilities within the Tamale metropolis. A simple random sampling was used and data collected were analyzed using SPSS version 23 (www.ibm.com) and the outcomes of variables presented by frequencies in tables or charts.
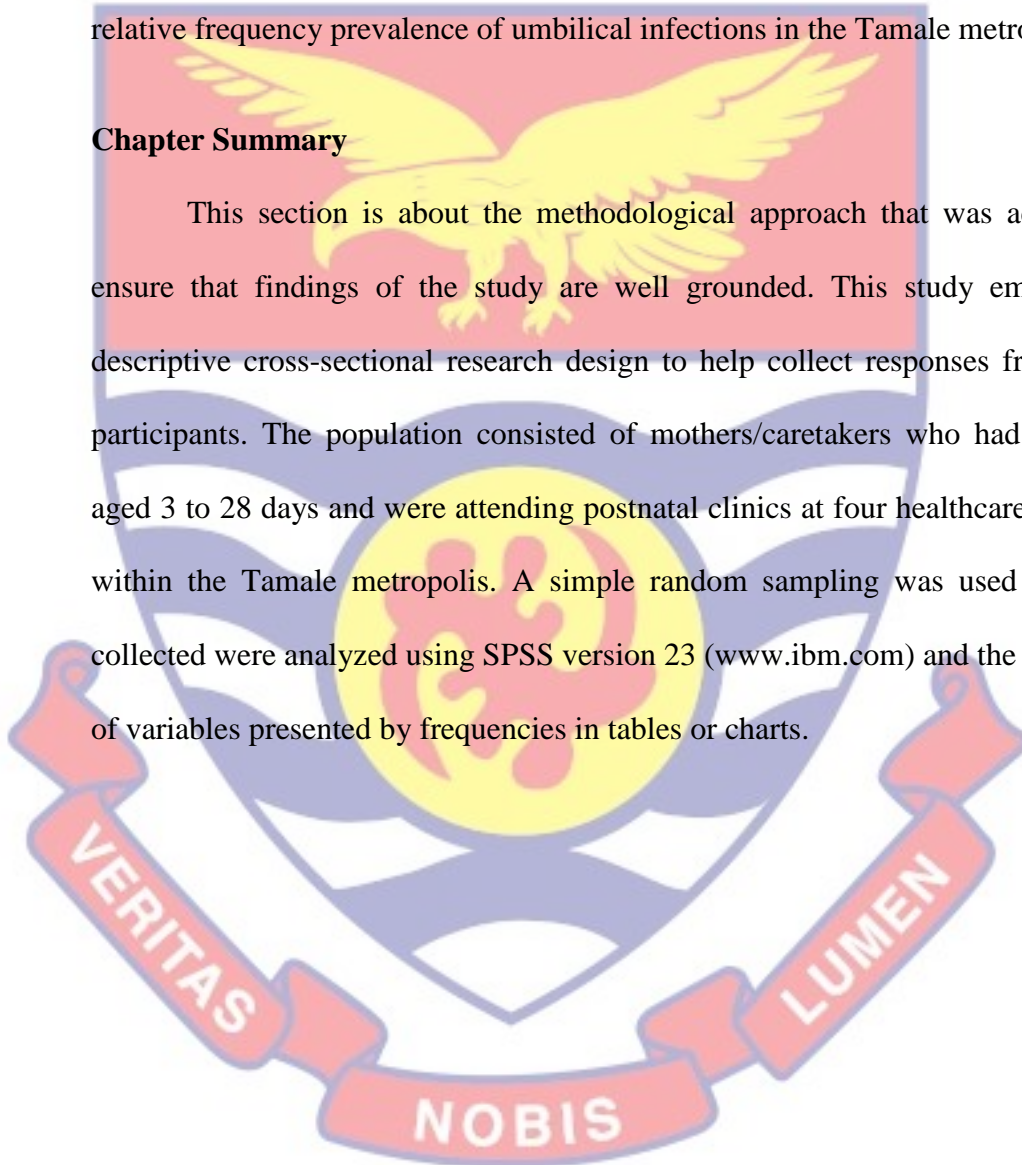
CHAPTER FOUR

RESULTS AND DICUSSION

Introduction

This chapter presents the results of the study and discussion of the findings from the field. The study sought to assess the cord care practices of mothers/caretakers with neonates in the Tamale metropolis taking into account, the research questions and the objectives. The result of the study was presented in three major parts: the first part presented descriptive statistics of the baseline characteristics of the mothers/caretakers; the second part dealt with cord care practices and the assessment of the cord and the third part dealing with inferential reports of study variables as risk factors for omphalitis. The sample size was 358 mothers/caretakers who were attending postnatal clinic with neonates within the ages of 3 to 28 days and had consented to take part in the study.

Demographic Characteristics

The baseline characteristics of mothers/caretakers sampled from the four different postnatal sites within the Tamale metropolis are as shown in Table 1. Out of the total of 385 questionnaires distributed, 358 were observed to be completed and included in the study for analysis. In all, 123 (34.4%) questionnaires were received from Tamale Teaching Hospital (TTH), 66 (18.4%) from the Tamale Central Hospital (TCH), 74 (20.7%) from the Tamale West Hospital (TWH) and 95 (26.5%) from the Reproductive and Child Health (RCH) unit. The mean age of the mothers/caretakers was 27.2 ± 5.1 years. Majority of the respondents sampled (58.1%) were within the 25 to 33 years age group and a similar trend was observed

when assessed by each facility. About 27.4% of the total respondents were within the 16 to 24 years age group, 8.7% within the 34 to 42 years age group with about 5.0% indicating that they do not know their ages.

Assessment of marital status showed 93.0% of the total number of mothers/caretakers sampled being married and this trend was similar across the selected facilities. The percentages of mothers/caretakers who were cohabiting or single were 3.4% and 3.6% respectively. On assessing the educational background of the respondent's sampled, 30.7% had attained Senior High School education and 23.1% had attained Tertiary level education with 27.1% indicating that they have had no formal education. When evaluated by postnatal site, it was observed that most of the mothers/caretakers 31.7% accessing TTH had Tertiary education with mothers/caretakers from TCH (39.4%), TWH (32.4%) and RCH (35.8%) having Senior High School education. However, for TWH, it was observed that majority of the mothers/caretakers (37.8%) have had no education with 32.4% having Senior High School level education. The number of mothers/caretakes who have never had education at TTH (30.1%) was almost similar to the number who have had Tertiary level education (31.7%). For those accessing the TWH, 37.8% have had no education and this ranked highest when compared to those who are educated. A greater percentage of the mothers/caretakers sampled were Muslims (84.1%) with Christians and Traditionalists comprising 13.1% and 2.8% respectively. When assessed by postnatal site, a similar trend was observed with majority being Muslims followed by the Christian and Traditional religions. The main occupation of the respondents was trading (33.8%), 24.0% indicated they own their private

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businesses, 14.2% were government employees, 4.8% were farmers and 23.2% had

no occupation.

Table 1: Baseline maternal characteristics of the studied population

	Postnatal Sites				
Variables	TTH N=123 (%)	TCH N=66 (%)	TWH N=74 (%)	RCH N=95 (%)	Total N=358 (%)
Age (years)	28.7 ± 4.9	26.7 ± 5.1	24.7 ± 3.9	27.6 ± 5.2	27.2 ± 5.1
Age group (years)					
16 – 24	23(18.7)	18(27.3)	31(41.9)	26(27.4)	98(27.4)
25 – 33	77(62.6)	38(57.6)	38(51.4)	55(57.8)	208(58.1)
34 – 42	19(15.5)	2(3.0)	0(0.0)	10(10.5)	31(8.7)
>42	1(0.8)	1(1.5)	0(0.0)	1(1.1)	3(0.8)
Do not know	3(2.4)	7(10.6)	5(6.7)	3(3.2)	18(5.0)
Marital Status					
Married	117(95.1)	61(92.4)	70(94.6)	85(89.5)	333(93.0)
Cohabiting	5(4.1)	3(4.6)	1(1.4)	3(3.2)	12(3.4)
Single	1(0.8)	2(3.0)	3(4.0)	7(7.3)	13(3.6)
Education					
None	37(30.1)	14(21.2)	28(37.8)	18(18.9)	97(27.1)
Primary	16(13.0)	7(10.6)	9(12.2)	15(15.8)	47(13.1)
Junior High	5(4.1)	3(4.6)	8(10.8)	5(5.3)	21(6.0)
Senior High	26(21.1)	26(39.4)	24(32.4)	34(35.8)	110(30.7)
Tertiary	39(31.7)	16(24.2)	5(6.8)	23(24.2)	83(23.1)
Religion					
Traditional	1(0.8)	5(7.6)	3(4.1)	1(1.1)	10(2.8)
Christian	20(16.3)	8(12.1)	6(8.1)	13(13.7)	47(13.1)
Muslim	102(82.9)	53(80.3)	65(87.8)	81(85.2)	301(84.1)
Occupation					
None	27(22.0)	13(19.7)	20(27.0)	23(24.2)	83(23.2)
Farmer	16(13.0)	0(0.0)	1(1.4)	0(0.0)	17(4.8)
Trader	31(25.2)	28(42.4)	29(39.2)	33(34.7)	121(33.8)
Private business	25(20.3)	18(27.3)	21(28.4)	22(23.2)	86(24.0)
Government employee	24(19.5)	7(10.6)	3(4.0)	17(17.9)	51(14.2)

Continuous data are presented as means±SD; Categorical data presented as frequencies and percentages; TTH-Tamale Teaching Hospital; TCH-Tamale Central Hospital; TWH-Tamale West Hospital; RCH-Reproductive and Child Health.

Facilities Accessed for Antenatal Care

The responses of the mothers/caretakers about the facilities they accessed during antenatal care is as shown in Figure 3. From the analysis, it was observed that the four postnatal sites represented the main facilities that mothers/caretakers will access antenatal care services. About 25.0% indicated they accessed TTH for antenatal services followed by TWH (19.0%), RCH (18.0%) and TCH (16.0%). About 3.0% indicated they never sought for antenatal care services with the remaining 19.0% indicating that they sought for antenatal care services in facilities other than the four main postnatal sites used for the study. These sites include health centers (4.0%), clinics (9.0%) and other hospitals (6.0%) within the municipality.
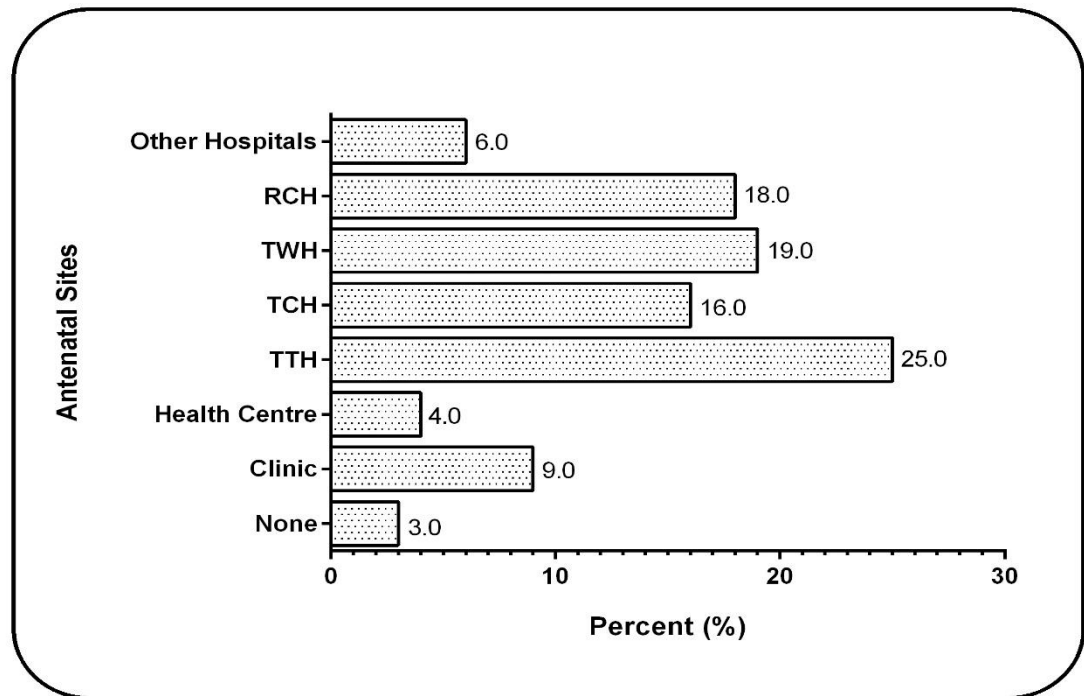
Figure 3: **Choice of sites for antenatal care visit**

Obstetric Report of Respondents

Obstetric information about mothers/caretakers sampled for the study were as presented in Table .2. When asked about seeking antenatal care before delivery, 94.1% of the total number of mothers/caretakers sampled indicated that they sought antenatal care with only 5.9% indicating they did not seek antenatal care. On the number of antenatal (ANC) visits before delivery, 50.8% of the mothers/caretakers indicated that they had less than eight (8) ANC visits before delivery. A percentage of 34.9 indicated they had 8 to 10 ANC visits with 8.4% indicating they had more than 10 ANC visits. A total of 21 (5.9%) of the mothers/caretakers indicated they never had ANC visit until delivery. When ANC visit was analyzed by postnatal site, it was observed that mothers/caretakers visiting TCH had majority with 8 to 10 visits compared with the other postnatal sites.

An analysis of the gestational weeks of the mothers/caretakers showed 72.3% indicating that they carried their pregnancies for more than 37 weeks before delivery. While 2.8% indicated they did not know the gestational weeks of their pregnancies before delivery, 24.9% delivered preterm. On assessing the mode of delivery, 77.9% of the mothers/caretakers indicated they delivered through spontaneous vaginal delivery with the remaining 22.1% indicating they delivered through caesarean section.

An assessment of the places where the respondents delivered their babies showed that most mothers/caretakers delivered at TTH (41.3%) followed by TCH (19.0%), TWH (18.7%), Home delivery (10.6%), Other Hospitals (5.9%), Clinics (2.8%) and Health Centers (1.7%). RCH does not conduct deliveries but provides

antenatal and postnatal services to pregnant women and mothers/caretakers respectively. An analysis of the responses from the mothers/caretakers sampled from the RCH showed majority (42.1%) indicating they delivered at TTH followed by TCH (18.9%), TWH (15.8%), Other Hospitals (10.5%), Home (9.5%) and Clinics (3.2%).

Table 2: Obstetric information about the studied population

	Postnatal Sites				
Variables	**TTH N=123 (%)**	**TCH N=66 (%)**	**TWH N=74 (%)**	**RCH n=95 (%)**	**TOTAL N=358 (%)**
Attended ANC					
Yes	118(95.9)	60(90.9)	72(97.3)	87(91.6)	337(94.1)
No	5(4.1)	6(9.1)	2(2.7)	8(8.4)	21(5.9)
Number of ANC visits					
None	5(4.1)	6(9.1)	2(2.7)	8(8.4)	21(5.9)
<8	63(51.2)	26(39.4)	52(70.3)	41(43.2)	182(50.8)
8 to 10	39(31.7)	30(45.4)	16(21.6)	40(42.1)	125(34.9)
>10	16(13.0)	4(6.1)	4(5.4)	6(6.3)	30(8.4)
Gestational weeks					
Preterm	38(30.9)	15(22.7)	15(20.3)	21(22.1)	89(24.9)
≥37	81(65.9)	48(72.7)	59(79.7)	71(74.7)	259(72.3)
Do not know	4(3.2)	3(4.6)	0(0.0)	3(3.2)	10(2.8)
Mode of delivery					
C/S	42(34.1)	14(21.2)	8(10.8)	15(15.8)	79(22.1)
SVD	81(65.9)	52(78.8)	66(89.2)	80(84.2)	279(77.9)
Place of delivery					
Home	13(10.6)	3(4.6)	13(17.6)	9(9.5)	38(10.6)
Health Centre	6(4.9)	0(0.0)	0(0.0)	0(0.0)	6(1.7)
Clinic	5(4.1)	0(0.0)	2(2.7)	3(3.2)	10(2.8)
TTH	83(67.4)	15(22.7)	10(13.5)	40(42.1)	148(41.3)
TCH	2(1.6)	45(68.2)	3(4.1)	18(18.9)	68(19.0)
TWH	5(4.1)	1(1.5)	46(62.2)	15(15.8)	67(18.7)
Other hospitals	9(7.3)	2(3.0)	0(0.0)	10(10.5)	21(5.9)

Continuous data are presented as means±SD; TTH-Tamale Teaching Hospital; TCH-Tamale Central Hospital; TWH-Tamale West Hospital; RCH-Reproductive and Child Health; ANC-Antenatal care; C/S-Caesarean section; SVD-Spontaneous vaginal delivery.

Neonatal Reports

Neonatal information and reports on umbilical cord assessment are as shown in Table .3. The mean age for the neonates encountered was 9.7 ± 6.8 days. Site specific analysis showed a neonatal age of 9.9 ± 6.5 days for neonates at TTH; 7.6 ± 5.7 days for neonates at TCH; 10.9 ± 7.6 days for neonates at TWH and 9.9 ± 7.1 days for neonates at RCH. A general analysis of gender showed 50.8% were males with the remaining 49.2% being females. The mean weight of the neonates for the general sample was 2.9 ± 0.6 kg with about 15.6% being reported to have low birth weight (<2.5 kg). Site specific analysis showed a mean neonatal birth weight of 2.8 ± 0.7 kg with a low birth weight prevalence of 21.1% at TTH; 3.0 ± 0.5 kg with a low birth weight prevalence of 10.6% at TCH; 2.9 ± 0.5 kg with a low birth weight prevalence of 14.9% at TWH and 3.0 ± 0.7 kg with a low birth weight prevalence of 12.6% at RCH.

The recorded mean cord separation time for the neonates was 5.8 ± 2.6 days. Majority of the neonates (49.4%) had their cord separation happening within 2 to 7 days with about 43.3% having their umbilical cord intact and not fallen off. The status of the umbilical cord of neonates was assessed to determine whether the cord was infected or not. The presence of signs such as redness, swelling, pus and bad or foul smell was used as a proxy to infer infection of the cord. It was observed that 15.4% of neonates had their umbilical cord being infected upon close examination with the remaining 84.6% being clean and dry upon assessment.

Table 3: Neonatal report and cord assessment

| Variables | Postnatal Sites | | | | |
	TTH N=123 (%)	TCH N=66 (%)	TWH N=74 (%)	RCH n=95 (%)	TOTAL N=358 (%)
Age (days)	9.9 ± 6.5	7.6 ± 5.7	10.9 ± 7.6	9.9 ± 7.1	9.7 ± 6.8
Gender					
Male	67(54.5)	34(51.5)	37(50.0)	44(46.3)	182(50.8)
Female	56(45.5)	32(48.5)	37(50.0)	51(53.7)	176(49.2)
Weight (kg)	2.8 ± 0.7	3.0 ± 0.5	2.9 ± 0.5	3.0 ± 0.7	2.9 ± 0.6
<2.5kg	26(21.1)	7(10.6)	11(14.9)	12(12.6)	56(15.6)
Cord separation time (days)	6.4 ± 3.4	5.9 ± 1.7	5.0 ± 1.8	5.6 ± 2.3	5.8 ± 2.6
2 to 7	60(48.8)	21(31.8)	45(60.8)	51(53.7)	177(49.4)
8 to 13	7(5.7)	4(6.1)	4(5.4)	6(6.3)	21(5.9)
14 to 19	1(0.8)	0(0.0)	0(0.0)	2(2.1)	3(0.8)
≥20	2(1.6)	0(0.0)	0(0.0)	0(0.0)	2(0.6)
Not fallen off	53(43.1)	41(62.1)	25(33.8)	36(37.9)	155(43.3)
Cord status					
Clean and dry	96(78.1)	62(93.9)	58(78.4)	87(91.6)	303(84.6)
Infected	27(21.9)	4(6.1)	16(21.6)	8(8.4)	55(15.4)

Continuous data presented as means±SD; TTH-Tamale Teaching Hospital; TCH-Tamale Central Hospital; TWH-Tamale West Hospital; RCH-Reproductive and Child Health.

Risk Variables for Birth Weight

With a recorded low birth weight prevalence of 15.6%, the study further investigated variables which might serve as risk factors for low birth weight using multiple logistic regression (Table .4). From the univariate analysis, being a Farmer was associated with approximately 14 times risk (p = 0.001) of delivering a baby with low birth weight and odds was still significant with approximately 8 times risk in the multivariate analysis. ANC visits below the recommended eight (8) times visit (adjOR = 3.0; p = 0.004), gestational weeks less than the recommended 37 weeks (adjOR = 4.5; p = 0.0001) and delivery by Caesarean section (adjOR = 2.8;

p = 0.011) were significantly associated with low birth weight in the univariate and consequently the multivariate analysis.

Table 4: Logistic regression of study variables associated with birth weight

Variables	Univariate cOR(95%CI)	Multivariate p-value	adjOR(95%CI)	p-value
Occupation				
Government Employee	1	1		
Private	1.1(0.5 - 2.8)	0.804	0.9(0.3 - 2.9)	0.984
Trader	0.6(0.2 - 1.4)	0.215	0.6(0.2 - 1.8)	0.375
Farmer	13.7(3.1 - 60.8)	0.001	7.8(1.3 - 46.0)	0.024
None	0.7(0.3 - 1.9)	0.518	0.8(0.2 - 2.4)	0.644
ANC Visits				
≥ 8	1	1		
<8	3.0(1.6 - 5.7)	0.001	3.0(1.4 - 6.5)	0.004
Gestational Weeks				
≥ 37	1	1		
<37	6.1(3.3 - 11.3)	0.0001	4.5(2.2 - 8.9)	0.0001
Mode of delivery				
SVD	1	1		
C/S	2.2(1.2 - 4.1)	0.012	2.8(1.3 - 6.1)	0.011

cOR-crude odds ratio; adjOR-adjusted odds ratio; ANC-antenatal care; SVD-spontaneous vaginal delivery; C/S-caesarean section

Cord Care Practices

Assessment of materials used for umbilical cord tying and how mothers/caretakers apply diaper for their babies are as shown in Figure 4. The figure shows participant distribution based on their responses to questions on materials used for cord tying after delivery (Figure 4.A). Responses to questions on how the cord stump was handled when applying diaper on the neonate is summarized in Figure 4.B.

Cord Tying Materials

From Figure 4.A, majority of the mothers/caretakers 88.0%; indicated that a clamp was used to tie the cord after delivery with 7.5% indicating new thread was used to tie the umbilical cord after birth and 1.7% indicating that nothing was used to tie the cord after birth. About 2.8% did not provide any responses to this question.

Diaper Application

Responses to varied ways in which diapers are applied are as summarized in Figure 4.B. On diaper application, 67.6% indicated that they applied the diaper under the cord stump; 24.9% indicated they applied the diaper with the cord stump inside the diaper; 3.6% indicated they did not use diaper and 3.9% did not provide responses to this question.
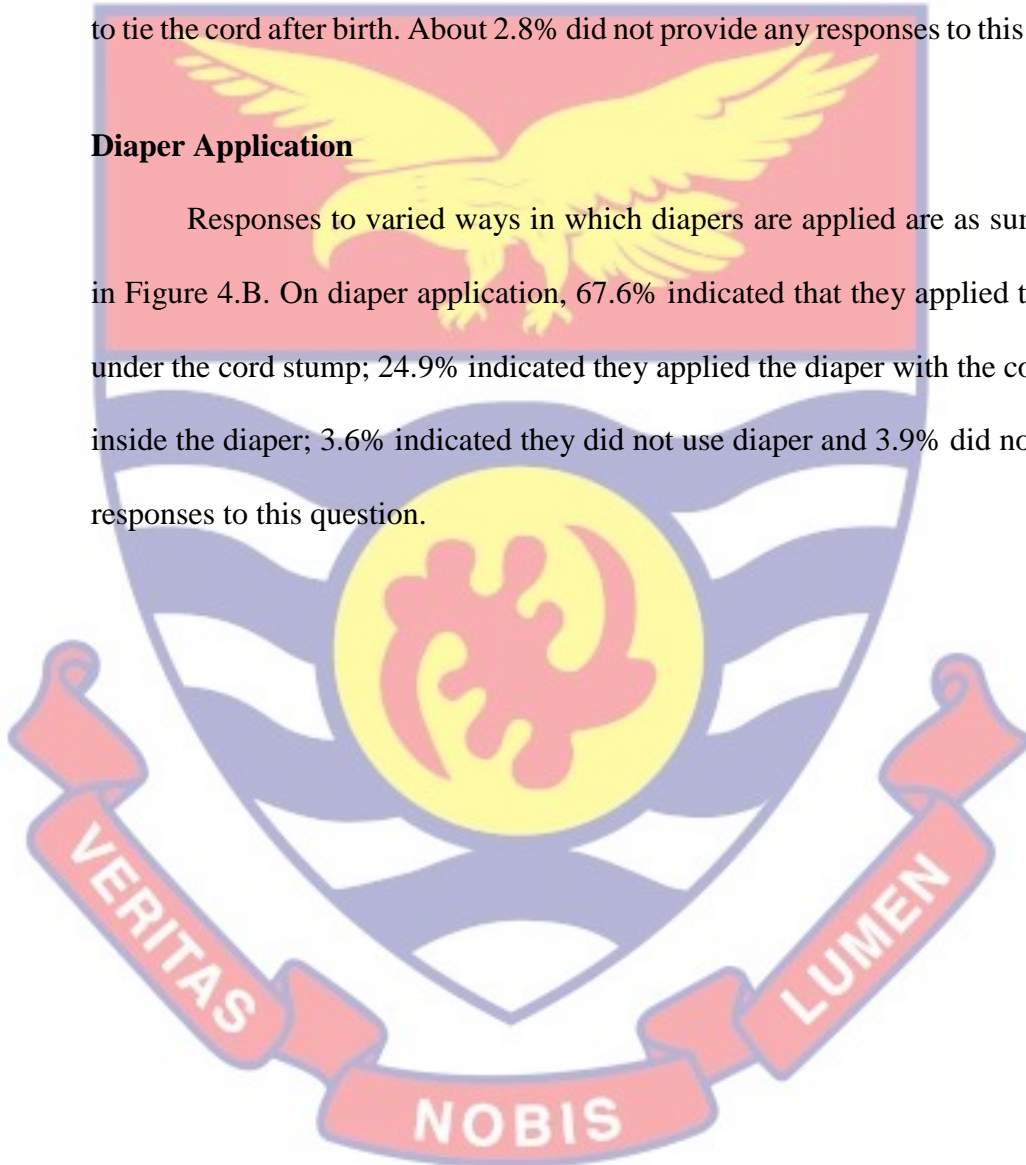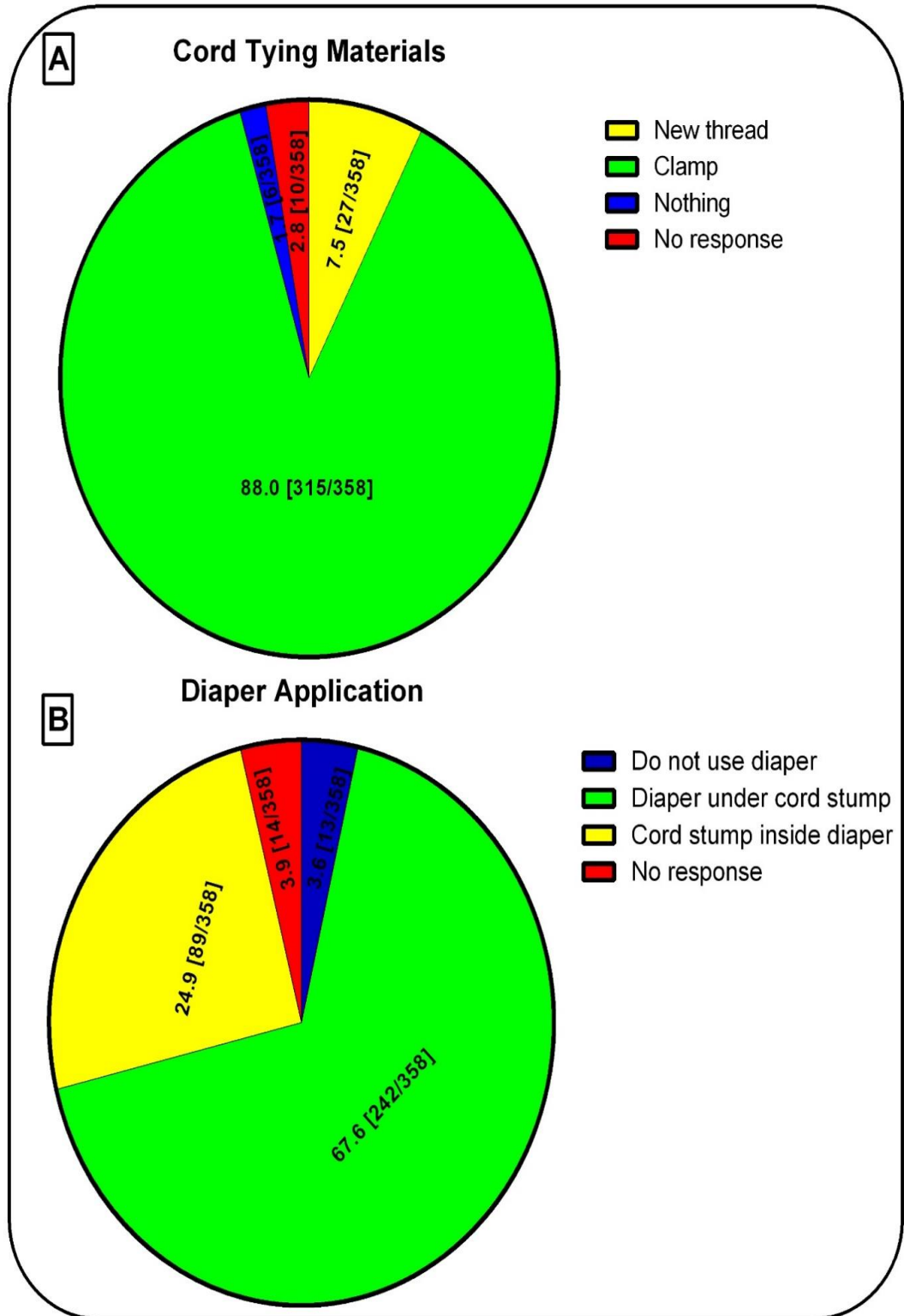
Figure 4: **Materials for umbilical cord tying and diaper application**

Cord Cutting Materials

An assessment of materials which were used for umbilical cord cutting are as shown in Figure 5. It was observed that 47.2% of the respondents indicated that scissors were used to cut the umbilical cord of their babies. A percentage of 26.2 indicated that razor blade was used to cut the umbilical cord with 19.8% claiming they never saw the material which was used to cut the cord of their babies. Only one respondent (0.3%) indicated that a knife was used for the cord cutting and likewise the same proportion indicated that surgical blade was used for the umbilical cord of the baby. Approximately 3.0% claimed they do not know what was used to cut the umbilical cord of the baby with a similar percentage not providing response to this question.
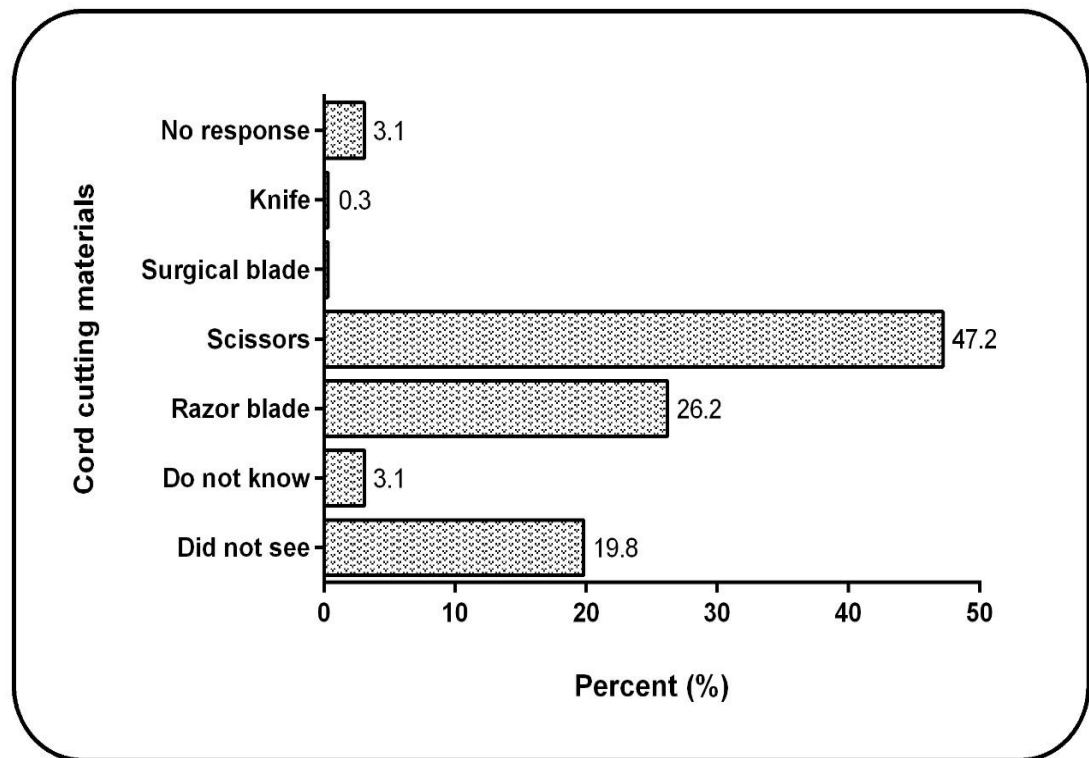
***Figure 5*: Materials used for umbilical cord cutting**

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Topical Agents Applied on the Cord

Details of topical agents that were applied on the umbilical cord of the neonates as recorded from the mothers/caretakers are as shown in Figure 6. Majority 62.8% of the respondents indicated that they applied methylated spirit on the umbilical cord with the application of shea butter being 24.3%. Only 3.1% indicated that chlorhexidine was applied to the umbilical cord, 1.1% claimed they just allowed the umbilical cord to air dry and 0.3% applied other materials such as toothpaste (e.g. pepsodent), hot water, penicillin and Vaseline. For the remaining proportion of respondents, 4.2% reported they do not apply anything to the umbilical cord and 2.5% indicated they do not know what was applied to the umbilical cord of their babies with 0.8% not providing any response to this question.
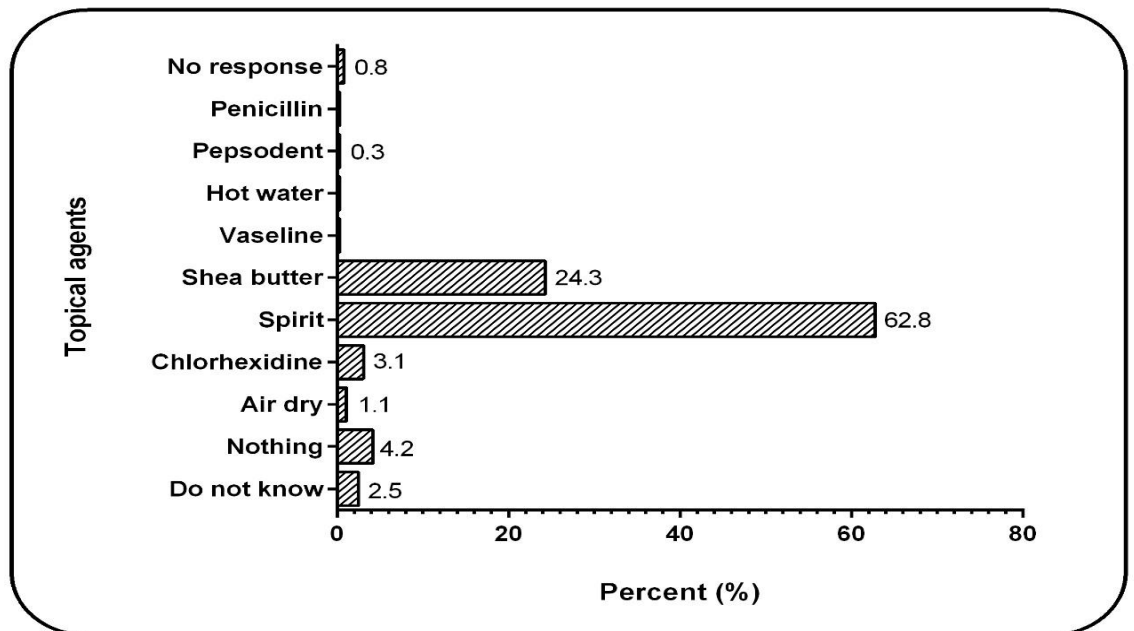
Figure 6: **Topical agents for umbilical cord management**

Influence of Education and Facility of Delivery on Choice of Topical Agents

After analyzing the responses for the use of topical agents by the mothers/caretakers, the study further analyzed the choice of topical agent to apply based on the educational level of the mothers/caretakers and the summary presented in Figure 7.A. It was observed that, irrespective of the educational level of mothers/caretakers, majority of them applied methylated spirit to the umbilical cord followed by Shea butter as the second topical agent of choice. The percentage of mothers/caretakers who have had no education using shea butter as a topical agent for the umbilical cord was more than mothers/caretakers with Primary, JHS, SHS and Tertiary level education.

In Figure7.B, the topical agents applied to the umbilical cord were analyzed based on the place of delivery of the baby as indicated by the mothers/caretakers. Majority of the mothers/caretakers who delivered at home (68.4%) mostly used Shea butter as the topical agent of choice for the umbilical cord with only 21.1% indicating that they used methylated spirit. With the exception of this, the general trend observed was that mothers/caretakers who delivered at Health Centres, Clinics, TTH, TCH, TWH and Other Hospitals mostly used Methylated Spirit as the topical agent of choice for the umbilical cord followed by Shea butter.
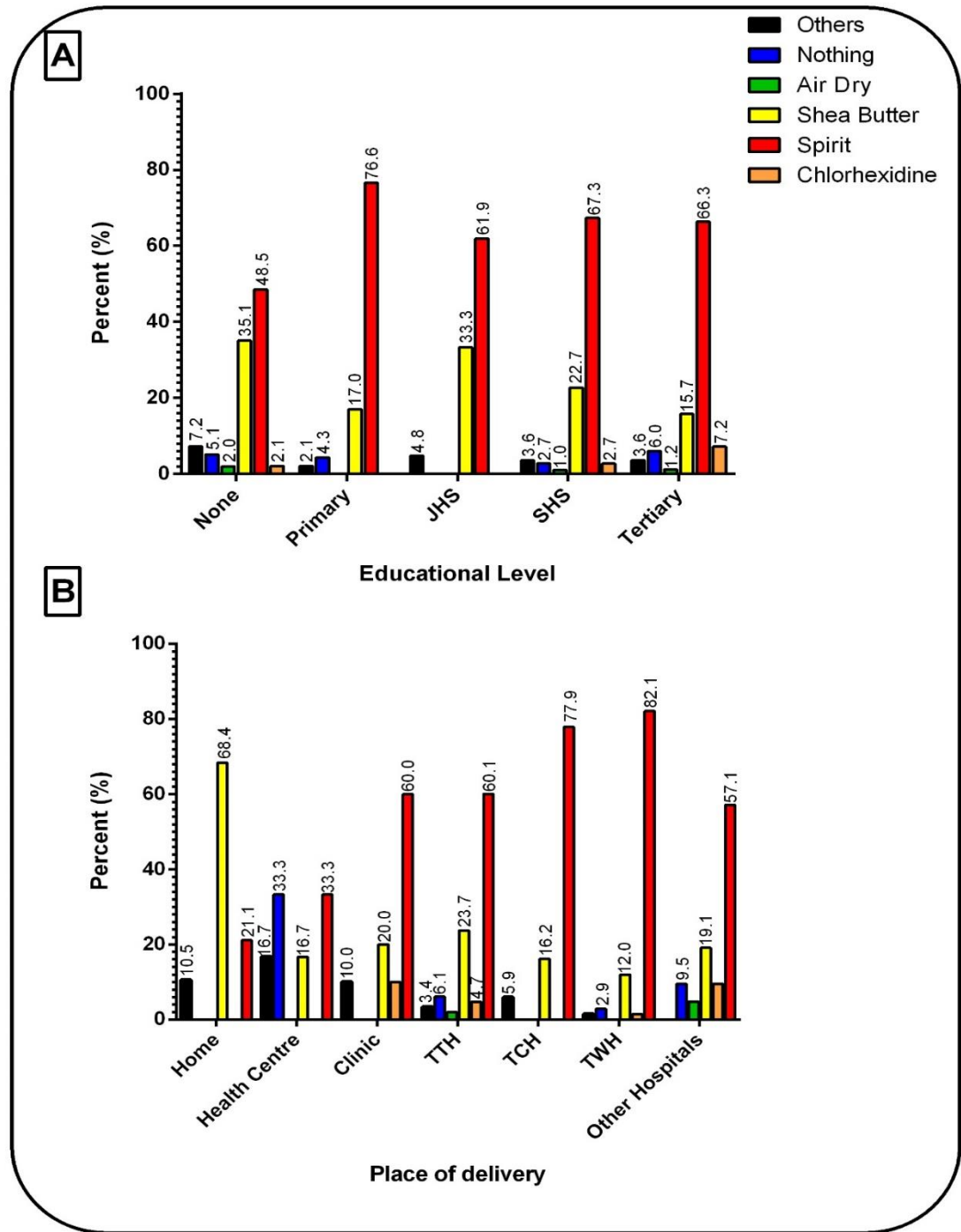
Figure 7: **Analysis of topical agents applied on the umbilical cord based on educational level (7.A) and place of delivery (7.B)**

Recommendations for Topical Agent use

The study further analyzed where mothers/caretakers got recommendation from to use the topical agents being applied on the umbilical cord and the data is as shown in Figure 8. It was observed that a greater percentage of recommendations came from Nurses (37.1%) followed by Midwives (25.1%) and Mothers (12.3%). A percentage of 4.5 of the mothers/caretakers indicated they applied the topical agents as a result of their previous experiences in using that particular agent with 3.4% and 2.8% respectively indicating that the topical agent they used were recommended by the Grandmothers and Mothers-in-law. With the exception of 6.7% who did not provide responses for the questions, the remaining responses for recommendation of topicals from relatives (0.8%), friends (1.1%), seeing people using it (1.4%), traditional birth attendants (1.4%) and doctors (1.7%) were all under 2.0%. A percentage of 1.7 indicated that no one recommended the topicals for them.

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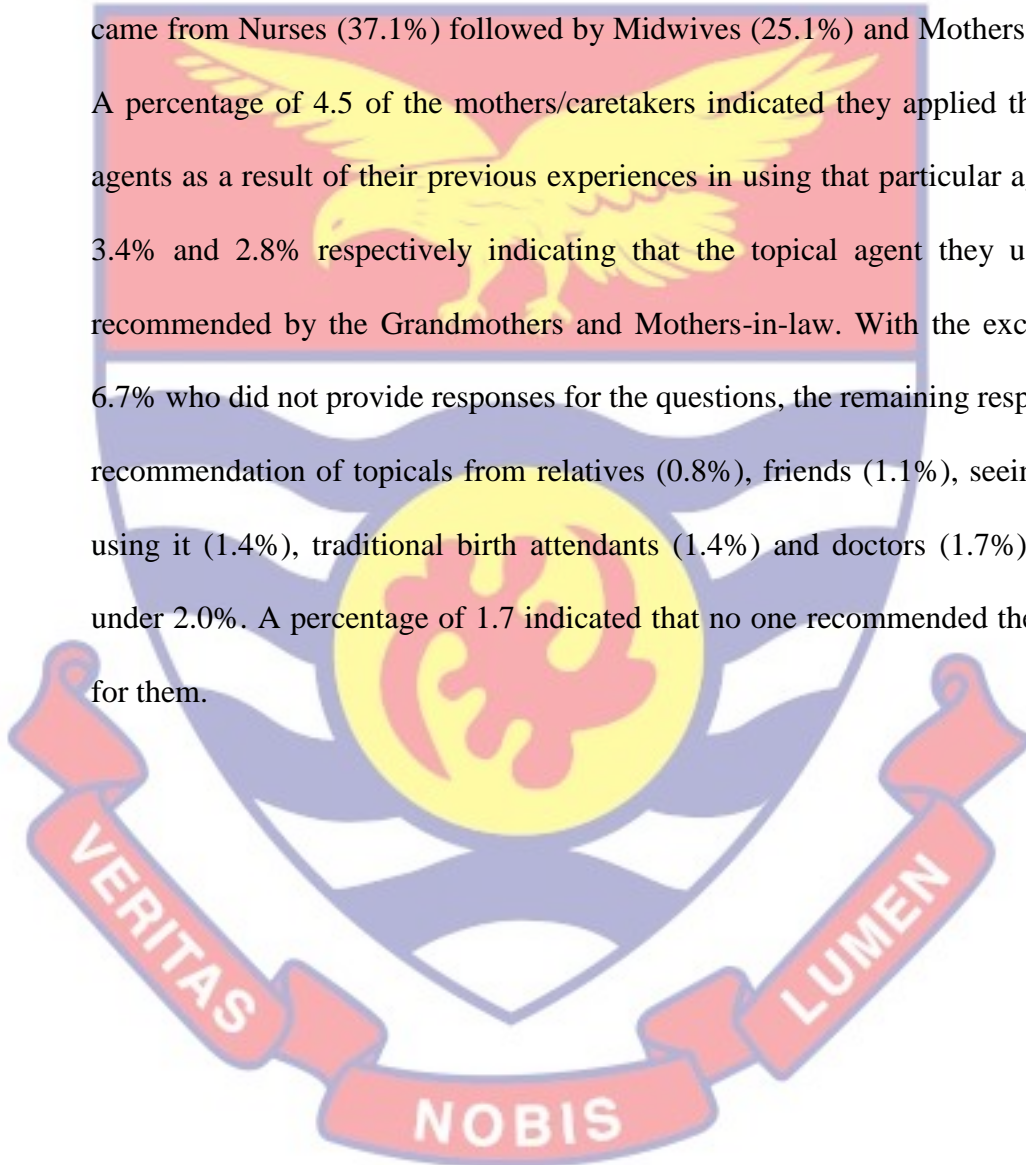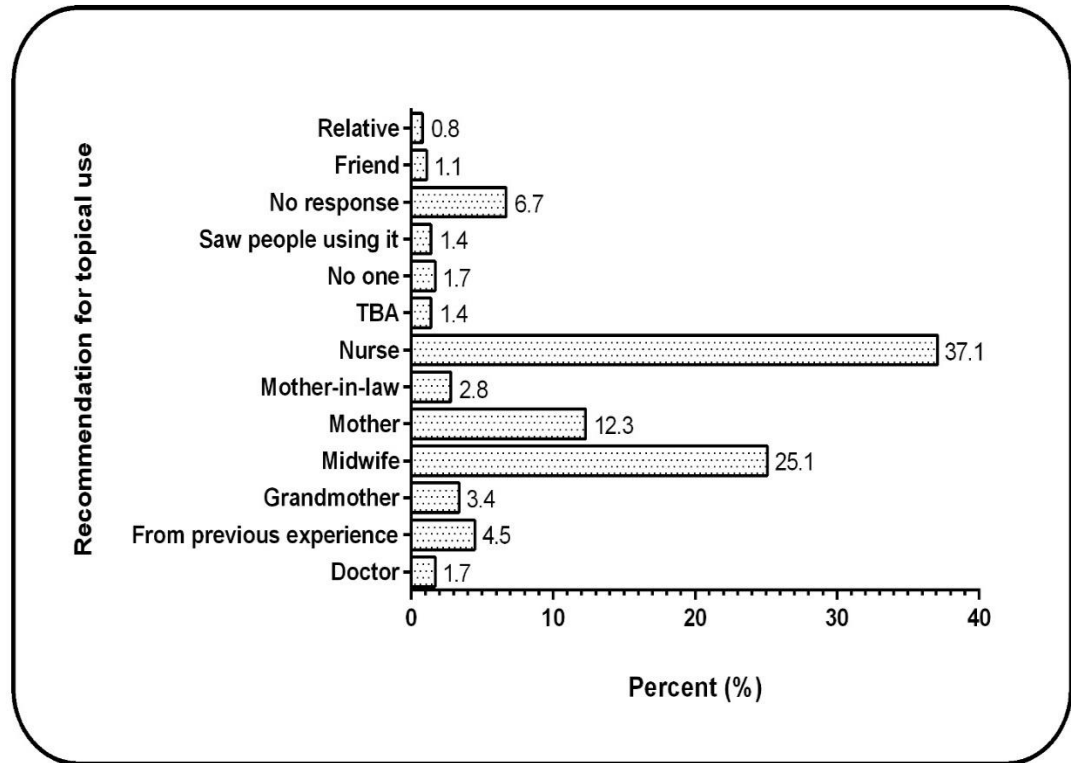
Figure 8: **Recommendations for umbilical topical agent usage**

Reasons for Applying Topicals

Analysis of the reasons why mothers/caretakers accepted the recommended topicals applied to the umbilical cord of their babies are as shown in Figure 9. For the responses gathered, 27.1% applied the recommended topicals in order to '*prevent infection*' of the cord; 19.8% indicated they applied the recommended topical '*for the cord to heal faster*'; 15.3% indicated they '*did not have any reason*' for applying the recommended topical agent; 13.1% indicated they applied the recommended topical agent so that '*the cord will fall off quickly*' and 9.4% applied the recommended topical so as '*to keep the cord dry*'. With 2.0% indicating that they used the topical agent '*because everybody was using it*', 1.7% indicated that they applied the topical agent '*to make the cord moist*' with another 1.7% indicating

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they applied the topical agent because they got '*advice to do so*'. A percentage of 8.7% did not offer responses for this question and 0.3% separately indicated that the topical agent they applied '*was given to them at the hospital*'; they were told it was good for the cord and it will prevent the cord from being wet.
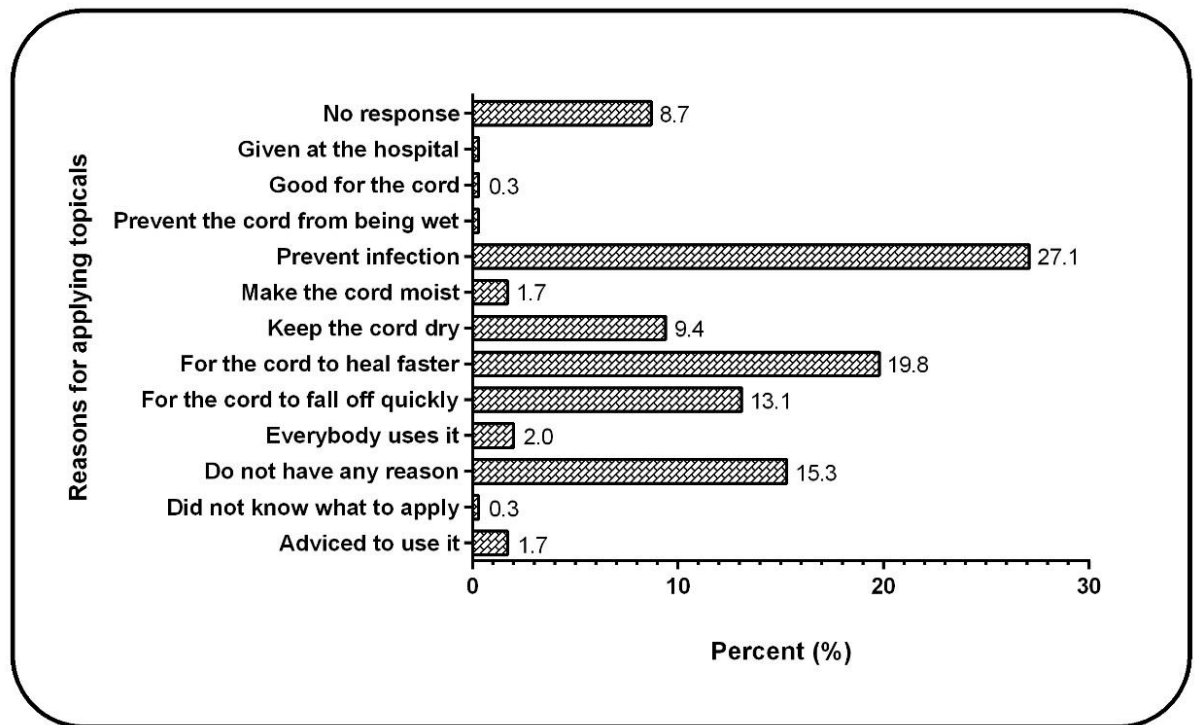
Figure 9: **Reasons for applying topical agents**

Practices Adopted when Umbilical Cord is Soiled

Figure 10 presents a summary of analyses of the practices that mothers/caretakers employed when the umbilical cord is soiled. By ranking the responses, 26.5% of the mothers/caretakers indicated that they cleaned the umbilical cord with baby wipes when soiled followed by 22.3% indicating they cleaned the cord with methylated spirit and 13.7% indicating they cleaned the cord with water only. A percentage of 6.7 indicated they have not experienced cord soiling before; 5.9% indicated they clean with water and dettol; 3.4% indicated

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they applied Shea butter when the cord was soiled; 3.1% indicated they cleaned with only cotton, 2.5% (9/358) indicating they cleaned the cord with Salt water only when soiled with 1.4% indicating they cleaned the cord with cloth when soiled. Responses on chlorhexidine use, tissue use, air drying, cleaning with hot water were all under 1.0%. About 11.7% did not provide responses to the question and 0.8% indicated they do not do anything when the umbilical cord is soiled.
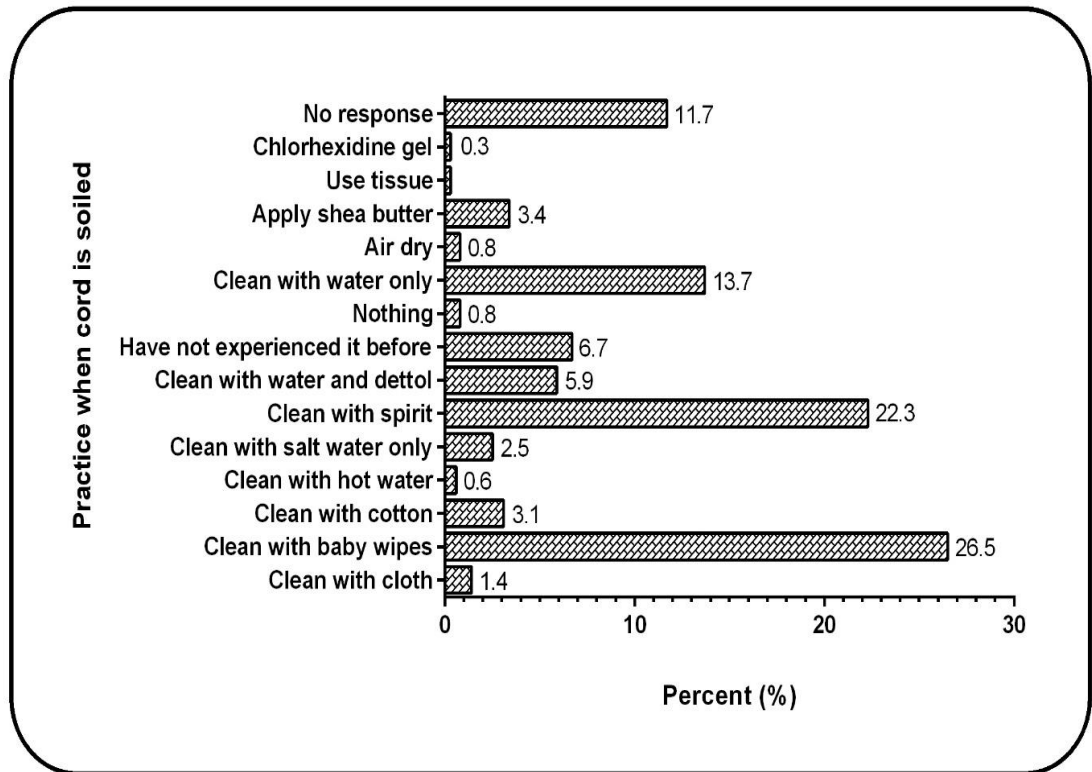
Figure 10: **Adopted practices when umbilical cord is soiled**

Practices as Risk Variables for Umbilical Cord Infection

Table 5 shows a summary of multiple logistic regression assessing neonatal practices and other demographic variables as risk variables for umbilical cord infection. Results are presented for univariate and multivariate analysis of the selected risk variables. In the overall analysis, cord separation time, cord cutting

material, topical applications and diaper applications were the significant variables serving as risk factors for umbilical cord infection. Neonates who had their umbilical cord not separated were 5.7 times (p = 0.0001) at risk of developing cord infection and this increased to 11.7 times (p = 0.0001) in the multivariate analysis. Neonates whose cord were intact for over seven (7) days were 4.4 times (p = 0.003) likely to develop cord infection and this risk increased to 12.3 times (p = 0.0001) in the multivariate analysis. When razor blades were used for cord cutting, there was 2.3 times (p = 0.025) risk of neonatal cord infection and this increased to 2.7 times (p = 0.046) in the multivariate analysis.

For topical applications, mothers/caretakers who applied nothing to the cord had 5.9 times (p = 0.002) risk of developing cord infection and this risk increased to 8 times (p = 0.009) in the multivariate analysis. For mothers/caretakers who applied Shea butter on the umbilical cord, the neonates were at 2.8 times (p = 0.002) of developing cord infection and this risk rose to 3.6 times (p = 0.005). For diaper application, mothers/caretakers who indicated that they kept the cord stump inside the diaper, the neonates were 4 times (p = 0.0001) at risk of developing umbilical cord infection and this observation was still significant in the multivariate analysis with a risk of 3.2 times (p = 0.006). The age of the baby, mother/caretaker education, facility where postnatal service was sought and number of antenatal visits were not significantly associated with umbilical cord infection in the multivariate analysis.

Table 5: Multiple logistic regression of neonatal practices as risk variables for umbilical cord infection

Variables	Univariate		Multivariate	
	cOR(95%CI)	p-value	adjOR(95%C)	p-value
Antenatal visit				
≥8	1			
<8	2.1(1.1 - 3.9)	0.023	1.5(0.6 - 3.3)	0.374
Postnatal Facility				
TTH	1			
MCH	0.3(0.1 - 0.8)	0.009	0.3(0.1 - 1.0)	0.055
TCH	0.2(0.1 - 0.7)	0.009	0.2(0.1 - 0.7)	0.016
TWH	0.9(0.5 - 2.0)	0.957	1.9(0.7 - 5.1)	0.205
Education				
None	0.9(0.4 - 1.9)	0.799	0.5(0.2 - 1.6)	0.271
Primary	0.6(0.2 - 1.7)	0.338	0.4(0.1 - 1.4)	0.150
Junior High School	3.0(1.1 - 8.7)	0.039	2.2(0.5 - 10.4)	0.325
Senior High School	0.7(0.3 - 1.5)	0.319	0.7(0.2 - 2.2)	0.570
Tertiary	1			
Baby age	0.9(0.8 - 0.9)	0.014	0.9(0.9 - 1.0)	0.150
Cord separation				
<7	1			
Not separated	5.7(2.4 - 13.3)	0.0001	11.7(3.7 - 36.7)	0.0001
≥7	4.4(1.6 - 11.7)	0.003	12.3(3.2 - 48.1)	0.0001
Cord cutting material				
Others	2.3(1.1 - 4.8)	0.035	2.6(0.9 - 6.7)	0.058
Do not know	5.1(1.3 - 19.1)	0.016	2.1(0.3 - 13.9)	0.432
Razor blade	2.3(1.1 - 4.6)	0.025	2.7(1.0 - 7.0)	0.046
Scissors	1			
Topical applications				
Others	0.7(0.1 - 5.9)	0.769	0.8(0.1 - 8.9)	0.846
Nothing	5.9(1.9 - 17.9)	0.002	8.0(1.7 - 38.1)	0.009
Air dry	2.9(0.3 - 29.3)	0.361	1.0(0.1 - 19.3)	0.995
Shea butter	2.8(1.5 - 5.4)	0.002	3.6(1.5 - 8.7)	0.005
Chlorhexidine	3.3(0.8 - 13.3)	0.094	4.5(0.8 - 25.9)	0.094
Methylated Spirit	1			
Diaper application				
No diaper	1.6(0.3 - 7.5)	0.657	1.1(0.1 - 8.4)	0.911
Stump inside diaper	4.0(2.2 - 7.3)	0.000	3.2(1.4 - 7.1)	0.006
Diaper under stump	1			

cOR-crude odds ratio; adjOR-adjusted odds ratio; 95%CI-95% confidence interval

DISCUSSION

Countries have the fundamental right to show commitment to enable pregnant women survive natural phenomenon of pregnancy and childbirth as part of the national support to sexual and reproductive health. Tunçalp *et al.* (2015) in a study on quality of care for pregnant women and newborns, reiterated the WHO vision of a world where every pregnant woman and newborn received quality care throughout pregnancy, childbirth and the postnatal period. The postnatal period is noted to be critical to the health and survival of mothers and their newborns because it provides avenues for promoting healthy behaviour which is not limited to but includes appropriate cord care practices. In order to better understand the umbilical cord care practices of mothers/caretakers within the Tamale Metropolis in the Northern Region of Ghana, the varied materials used for cord management and to establish the presence or otherwise of umbilical cord infection (omphalitis), responses were sampled from mothers/caretakers seeking postnatal services at the TTH, TCH, TWH and the RCH for this study**.**

Educational Level and Child Birth

The Ghana Statistical Service and Ghana Health Service (2018) provides data for monitoring maternal health within Ghana and samples responses for three zonal levels for which Northern Region is inclusive. Assessment of the educational level of mothers in this study showed that about 1 in 4 have no education which compares closely to the ratio of 1 in 5 reported in the GMHS report. This shows a fairly increased illiteracy level among the mothers sampled despite the opportunities available for more to pursue education in this modern era.

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Notwithstanding the observed illiteracy rate, a striking improvement was realized in the percentage of mothers/caretakers (23.1%) who had had tertiary education which represents an increased rate compared to the 8% quoted in the Ghana Statistical Service and Ghana Health Service (2018) report. The report further indicated women in rural areas having an average of 4.7 children compared to 3.3 children among women in urban areas and further stated that women with no education have twice as many children than women with more than secondary education (5.5 versus 2.7). Findings from this study showed an average of 2.4 children for the sampled mothers and this can be attributed to the rapid urbanization of the Tamale metropolis and the fact that majority of the mothers/caretakers were educated thereby enabling them to take a decision to control child birth.

Antenatal Care Services

Antenatal care (ANC) services define care provided by skilled healthcare professionals to pregnant women to ensure they get the best health outcomes for both mother and baby during the period of pregnancy. The components of ANC comprise risk identification, prevention and management of pregnancy-related or concurrent diseases and health education and promotion. Carroli *et al.* (2001) indicated that attendance to ANC sessions reduces maternal and perinatal morbidity and mortality directly through detection and treatment of pregnancy-related complications and indirectly through the identification of mothers who were at increased risk of developing complications during labour and delivery thereby ensuring referral to an appropriate level of care. About 94% of the mothers/caretakers sampled for this study sought ANC services before delivery

showing an improved uptake of ANC services which will serve as a rich platform for health promotion and education.

The four (4) postnatal sites (TTH, TCH, TWH & RCH) selected for this study represented the most preferred facilities for mothers/caretakers to seek ANC services with a total of 78% preferring these sites. The WHO published new recommendations on ANC for a positive pregnancy experience outlining a new set of evidence-based global guidelines on recommended content and scheduling for ANC (WHO, 2014). This guideline includes a significant new recommendation that pregnant women have eight contacts with the health system during each pregnancy and replaces the 2002 WHO focused ANC (FANC) model which required four critical contacts with the health system during pregnancy (WHO, 2002). Analyzing the number of ANC visits based on the 2016 WHO recommendations, it was observed that half (50.8%) of the mothers/caretakers actually had ANC visits below the recommended eight contacts with the health system. Since the ANC visits represents the most favourable contact point to get more information about the risks and problems pregnant mothers may encounter during delivery, the observed reduction in ANC visits could serve as a major disincentive to proper education hence resulting in negative health outcomes for pregnant women and newborns. Studies conducted by varied authors have shown that women who had more prenatal visits were more likely to deliver at the health institutions (Nketiah-Amponsah & Sagoe-Moses, 2009; Amano *et al.*, 2012; Mengesha *et al.*, 2013; Feyissa & Genemo, 2014).

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Umbilical Cord Care Practices

The WHO advocates for clean cord care as one of the essential newborn care practices to reduce morbidity and mortality amongst newborn (WHO, 1998; Darmstadt *et al.*, 2005; Kumar *et al.*, 2010). Unclean and unstandardized delivery practices and cutting of the umbilical cord in neonates with unsterile instruments usually contributes to the contamination of the cord and increases the risk of microbial infection (Akani *et al.*, 2004). Studies conducted by Abhulimhen-Iyoha and Ibadin (2012) and Monebenimp *et al.* (2013) in Nigeria and Cameroon revealed unsatisfactory levels of cord care practices among mothers/caretakers with potential increased risk of infection and mortality during the neonatal period.

Cord Cutting Materials

Findings from this study show an increased use of razor blade for cord cutting aside surgical scissors. Further, the use of razor blade for cord cutting was significantly associated with approximately 3 times risk of cord infections. A cursory evaluation of the study data showed that razor blades were the predominant cord cutting materials used by mothers who claimed they had home delivery. There was no way of ascertaining if the razor blades utilized were new and whether they were handled aseptically with the attendant tasked with cord cutting going through proper hand washing processes to avoid contaminating the cutting edges of the razor blade and consequently infecting the umbilical cord. Muriuki *et al.* (2017) reported in their study that most mothers used razor blades for cord cutting when there are no sterile instruments with others affirming that the most common instrument for cutting the cord in the community was just a razor blade or a knife.

The observed risk of infection associated with the use of razor blades calls for a concerted effort to advocate for mothers to seek health care services during pregnancy and child birth.

Topical Agents

Readily accessibility of the right information is considered crucial to practice of any procedure hence umbilical cord care will not be an exception. The WHO advocates for dry umbilical cord care and the application of topical antiseptics in situations where hygienic conditions are poor or infection rates are high (WHO, 2014; Bhatt *et al.*, 2015).

In this study, methylated spirit was the most predominant topical antiseptic applied to the cord followed by shea butter. This findings is in consistent with a study done in the Volta Region of Ghana by Nutor *et al.* (2016) where more than half of the participants (68%) used methylated spirit as the topical agent of choice with other topicals being shea butter, oil and tooth paste. Indeed, it was observed that irrespective of educational status, all the mothers applied either methylated spirit or shea butter on the umbilical cord with mothers who claimed they delivered at home mostly applying shea butter on the cord. All the health care facilities primarily used methylated spirit with shea butter ranking as the second highest topical agent of preference although the WHO recommends dry cord care for institutional births (WHO, 2014). When the mothers were asked how they got information about which topical agent to use, they iterated that it was primarily recommended by Nurses, Midwives and their own mothers which is in agreement with the findings of Nutor *et al.* (2016) who reported that 79% of mothers surveyed

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received recommendation primarily from nurses and midwives. Afolaranmi *et al.* (2018) and Obimbo *et al.* (1999) in separate studies all reported that majority of mothers mentioned the use of methylated spirit as the most appropriate topical agent of choice for cleaning the cord.

The three top reasons given for the use of these noted topical agents were to: '*prevent infection*', '*to enable the cord fall faster*' and the third option being that they '*do not have any reason*'. On analyzing the risk of such topical agents causing cord infections, application of shea butter was associated with a 4 times risk of cord infection and babies of mothers who claimed they did nothing to the cord had 8 times risk of developing cord infection. It is therefore obvious that mothers/caretakers sampled for this study had inadequate knowledge about the standard or the recommended cord care practices as outlined by the GHS and MoH.

Umbilical Cord Management

The range of other substances applied to the cord in this study was: Vaseline, hot water, pepsodent (toothpaste) and penicillin. This is in agreement with a study done in Nigeria by Osuchukwu *et al.* (2017) which reported that a low percentage used of the respondents used 'close up' (tooth paste) to manage the umbilical cord.

Other substances made mention of by mothers for cord care in other studies ranged from hot water, salt and saliva, herbal preparation, tooth paste, ash (Mullany *et al.*, 2009; Abhulimhen-Iyoha *et al.*, 2011; Osuchukwu *et al.*, 2017; Afolaranmi *et al.*, 2018). Respondents had varied reasons for the choice of substances for the management of the cord of which reduction of cord separation time was the main

goal. This is in consonance with Osuchukwu *et al.* (2017) who reported that, the major reason for the choice of material for cord management was to hasten cord separation time and to wade off evil spirits. These reasons might be linked to the traditional believes and cultural orientations of the people (Osuchukwu *et al.*, 2017). A similar report by Okedo *et al.* (2010) stated that, cultural believes and traditional practices influences were the implications for cord care management and separation time. This brings to light the importance of cultural stereotypes as a driver of practice of cord care and more often than not its underestimated subtle contribution to neonatal morbidity and mortality in resource poor settings. Some of the mothers did not apply anything to the cord and this finding is similar to the report of (Sinha *et al.*, 2014) whose study conducted in India revealed that half of the mothers did not apply anything to the cord.

The WHO (2013) recommended the application of daily chlorhexidine (7.1% chlorhexidine digluconate aqueous solution or gel, delivering 4% chlorhexidine) to the umbilical cord stump during the first week of life for newborns delivered at home in settings with neonatal mortality rates of 30 per 1000 live births or higher . Chlorhexidine was therefore expected to replace the use of harmful traditional substances such as the topical applications observed in this study. The use of chlorhexidine in this study was on the low even within the major health care facilities sampled where methylated spirit was the topical agent of choice followed by shea butter. In the Family Health Division (2015) annual report, there was indication of the introduction of 7.1% chlorhexidine digluconate in cord care management as a replacement for methylated spirit which was the predominant

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topical agent being used in Ghana. In a policy brief based on extensive operations research in Ghana, the Ministry of Health (MOH) and Ghana Health Service (GHS) recommended daily application of chlorhexidine digluconate gel (7.1%) to the umbilical cord until the cord falls off and the wound is completely healed (MoH, 2018). By this policy, chlorhexidine was included in the 2017 Ghana essential medicines list and was supposed to replace methylated spirit which has been used for umbilical cord care in Ghana for many years. The low patronage for chlorhexidine within the healthcare facilities and major finding that the use of methylated spirit was recommended ahead of chlorhexidine can be attributed to issues relating to ready availability and supply or the fact that nurses and midwives have not been properly updated on the new WHO protocol for chlorhexidine use which has been adopted by the MOH/GHS and communicated in a policy brief.

Clean dry cord care was again recommended by the WHO for newborns delivered in health facilities. Mothers from this study showed their readiness to use methylated spirit or shea butter whether delivery of their babies occurred in health care facilities or home. This gives ample evidence that even where health care providers recommend certain newborn care practices such as delayed bathing and dry cord care as recommended by WHO, mothers will still resort to alternative practices such as early bathing and the application of substances to the cord due to cultural beliefs surround birth which finding is corroborated by the studies of Waiswa *et al.* (2008) and Moyer *et al.* (2012). The finding from this study that applying nothing on the umbilical cord and the application of shea butter were significantly linked with cord infection is contrary to the reports of Howard (2001),

Janssen *et al.* (2003), Shafique *et al.* (2006) and Dore *et al.* (1998) who in separate studies compared treatment versus non-treatment of the cord and concluded that there was no demonstration of increased incidence of infection when the umbilical cord was left untreated.

Omphalitis and Cord Separation Time

Omphalitis is an infection of the umbilicus or its surrounding tissues and typically occurs in the neonatal period. If allowed to persist, omphalitis becomes a true medical emergency which can progress to systemic infection and result in death with estimates of mortality being quoted to be between 7% to 15%. To avert morbidity and mortality of neonates, early recognition and treatment of omphalitis is essential. The incidence in neonates delivered in hospitals in developing countries can approach 8% (Sawardekar, 2004) and if born at home could rise as high as 22% (Mir *et al.*, 2011).

In this study, the presence of signs such as redness, swelling, pus and bad or foul smell was used as a proxy to infer infection of the cord similar to definitions adopted by El Arifeen *et al.* (2012) and Soofi *et al.* (2012) and mothers with babies who were found with such signs were advised to seek medical attention. The prevalence of omphalitis in this study was estimated to be 15.4% and represents babies born in health facilities and at home. An average of the incidence rates as quoted by Sawardekar (2004) and Mir *et al.* (2011) representing home and hospital delivery gives an incidence of 15.0% which compares well to the prevalence estimated from this study. The risk factors for omphalitis as stated by Mir *et al.* (2011) and Sawardekar (2004) included: low birth weight, home delivery, improper

cord care, non-sterile delivery etc. while the risk factors for omphalitis from this study comprised: delayed cord separation, cord cutting material, topical agents applied and placement of cord stump inside a diaper.

The mean cord separation time of 5.8 (±2.6) days observed in this study was slightly higher than the mean value of 4.2 day reported by Mukhtar-Yola *et al.* (2011) in Kano and lower than the 8.7 days reported by Oladokun *et al.* (2005) in Ilorin. Though longer cord separation time in this study was associated with increased risk of omphalitis, studies in developed countries reported longer but safer time of cord separation depending on the care provided (Mullany *et al.*, 2003; Pomeranz, 2004; Imdad *et al.*, 2013) with observed mean cord separation time of 10 days. Other studies have reported mean cord separation times of 7 days (McConnell *et al.*, 2004; Mir *et al.*, 2011). Though it is plausible to suggest that the shorter cord separation time in this study may be attributable to the choice of topicals being used by mothers, it could also be said that for babies with delayed cord separation times, unhygienic processes would be the main routes to cord infection. Mullany *et al.* (2006b) reported that cord care practices were significantly related to time of cord separation supporting the assertion delayed cord separation offers an avenue for mothers to adapt to unhygienic cord care practices in a quest to aid faster separation which might place the newborn at risk of developing omphalitis.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter describes the main findings and the conclusion of the study. It also offers some recommendations that is essential for implementation for improved neonatal care within Tamale metropolis and in Ghana at large while outlining the areas of future research that would serve as a point of reference for other studies for both academic and policy makers.

The new born undergoes series of activities after birth including care of the umbilical cord which is usually handled by mothers/caretakers after delivery either at home or within the health facility. The lack of proper care and know-how can lead to infection of the cord with resultant sepsis and mortality. Good cord care practices are therefore necessary and a prerequisite for the prevention of infection and the reduction of neonatal sepsis and mortality. Most studies within West Africa reports of poor cord care practices (Abhulimhen-Iyoha &Ibadin, 2012; Monebenimp *et al.*, 2013). The World Health Organization recommended dry cord in areas of low neonatal mortality rate and the application of chlorhexidine 4% in areas of high neonatal mortality rate. In Ghana, the Ministry of Health had adopted daily application of 7% chlorhexidine ointment for newborn umbilical cord care with the hope to further reduce the mortality rate in the country.

The purpose of this study was to assess the umbilical cord care practices among mothers/caretakers with neonates in the Tamale metropolis with the following research questions:

1. What are the umbilical cord care practices adopted by mothers/caretakers with neonates in the Tamale metropolis?

2. What are the common clinical signs of omphalitis among the neonates in the Tamale metropolis?

3. What are the various materials used by mothers/caretakers for cord care?

Conclusions

The study observed that majority of the mothers were within the desirable reproductive age group of 25 – 33 years with most of them seeking ANC services before delivery. Majority of the mothers had the less than eight ANC visits as per the WHO recommendations. With an illiteracy rate of 1:4 being observed among the mothers, there is a need to vary the modes in which information is given in order to ensure that all mothers get fair understanding of the newborn care practices. A higher preterm rate (24.9%) was observed and coupled with that a high prevalence of low birth weight. Farming as an occupation and delivery through Caesarean section were significant risk variables for low birth weight. Mothers who delivered at home used razor blade for cord cutting. Methylated spirit was the topical agent of choice for treating the umbilical cord followed by shea butter and did not matter whether the delivery was conducted at a health facility or at home. Chlorhexidine use was on the low (3.1%) despite the MOH/GHS policy recommending its use. The mean cord separation time was 5 days which shows improved separation time given the fact that delayed separation was significantly associated with umbilical cord infections in this study. The prevalence of cord infections (omphalitis) was 15.4% with associated risk factors being delayed cord separation, cord cutting

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material, shea butter as a topical agent and placement of the cord stump inside the diaper.

Study Implications

Nursing Practice

1. About 94% of the mothers/caretakers sampled for this study sought antenatal services before delivery showing evidence that majority of pregnant women seek ANC services. This serves as a rich platform for educating the pregnant women on the need for proper umbilical cord handling and care since it is not part of the subjects mostly spoken about during antenatal attendance. This is to discourage mothers/caretakers of any wrong practices they have already adopted.

2. Nurse administrators, Chief Nursing Officers and Principal Midwives as well as the Unit Heads of Nursing should adopt innovative strategies such as demonstrations, teaching in the local language, short videos or documentaries in communicating and disseminating good cord care practices at ANC and postnatal sessions given the illiteracy rate observed in order to ensure that all mothers attain equal understanding of newborn care practices.

3. About half the mothers sampled for the study had less than eight (8) ANC visits with the health system based on the newly proposed guidelines of the WHO. With the observation of a high patronage for ANC services by mothers, nurses/midwives can take advantage of such platform to create awareness on the need of pregnant mothers to adhere to required scheduled

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ANC visits. This will provide a favourable contact point to offer information about the risks and problems encountered by pregnant mothers during delivery.

Nursing Education

1. The use of razor blade for cord cutting was associated with a significant risk for cord infection and this practice was predominant in mothers who delivered at home. This finding offers an avenue for nurses/midwives to educate pregnant mothers on the need for early health seeking behaviours in healthcare facilities and steps for going through hygienic and sterile processes where razor blades are being used.

2. The study observed a high prevalence of low birth weight which was associated with mothers whose primary occupation was farming and those with lower that eight ANC visits. This finding will help nurses/midwives to provide more focused and targeted education to pregnant mothers who fall in this category.

Nursing Research

1. The use of chlorhexidine was low within the healthcare facilities with methylated spirit being recommended ahead of chlorhexidine for the mothers by the nurses/midwives. With the Ghana Health Service and the Ministry of Health recommending the daily application of chlorhexidine digluconate, it is imperative that further research is conducted to elucidate the factors mitigating against the use of chlorhexidine.

2. The application of shea butter as a topical agent was associated with a high risk for cord infection. As a widespread practice, it will be insightful if further research can be conducted to ascertain the nature and quality of the shea butter as a medium for cord infection in neonates.

Recommendations

Policy makers

1. Hospital authorities should intensify the training on the adopted policy of chlorhexidine to healthcare workers so this can be transferred appropriately to mothers.

2. Grandmothers play a very important role in newborn care of neonates and as such should be a target group for health education to improve newborn care practices within the catchment area by the Ghana health service.

3. The Ministry of Health and the Ghana Health Service should actively engage doctors in the policy training on newborn care practices.

4. The ministry of health and the Ghana health service should incorporate the approved cord care practices to the components of antenatal services.

5. There should be a review of the nurses and midwifery curriculum to encompass umbilical cord hygiene as part of the education rendered to pregnant women at the antenatal level.

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APPENDIX

Appendix A: QUESTIONNAIRE

TOPIC: *Cord care practices among mothers/caretakers with neonates within the Tamale metropolis*

INSTRUCTIONS

We humbly request you to make time to fill this questionnaire as correctly and completely as possible.

- *Do not write respondent's name on the questionnaire*
- *For questions with options to choose from, please respond with a tick [√] for appropriate answers*
- *Where responses are being provided for 'others', please be brief*

Hospital: Serial No:

…………………………………………………. …………………………
.   …

A. DEMOGRAPHIC DATA: MOTHER/CARE TAKER

1. Age (years): …………

2. Marital Status: [ ] Single   [ ] Married   [ ] Cohabiting   Others (specify)……………

3. Educational Level: [ ] None   [ ] Primary   [ ] Secondary   [ ] Tertiary

4. Religion: [ ] Christian   [ ] Muslim   [ ] Traditional   Others (specify) ……………..

5. Employment: [ ] Yes   [ ] No

6. Occupation: ……………………………………………………………………………………

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B. SPOUSAL INFORMATION

1. Age (years):
   …………

2. Marital Status: [ ] Single   [ ] Married   [ ] Cohabiting   Others
   (specify)……………

3. Educational Level: [ ] None   [ ] Primary   [ ] Secondary   [ ]
   Tertiary

4. Religion: [ ] Christian   [ ] Muslim   [ ] Traditional   Others (specify)
   ………………

5. Employment: [ ] Yes   [ ] No

6. Occupation:
   ………………………………………………………………………………………

C. OBSTETRIC REPORT

1. Where did you attend ANC? [ ] West Hospital   [ ] Central Hospital
   [ ] Teaching Hosp.

   [ ] Maternal & Child Health   Others (specify):
   ……………………………………..

2. How many children do you have? ………………………….

3. Did you attend antenatal clinic before? [ ] Yes   [ ] No

4. Number of ANC visits: …………………….

5. How long did you carry the pregnancy (Gestational weeks)? …………………….

6. How long did the labour last (Duration of Labour):
   …………………….

7. Mode of delivery: [ ] SVD   [ ] Caesarean

8. Place of delivery: [ ] West Hospital   [ ] Central Hospital   [ ] Teaching
   Hospital [ ] Home   Others (specify): ……………………………

D. BABY'S REPORT

1. Age (days): …………………..

2. Sex: [   ] Male   [   ] Female

3. What is the baby's birth weight (kg): …………

4. When did the baby cry at birth: [   ] Immediately   [   ] ≤ 5 minutes   [   ] > 5 minutes

5. When did you initiate breastfeeding after birth: [   ] ≤ 1 hour   [   ] > 1 hour

    Others (*specify*):
    …………………………………………………………………………………….

6. Has the baby experienced any of the following health problems since delivery?
    [   ] Nappy rash   [   ] Generalized rash   [   ] None
    Others (specify):
    …………………………………………………………………………………….

E. CORD ASSESSMENT

1. Has the baby's umbilical cord ever appeared in the following manner?
    [   ] Reddened   [   ] Swollen   [   ] Pus   [   ] Bad or foul smell   [   ] None

2. How long did the umbilical cord stump take to fall of? ……………………

3. Status of the umbilical cord (*researcher's assessment*)
    ……………………………………………………………………………………

4. Action taken (*if any*):
    ……………………………………………………………………………………..

F. PRACTICE

1. When do you wash your hands?
    [   ] whenever I attend to the baby   [   ] when I am going to eat
    [   ] after I visit the toilet   [   ] whenever I put on diaper for the baby
    Others (*specify*): …………………………………………………………………….

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2. How do you wash your hands?

   [   ] with soap and running water   [   ] with only water in a bowl

   Others (*describe*): …………………………………………………………………………..

   …………………………………………………………………………………………………

3. What do you think should be used to tie your baby's cord? [   ] Clamp

   [   ] A new thread

   Others (specify): ………………………………………………………………………………..

4. What was used to tie your baby's cord? [   ] Clamp   [   ] A new thread

   Others (specify): …………………………………………………………………………………

5. What was used to cut the baby's umbilical cord? [   ] Scissors   [   ] Razor blade

   [   ] Knife   Others (specify): …………………………………………………………………

6. What do you apply on the baby's umbilical stump? [   ] Nothing   [   ] Spirit

   [   ] Air dry

   [   ] Chlorhexidine   [   ] Shea butter   Others (specify): …………………………

7. Why did you apply it to the umbilical cord? …………………………………………………

   ……………………………………………………………………………………………………

8. Who recommended it to you? ……………………………………………………………………

   ……………………………………………………………………………………………………

9. What do you do when the umbilical cord is soiled?

   [   ] clean the cord with only water   [   ] clean with normal saline only

   [   ] clean with salt water only   [   ] wash with water and Dettol or antiseptics

   Others (*specify*): ……………………………………………………………………………….

   ……………………………………………………………………………………………………

10. How do you apply diaper (pampers)/nappy on the baby?

[   ] wrap the diaper with the stump inside the diaper

[   ] put the diaper under the cord stump

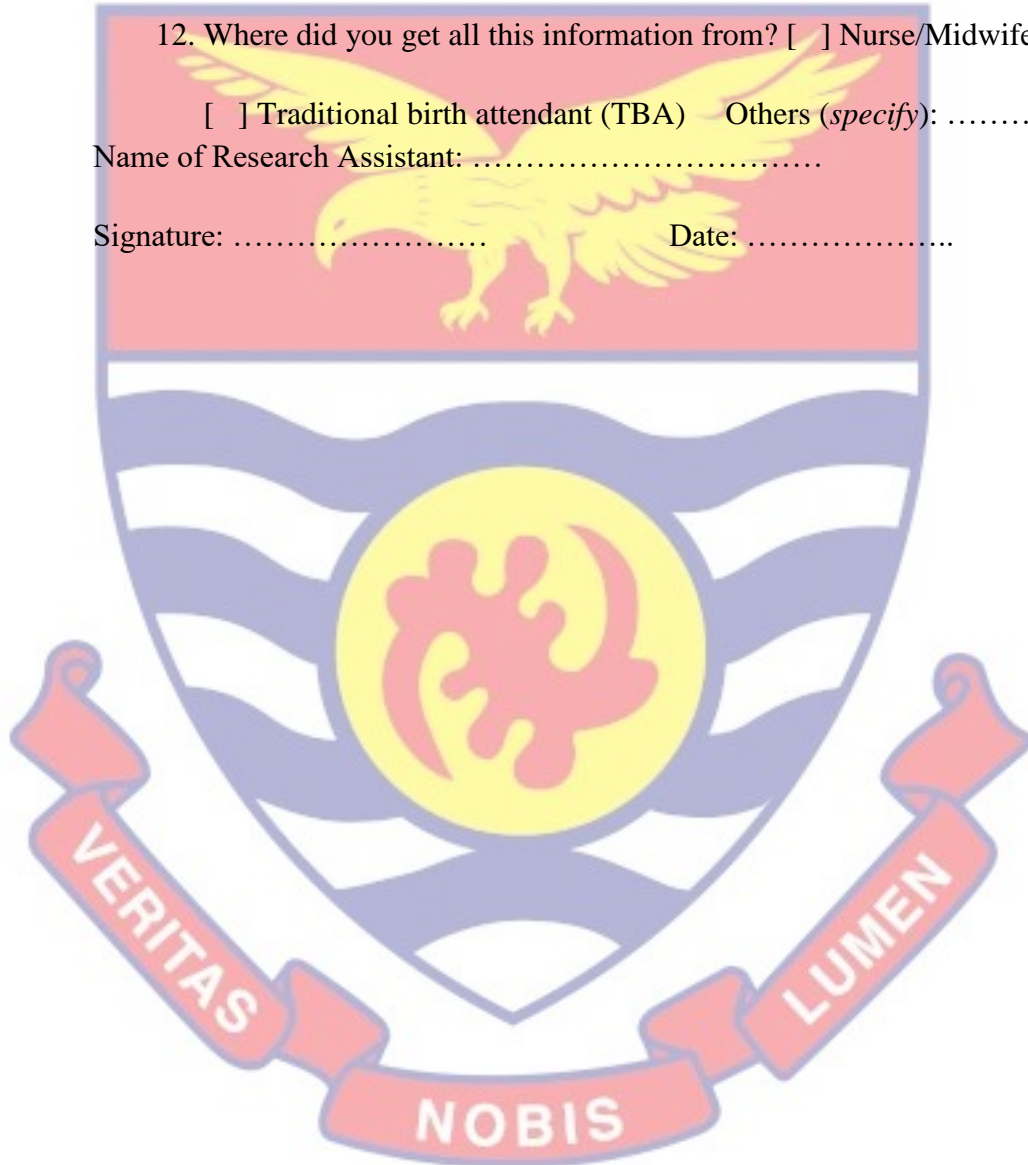Others (*specify*): ………………………………………………………………

11. Do you always stay with the baby in the same room? [   ] Yes   [   ] No

12. Where did you get all this information from? [   ] Nurse/Midwife   [   ] Mother

[   ] Traditional birth attendant (TBA)   Others (*specify*): …………………………

Name of Research Assistant: …………………………

Signature: ……………………   Date: ………………..

APPENDIX B
INFORMED CONSENT FORM

Title of study: cord care practices among parents with neonates within the tamale metropolis.

Principal investigator: Efua Yeboah Quaye.

Address: Tamale teaching hospital post office box 16, Tamale. N/R

Email: efuaquaye@gmail.com

General Information about Research

The research is being undertaken for Masters in Nursing at the University of Cape Coast. It is purely for academic purposes. This study is being conducted to assess the umbilical cord care practices among mothers/care takers and the determinants of umbilical cord infection among neonates in the Tamale Metropolis. The motivation for the study is that the researcher seeks to establish the influence of umbilical cord care practices of mothers/caretakers on the infection of the cord stump among neonates.

Procedures

To find answers to some of these questions, we invite you to take part in this research project within a period of two months that is from January to February in the Tamale Metropolis. If you accept, you will be required to answer a questionnaire which will be provided by the researcher and the research assistants and will be collected by the researcher and the research assistants. You have been invited to take part because you delivered your baby in one of the selected hospitals in which the project is being carried out or because your child is on admission at the neonatal intensive care unit playing your role as a nursing mother/caretaker. I humbly request twenty (20) minutes of your time to answer this questionnaire. It is my hope that you will consider this as your contribution to nursing profession in the quest to expand nursing knowledge. The information that will be gathered will be considered confidential, no one will be allowed to get access to it apart from the researcher, her supervisor and the research assistants.

Possible Risks and Discomforts

I do not envisage any risk associated with this project to you or your baby since it is not an experimental research. However, the discomfort will be your extra time I would need for you to complete the questionnaire and the discomfort to the baby as a result of your attention from the baby to the researcher when answering the questionnaire.

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Possible Benefits

The purpose of this research is to assess the consistency of umbilical cord care practices of mothers/caretakers to established standard of care recommended by the Ghana Health Service and WHO. This research will help us gain greater insight into the various ways people care for the new-born umbilical cord and the different substances that are used to clean the umbilical cord stump. This information will be made available to all health care providers to abreast themselves with umbilical cord care practices by mothers/caretakers which will help improve quality of care. The result will be given to Ghana Health Service and the Ministry of Health to improve policies on umbilical cord care in Ghana.

Confidentiality

All the information that will be provided in this study would be treated with the utmost confidentiality. Respondents names are not required, and only the research assistants and I are privy to the handling of the questionnaires. Also, your name will not be mentioned in any of the reports that would be generated from this research.

Voluntary Participation and Right to Leave the Research

Please note that your participation in this study is purely voluntary and you have the liberty to decline in participation if you wish to do so.

volunteer agreement

The above document describing the benefits, risks and procedures for the research title (name of research) has been read and explained to me. I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree to participate as a volunteer.

_____
_____

Date   Name and signature
or mark of volunteer

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If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

_____

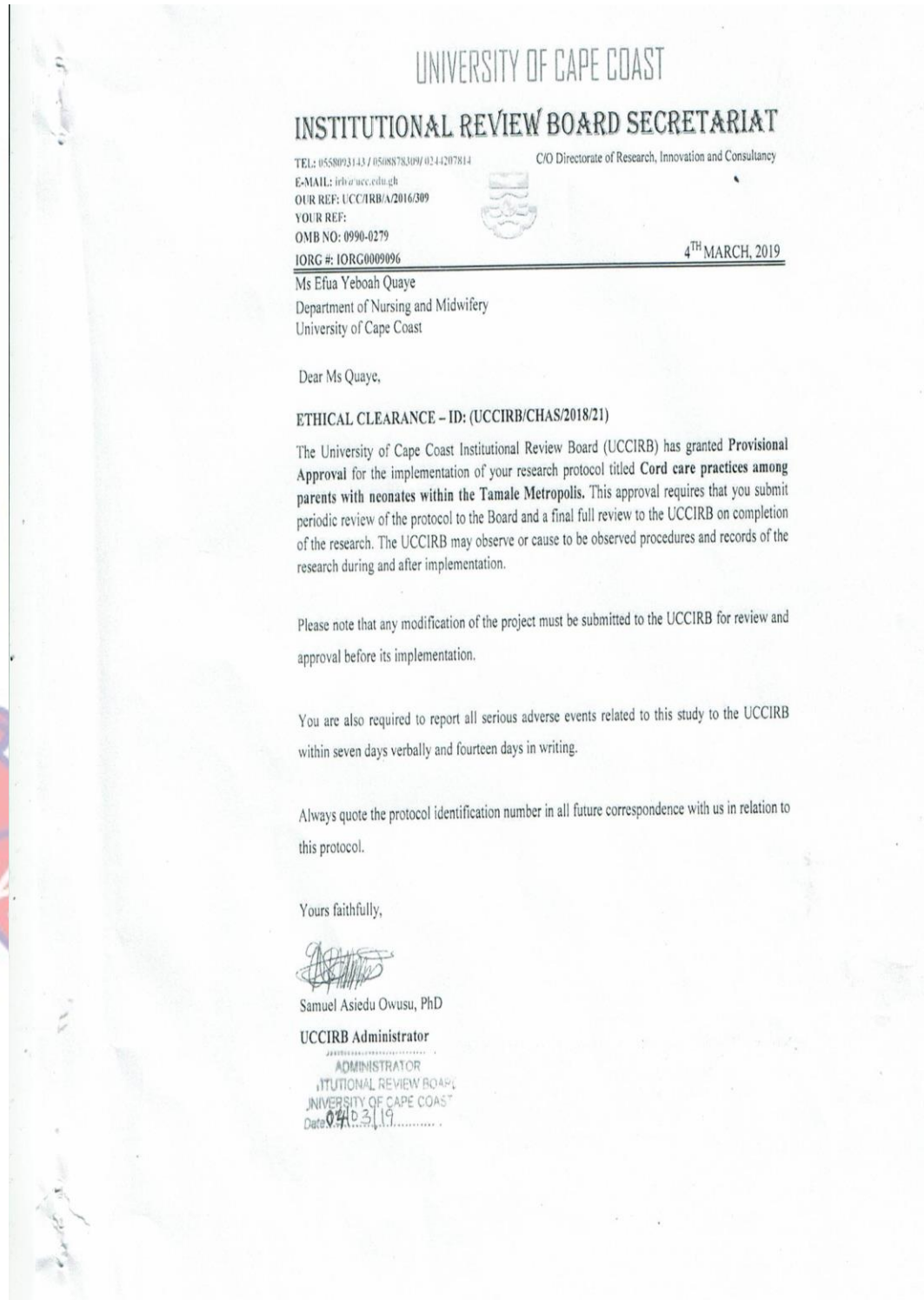   Date   Name and
signature of witness

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____

_____

       Date   Name Signature of Person Who
Obtained Consent

APPENDIX C
ETHICAL CLEARANCE- UNIVERSITY OF CAPE COAST

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0508878309/ 0244207814   C/O Directorate of Research, Innovation and Consultancy
E-MAIL: irb@ucc.edu.gh
OUR REF: UCC/IRB/A/2016/309
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0009096   4TH MARCH, 2019

Ms Efua Yeboah Quaye
Department of Nursing and Midwifery
University of Cape Coast

Dear Ms Quaye,

ETHICAL CLEARANCE – ID: (UCCIRB/CHAS/2018/21)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted **Provisional Approval** for the implementation of your research protocol titled **Cord care practices among parents with neonates within the Tamale Metropolis.** This approval requires that you submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

Please note that any modification of the project must be submitted to the UCCIRB for review and approval before its implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu, PhD

UCCIRB Administrator
ADMINISTRATOR
ITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST
Date 04/03/19

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APPENDIX D
ETHICAL CLEARANCE- GHANA HEALTH SERVICE

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the
number and date of this
Letter should be quoted.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
GPS Address: GA-050-3303
Tel: +233-302-681109
Fax | 233-302-685424
Email: ghserc@gmail.com
24th June, 2019

MvRef. GHS/RDD/ERC/Admin/App/19/75
Your Ref. No.

Efua Yeboah Quaye
University of Cape Coast
College of Nursing and Midwifery

GHS-ERC Number	GHS-ERC062/03/19
Project Title	Cord Care Practices Among Mother/Caretakers With Neonates Within The Tamale Metropolis
Approval Date	24th June, 2019
Expiry Date	23rd June, 2020
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)

- Renewal of ethical approval if the study lasts for more than 12 months,

- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.

- Submission of a final report after completion of the study

- Informing ERC if study cannot be implemented or is discontinued and reasons why

- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED...

DR. CYNTHIA BANNERMAN
(GHS-ERCCHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

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