



UNIVERSITY of
RWANDA

**MOTHERS' KNOWLEDGE AND PRACTICE REGARDING
NEONATAL HYPOTHERMIA AT A SELECTED PROVINCIAL
HOSPITAL IN RWANDA**

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School of Nursing and Midwifery

Master of Nursing Sciences

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**A dissertation submitted in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE IN NURSING
In the College of Medicine and Health Sciences**

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August 2019.

DECLARATION

I declare that this Dissertation contains my own work except where specifically acknowledged.

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Date:

DEDICATION

To the Almighty God, my heavenly father, savior and protector

To Claudine NSHUTIYUKURI and MUTOKA Family for their support and encouragement,

To my lovely children Lætitia, Eugène, Théophile, Placide, Samuel, Domina, Jeanne, Alice, Dieudonné and Hertier.

To my relatives and my neighbors,

To my lecturers, my colleagues, my friends and fellow classmates.

AKNOWLEDGEMENT

I glorify the ALMIGHTY GOD for his guidance along my daily activities including studies. Gratefulness to the Republic of RWANDA, to all persons who have contributed directly or indirectly to my learning process especially my lecturers.

May the academic administration met here my deep honor in regard to the provided master study through his fee waiver, Rwamagana Campus authorities notably our campus manager sister Epiphany MUKABARANGA and the Head of department, Mr. Sylvestre GASURIRA for their support and encouragement. Also I express thank my work colleagues for the heavy workload related to our absence at job.

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ABSTRACT

Background: World health organization (WHO) considers neonatal hypothermia as a decrease of axillary temperature in infant which is below thirty point five degree Celsius. Hypothermia in neonate is a big problem as it contributes globally to newborn mortality and morbidity. Mothers as nearest caregivers of neonate are supposed to recognize danger signs that affect the newborn baby including hypothermia which is one of them in order to apply best practices regarding neonatal hypothermia prevention.

The Aim of this study: The aim of the current study was to assess mothers' knowledge and practice regarding neonatal hypothermia at a selected provincial hospital in Rwanda.

Specific objectives: The specific objectives were (1) To determine the level of the knowledge of mothers regarding neonatal hypothermia at a provincial hospital, (2) To describe the level of practice of mothers regarding neonatal hypothermia prevention at a provincial hospital, (3) To establish an association between knowledge, practice and social demographic characteristics regarding neonatal hypothermia at the selected provincial hospital.

Methodology: A quantitative cross sectional descriptive study was used. 161 mothers of living babies was selected using convenience sampling strategy. An adopted and modified closed ended questionnaire was used to collect data. A pilot study was done on 20 mothers having the same characteristics as the target population to test the accuracy of the questionnaire. Data were cleaned, coded and entered into the statistical package for social sciences (SPSS) version 21. Descriptive and inferential statistics were used to analyze data.

Results: Results shown that among the 161 mothers 97 of them (60.2%) had inadequate knowledge about neonatal hypothermia, whereas the remaining (39.8%) have an adequate knowledge. Regarding practice, only 42 of 161 mothers (26.1%) had good practice.

Conclusion: The overall study shown that mother's knowledge and practice regarding neonatal hypothermia are still low. There is a need to assess promptly the knowledge and practice among mothers in terms of hypothermia to decrease subsequent death related to neonatal hypothermia.

KEYWORDS

Knowledge, Practice, Mothers, Neonatal Hypothermia.

LIST OF ACRONYMS AND ABBREVIATIONS

WHO:	World Health Organization
LMIC:	Low and Middle Income Countries
CNS:	Central Nervous System
C/S:	Caesarean Section
KMC:	Kangourou Mother Care
SDG :	Sustainable Development Goal
MDG:	Millenium Development Goal
CHW:	Community Health Workers
NICU:	Neonatal Intensive Care
NE:	Necrotizing Enter colitis
°C:	Degree Celsius
UNICEF:	United Nations Children's Fund
UN:	United Nations
NISR :	National Institute of Statistics Rwanda
IRB:	Institutional Review Board

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CHAPTER ONE: INTRODUCTION

1.1. INTRODUCTION

Hypothermia in neonate can occur at any time and is a crucial threat for newborn survival in neonatal period which is the period from zero day up to 28 days of life (Boundy *et al.*, 2016). Its incidence is higher in a period less than 24 hours of birth and babies are more likely to die due to hypothermia as the neonate has at that moment to deal with the extrinsic thermal variations that contrast evidently the intra uterine area (Qazi, Saqib and Raina, 2019a).

Therefore, mothers nearest caregivers of neonates need to have adequate knowledge and practice regarding hypothermia in terms of possible signs, symptoms, causes, complications and preventive measures about this problem as it is most of the time unknown and carries heavy risks for such babies (Yadav *et al.*, 2016).

1.2. BACKGROUND TO THE STUDY

WHO considers hypothermia as a decrease of axillary temperature in infant which is less than 36.5°Celsius. Although all infants are prone to neonatal hypothermia, the high incidence is noticeable in preterm babies rather than in term infants (Devi, 2015). Worldwide, neonatal hypothermia constitutes a substantial leading cause to neonatal death and health impairment among neonates regardless of climates (Demissie, Abera and Chichiabellu, 2018).

According to World Health Organization 2014, each year, about 125 million infants are born and eight million of them die before their first birthday; among the causes of death, hypothermia kills more than a quarter of them, representing 2.5 million. Its prevalence is high in developing countries (Demissie, Abera and Chichiabellu, 2018). A study done by (Lunze *et al.*, 2013) found that hypothermia is frequent in babies born at health facility with a prevalence that ranges from 32% to 85%, and those whom the deliveries take place at home, the prevalence ranges from 11% to 92%. The same researchers agreed that even if hypothermia is not often an immediate cause of death, it has a great contribution to the increase of worldwide neonatal mortality.

Regarding High income countries (HIC), among reported neonatal deaths, UNICEF 2014 stated that the United States accounted an annually estimate of 720 neonatal deaths due to

extreme hypothermia. (Shukla and Nair, 2017).

For those countries hypothermia is more observed in preterm, sick and outborn babies than in low and middle income countries where the problem of hypothermia involves also term and healthy babies. For instance, in Canada 11.5%-12.5% of premature and under developed babies have hypothermia.

Estimate from LMIC shows that every year, 17 million of babies are exposed to hypothermia. Some regions of Sub Saharan Africa account an incidence of 60% to 85% (Onalo, 2013, Shukla and Nair, 2017). Similarly, hypothermia in neonate affects other parts of Africa; specifically in western region, on 100 neonates admitted in Neonatal Intensive Care Unit (NICU) sixty two of them were hypothermic (Demissie, Abera and Chichiabellu, 2018). The high prevalence of hypothermia in neonate was reported in Uganda 79% and in Nigeria and Zimbabwe the prevalence ranged one-to-one to 68% and 85% (Farhadi, 2014).

In Rwanda, data on the prevalence of neonatal hypothermia are limited but annual health reports highlighted the impact of hypothermia in neonatal death. The same report stated that among neonates admitted in neonatology, 77% of neonates had hypothermia (Statistics, 2014).

Hypothermia is responsible of a huge number of physiologic and metabolic disturbances, including hypoglycemia whose magnitude is obvious as it is mostly associated or worsens severe neonatal infections (sepsis, pneumonia), preterm birth and asphyxia, conditions that are known to kill babies in neonatal period (Shukla and Nair, 2017). The neonatal hypothermia is characterized by clinical features owing to environmental, physiologic factors or metabolic changes affecting all vital systems; hence a hypothermic baby appears lethargic with poor feeding, cold extremities, acrocyanosis and bradycardia with respiratory distress and tachypnea (Sacks *et al.*, 2015). A short of thermal protection is one of the problems leading to neonatal hypothermia in Low- and Middle-Income Countries (LMIC).

Hypothermia should be prevented through strict observance of chain of warmth including thermal control such as ensuring a warm area for delivery, warming baby and wrapping in warm clothes, practicing Kangaroo mother care, initiating early breastfeeding, delaying bathing, checking body temperature, providing care during transport when returning back home or transferring the baby from one unit to another (Lunze *et al.*, 2014). Hypothermia prevention in neonates is a key element to prevent child mortality as most of them are

vulnerable to die within the neonatal period (Zaman *et al.*, 2018).

Another meaningful aspect of preventing neonatal hypothermia is keeping the baby and the mother together as the neonate body temperature depends significantly to the mother's temperature (McCall *et al.*, 2018). However, babies delivered by caesarian section (C/S) do not benefit from the usual maternal bonding, because they are completely separated from the mother and cared apart; hence they are prone to hypothermia (Sacks *et al.*, 2015). Midwives in health facilities strive to adhere to the World Health Organization guidelines regarding the prevention of hypothermia in the neonates from the delivery room to the postpartum ward but the gaps are more observed when the baby is discharged from the hospital, running into the burden of the means of transport that are most of the time inadequate for the newborn baby. Furthermore, the baby has now to adapt to the family environment where this chain of warm is interrupted. To maintain the normal body temperature, external interventions are very crucial and aid in preventing neonatal hypothermia particularly in the first 12 hours of life (Mccall *et al.*, 2018). Therefore, healthcare providers have to equip the mothers with adequate knowledge and practice regarding neonatal hypothermia.

Mothers, especially the young ones, should be educated about how to handle the baby at home: Firstly keeping the baby close and not in cot is vital; delaying bath for 24 hours after birth, bathing must be done quickly but gently using warm water and the baby is dried immediately and wrapped in proper and warm clothes (Lunze *et al.*, 2014). The baby's head should be covered with a hat interfering with radiation process, changing wet diapers must be done as soon as possible to prevent heat loss by conduction. Kangourou Mother Care (KMC) and breastfeeding should be encouraged to be practiced at home even for the term babies as they are the main producers of natural heat and hold other many benefits that will enhance further positive outcomes for the growing infant (Boundy *et al.*, 2016).

Rwanda, one LMIC, has tried to achieve the sustainable development goal (SDG) three called health and wellbeing, which corresponds to millenium development goal (MDG) four that aims at reducing child mortality in Rwanda (Khurmi, Sayinzoga and Berhe, 2017). This country has deployed tremendous efforts to tackle child mortality by empowering its health system capacity through training and involvement of the community health workers (CHW)

in maternal child services, improving access to health facilities, enhancing skilled personnel and contributing to the health insurance (Binagwaho, Farmer, Nsanzimana, Karema, Gasana, 2014).

However, the neonatal mortality decreased slowly due to ongoing complications of prematurity, birth asphyxia, sepsis, conditions that are mostly linked to hypothermia, hence this last remains the leading cause to neonatal mortality (Khurmi, Sayinzoga and Berhe, 2017). Although it is not well documented as an isolated condition, neonatal hypothermia is known as a danger sign to be prevented (Onalo, 2013).

Neonatal hypothermia continues to be a global challenge for newborn survival whereas the mothers remain unknowledgeable regarding the neonatal hypothermia (Knobel, 2014). Assessing knowledge and constant health education addressing neonatal hypothermia among parents, especially mothers, should prevent or reduce cases of readmission in Neonatal Intensive Care Unit (NICU) due to hypothermia (Akimana, 2017).

Mothers play a significant role in newborns' life, wellbeing, and contribute enormously to their survival because they are ones whose knowledge in terms of infants' needs might help baby survive from danger conditions, notably hypothermia (Shrestha, 2015). Parent involvement in thermal care within the period around birth and in the subsequent days are important determinants of neonatal mortality (Amolo, Lucia, Irimu, Grace, Njai, 2017). Therefore, mothers, as close caregivers of neonates, must be knowledgeable about thermal care such as delaying bath, KMC practice, breastfeeding (Amolo, Lucia, Irimu, Grace, Njai, 2017). The present study intends to assess mothers' knowledge and practice regarding neonatal hypothermia as they are one's who are supposed to be aware of any change in the infant for an early management before complications arise.

1.3. PROBLEM STATEMENT

Neonatal hypothermia constitutes a worldwide cause of neonatal mortality and morbidity regardless of climates or the gestational age. Furthermore it is most of the time closely linked or worsens severe conditions that are known to kill babies in neonatal period such as prematurity, birth asphyxia and neonatal infections. Its prevalence is high in low and middle

income countries. Several studies have identified poor practice of mothers regarding neonatal hypothermia to be a contributing factor to hypothermia in neonates. In Rwanda, data on the prevalence of neonatal hypothermia are limited but Rwanda Ministry of Health (MOH), in its 2014 annual health statistics, highlighted the impact of hypothermia in neonatal death.

The same report stated that among the neonates admitted in neonatology, 77% had hypothermia. In 2016 MOH statistics, neonatal mortality was reported to be 11% and neonatal hypothermia was present in about 75% of all neonatal deaths.

Although hypothermia is known to kill babies in neonatal period, it is preventable by cost effective and affordable strategies. Adequate knowledge and practice of mothers in regard to hypothermia management/prevention have positive effects on neonatal survival. Moreover, during our past professional practice in the postpartum wards or at home among neighbours, we have observed that postpartum mothers exercised wrong practices that lead to neonatal hypothermia. Whereas there is a paucity of literature regarding mothers' knowledge and practice towards hypothermia in Rwanda. Therefore, there is a need to investigate in this phenomenon.

1.4. AIM OF THE STUDY

To assess the mothers' level of knowledge and practice on neonatal hypothermia at one selected provincial hospital in Rwanda.

1.5. RESEARCH OBJECTIVES

1.5.1. Specific objectives

1. To determine the mothers' level of knowledge regarding neonatal hypothermia at a selected provincial hospital in Rwanda.
2. To identify the mother's level of practice regarding neonatal hypothermia prevention at a selected provincial hospital in Rwanda.
3. To establish the association between the level of knowledge, practice and demographic characteristics regarding neonatal hypothermia at provincial hospital in Rwanda.

1.6. RESEARCH QUESTIONS

1. What is the mothers' level of knowledge regarding neonate hypothermia at a selected provincial hospital?
2. What is the level of mothers' practice regarding neonate hypothermia at provincial hospital?
3. What is the association between knowledge, practice and demographic characteristics regarding neonatal hypothermia at a selected provincial hospital?

1.7. RATIONALE/SIGNIFICANCE OF THE STUDY

This research aims to assess the mothers' knowledge and practice regarding neonate hypothermia at a selected provincial hospital. It will generate information and recommendations regarding neonatal hypothermia and this may inform policies, education, practice, research and community.

1.7.1. Policy

Regarding the policy, the findings from this study will help policy makers at different levels to develop policies and describe strategies that will help mainly mothers to prevent neonatal hypothermia and its management.

1.7.2. Education and practice

The health professionals will improve their awareness and provide to mothers consistent health package related to neonatal hypothermia. It may also help to convey a body of new knowledge in nursing as a profession.

It will also help the civil society to increase the knowledge on the importance of preventing, managing neonate hypothermia in a timely manner and empower mothers when necessary in addressing neonatal hypothermia.

1.7.3. Research

In terms of research, the information may be added to the existing body of knowledge in the domain of neonatal hypothermia and it will be used as a point of reference by other researchers in this field. Furthermore, the present study will help to generate body of

knowledge for further researches that will help in improving mother's knowledge and practice in management of neonate hypothermia.

1.7.4. Community

In terms of community, it will help to improve the life condition of Rwandan population including neonates by improving the mother's knowledge and practice regarding the prevention, early recognition and adequate interventions on neonatal hypothermia.

1.8. DEFINITION OF KEY TERMS

Knowledge: The state of being conscious about a given situation or having the knowledge regarding a given issue. (Gillon, 2017). In this study, it means the awareness of mothers on neonate hypothermia.

Practice: The way someone behaves or conducts himself in doing something (Blue *et al.*, 2016). In the present study, it refers to the way mothers behave in case of the neonate hypothermia.

Mothers: It is the plural of mother, which is an individual who has the biologic traits of female and can have pregnancy and give birth (Ward and Edelstein, 2014). In this study, it describes all mothers in reproductive age that gave birth to the living baby who is neonatal period and this last is between 0 to 28 days.

Neonatal hypothermia: It is the body temperature that is below of 36.5°C. (WHO 2014). In this study, it means the body temperature in neonates which is below 36.5°C.

Neonatal period: It is the period from birth to 28 days inclusive or first 4 weeks of birth (Boundy *et al.*, 2016). In this study it means also a period of 28 days from birth.

1.9. STRUCTURE/ ORGANIZATION OF THE STUDY

This dissertation is made of two main parts:

Part one will comprise the items that present the title of the student dissertation and declaration followed by the abstract, dedication, and acknowledgement. A table of the study content, a list of tables and acronyms as well as abbreviations used will be clearly presented.

Part two is composed by six chapters:

Chapter one will comprises an introduction to the overall study, an explicit background, a plausible problem statement followed by the aims of the study and its objectives and research questions, the significance of the study and definition of concepts and a conclusion to the chapter.

Chapter two will present the literature review which is made of a theoretical and an empirical literature, a wise critical review and research gap identification. An explicit conceptual framework and conclusion will be presented.

Chapter three will explain the body of methodology that specify the research design, research approach, research setting, population, sampling, data collection, data analysis strategies used to shape this study. Clear ethical considerations, methods of management and dissemination of data, limitations and challenges to the study will be clearly explained and a conclusion will be presented.

Chapter four presents the study findings.

Chapter five will open a detailed discussion and critically analyze the findings of the study. Recommendations around the topic of mothers' knowledge and practice regarding neonatal hypothermia will be addressed in chapter six.

1.10. CONCLUSION TO CHAPTER ONE

Chapter one explains and scrutinizes deeply the problem of neonatal hypothermia, a neglected condition that constitutes a global challenge across the world. Its prevalence is mainly high in limited resources countries including Rwanda and contributes extremely in increasing neonatal mortality and morbidity. The signs and symptoms, complications are well explained in order to raise its early recognition; among the causes of hypothermia poor practices of mothers and socio-demographic issues have been identified.

CHAPTER TWO: LITERATURE REVIEW

2.1. INTRODUCTION

A literature review is an objective through summary and critical analysis of the relevant available research and non-research literature on the topic being studied (Merryl, Harvey, Lucy, 2017, p.185). It will cover both theoretical, empirical literature with the corresponding conceptual framework of the study. Specifically, it presents the existing literature about mothers' knowledge and practice regarding neonatal hypothermia and the contributing factors. Material used is retrieved from Cochrane library, Pub Med, Google scholar from 2013 to 2019. A little of them falls in 2013. A detailed summary of the critical review and research gap identification will be discussed in this literature followed by a conclusion to chapter two.

Search terms: Mothers' knowledge, mothers' practices, Neonatal hypothermia.

2.2. THEORETICAL LITERATURE REVIEW

This theoretical review will discuss in details the theories regarding neonatal hypothermia, its incidence and prevalence, pathophysiological effects, potential consequences as well as its preventive measures.

2.2.1. Definition of neonatal hypothermia

The acceptable body temperature in neonatal period ranges between 36.5°C to 37.5°C ; any decrease that deviates to these variations is termed as hypothermia which is considered as life threatening to the newborn (Madhavi and Wickremasinghe, 2014). WHO classified the neonatal hypothermia as mild hypothermia (36°C to 36.4°C), moderate neonatal hypothermia (32°C to 35.9°C) and severe neonatal hypothermia (less than 32°C).

2.2.2. Neonates exposed to neonatal hypothermia

According to Rao *et al.*, 2016, Hypothermia is common in neonates, but mainly affects vulnerable categories of babies: The mode of delivery such as cesarean section expose the neonates to a decline of certain metabolic functions impeding the thermoregulation mechanism; thus those babies are more found to have breathing and thermoregulation patterns than those delivered vaginally.

Therefore midwives should try to initiate early breastfeeding in theatre if there is no contra indication both for the mother and the newborn. Anesthesiologists should prevent maternal hypothermia by implementing available measures such as warming fluids prior their administration to minimize neonate hypothermia during breastfeeding or skin to skin contact (Perlman and Kjaer, 2016). Policies regarding breastfeeding and skin to skin contact should be implemented in regard to infants born by caesarian section.

In certain morbid conditions such as asphyxia and impaired respiration the neonate has inadequate ability to normal heat production as the oxygen supply responsible for regulation of vital processes is compromised; subsequently the process of resuscitation delays the application of thermal care as during this imperative action, the healthcare providers are promptly busy for long time, unwillingly overlooking the application of preventives measures of neonatal hypothermia.

Another factor is that the problem of heat production is more observed in preterm infants due to immature thermoregulation, thin and permeable skin, and imbalanced body surface to weight ratio hindering heat conservation (Rao *et al.*, 2016). Furthermore, hypoglycemia in infants is an important contributor to hypothermia and vice versa: it maintains a vicious circle; therefore, breastfeeding treats hypothermia not only through bonding with and warming through the mother, but also by replenishing a newborn's glucose levels (Lunze *et al.*, 2013).

2.2.3. Pathophysiology of neonatal hypothermia

The neonate is more predisposed to hypothermia and the mechanisms involved in heat loss for neonate are found to be: the first is the radiation mechanism that occurs when the neonate is losing the heat from her/him to the surrounding matter which is not warmer, the second is the convection mechanism by which the neonate is losing the heat to the moving air when the newborn is not well covered, the third is the evaporation that happens when there is insensible water loss from neonate skin surface and this can be dependent to how damp is the neonate, how the neonate is immature and water permeable is the skin and lastly how much is the infant uncovered to drying factors such as air movement, and the fourth is the conduction which occurs when the neonate is put on a cold plane (Perlman& Kjaer, 2016).

In addition, neonate is likely to develop hypothermia because of absence of shivering response to decreased body temperature resulting in cellular ion and homeostasis imbalance (Kathryn I. McCance, Susan E. Huether, 2014).

2.2.4. Regulation of neonate normothermia

When the baby is in intrauterine area, the normal temperature is maintained by maternal physiological mechanisms while in extra uterine area, the baby should adapt to external environment by his/her own physiological mechanism which in that time is too immature and makes the neonate prone to hypothermia; here the caretakers should pay attention to help babies to deal well with the environment by applying preventives measures (Srivastava *et al.*, 2014).

The regulation of normal body temperature in neonate is maintained via different complicated mechanisms including physiological hormonal regulation, the external behavioural factors also play a crucial role in maintaining of the normal body temperatures (Lunze *et al.*, 2014). In neonate baby, the first source of avoiding hypothermia comes from non-shivering thermogenesis that deals with the use of brown adipose tissue (Knobel, 2014). Understanding the pathophysiology of heat loss and production is a key element to enhance truthful application of preventing or managing neonatal hypothermia.

2.2.5. The care of neonate to prevent hypothermia

Most effective interventions that lessen the occurrence of hypothermia in neonate are those which target all already known mechanisms of thermoregulation and include immediate drying, wrapping the infant in warm clothes, head covered by a cap and wearing feet with soft socks and maintaining a warm environment (Qazi, Saqib and Raina, 2019b). The same author recommends the use of current equipment for very low birth such as a plastic bag and their heads covered with a hat; the area of resuscitation or routine examination should be warmed by a radiant heater. Other genuine strategies are the skin to skin and early breastfeeding that are applied immediately after drying the baby; this is useful for all neonates including late preterm (Klett-dunbar, 2017). A study done in Ethiopia highlighted the obvious importance of early breastfeeding in preventing neonatal hypothermia whereby the authors argued strongly

that breastfed babies were less likely to develop hypothermia than those who did not (Demissie, Abera and Chichiabellu, 2018).

Keeping the baby and the mother together and encouraging breastfeeding are vital in maintaining the baby warm (Mccall *et al.*, 2018). A meta-analysis study done by (Boundy *et al.*, 2016) showed that Kangaroo mother care decreased significantly neonatal mortality from hypothermia at a rate of thirty six percent. The prevention and the management of neonatal hypothermia rely on its early recognition; when neonatal hypothermia is reported, aggressive management and restoration of the normal body temperature is very important to prevent subsequent complications (Onalo, 2013).

2.2.6. Consequences of neonatal hypothermia

An intra-uterine baby is under an environment that is at 5⁰C greater than external temperature, hence the newborn experiences consequences related to these variations; Several studies in the field of neonatal hypothermia have found that mortality increased by approximately eighty percent for every degree Celsius decrease first observed in axillary temperature and that relative risk of death ranged from two to thirty times than when neonatal hypothermia is prevented (Lunze *et al.*, 2014). Neonatal hypothermia is associated with or worsens severe neonatal conditions that comprise hypoglycemia, which is more obvious, and other disorders that affect newborn survival including respiratory patterns, blood disorders, gastrointestinal disorders such as Necrotizing Enterocolitis (NE)'. Hence it is known to be a major killer in neonatal period (Shukla and Nair, 2017).

2.3. EMPIRICAL LITERATURE REVIEW

2.3.1. Incidence and prevalence of neonatal hypothermia

Worldwide, neonatal hypothermia constitutes a substantial burden of mortality and morbidity among neonates regardless of climates and its prevalence is high in developing countries specifically in area with important neonatal mortality (Demissie, Abera and Chichiabellu, 2018). Numerous studies argued that neonatal hypothermia is frequent in babies born at health facilities with a prevalence that ranges from 32% to 85%, and those whom the deliveries take place at home, prevalence ranges from 11% to 92% (Lunze *et al.*, 2013). Informations from developing countries reported more than ninety percent of mild hypothermia cases and ten

percent of severe hypothermia. Moreover thirty four percent of neonate hypothermia out of NICU admission were found in Bangladesh (Demissie, Abera and Chichiabellu, 2018).

According to World Health Organization, each year, about one hundred twenty five million infants are born and 8million of them die before their first birthday; among the causes of death, hypothermia kills more than a quarter of them, representing 2.5 million (Shrestha, 2015). Although neonatal hypothermia is a worldwide burden, its incidence is more significant in low and middle income countries and involves all babies regardless of gestational; whereas observed cases of hypothermia in High Income Countries are attributable to preterm and low birth weight infants (Farhadi, 2014). This might be due to environmental factors and social economical differences. Estimate from LMIC shows that every year, seventeen millions of babies are exposed to hypothermia and some regions of Sub Sahara Africa account an incidence of 60% to 85% of hypothermia (Onalo, 2013, Shukla and Nair, 2017). In Ethiopia neonate hypothermia ranged from 53 to 69.8% (Demissie et al 2018). In Rwanda, MOH statistics, neonatal mortality was reported to be 11% in 2016, and neonatal hypothermia were present in about 75% of all neonatal deaths.

2.3.2. Mothers knowledge towards neonatal hypothermia

According to (Knobel, 2014), neonatal hypothermia continues to be a global challenge for newborn survival whereas mothers remain unknowledgeable regarding the neonatal hypothermia. In a study conducted in an Indian hospital (Shukla and Nair, 2017) highlighted the low knowledge of postnatal mothers in certain areas of hypothermia whereby its causes and risk factors were scored as 45.75% , in terms of meaning and definition, the signs and symptoms, knowledge ranges respectively at 38.75% , 31.5% while the area of consequences was only estimated at 28%.

Other studies show that the hypothermia is the most neglected among other dangerous conditions that affect newborns' health where mothers recognized only the hyperthermia to be more dangerous. For instance, a study conducted in Bangladesh found that hypothermia was recognized by only fourthly eight mothers whereas the majority of participants (96.6%) acknowledged hyperthermia as a danger sign (Amolo, Lucia, Irimu, Grace, Njai, 2017). A study done on the low awareness of hypothermia prevention among delivered mothers

underlined that only 4% of the participants were knowledgeable about the neonatal hypothermia (Shukla and Nair, 2017). This low knowledge leads to poor practice rising the problem of morbidity and mortality among newborns (Monika, 2017).

2.3.3. Practices of mothers towards neonatal hypothermia prevention

Poor practices in terms of neonatal hypothermia remain a challenge in LMIC as most of them are often rooted from the lack of knowledge, coupled with strong cultural beliefs (Yadav *et al.*, 2016). A study done in Zambia found that babies were washed immediately at birth in order to remove the odors from the child bearing canal and were kept away from the mother until she recovered. Similar cultural beliefs were observed in several areas; for instance the studies done in Pakistan and Nepal stated that the babies were washed with warm water and soap one to two hours after delivery since they were considered as dirty and were hardly wiped (Munoz, 2014). In addition to that wrong practices were observed from the traditional birth attendants who left the uncovered newborns attached to the placenta until the third stage of labor is completely achieved.

Furthermore a study conducted in Sri Lanka found that sixty nine percent of the mothers were practicing wrong ways that can lead to hypothermia such as washing the baby's body without drying the wet head, and washing the baby's head and body together at the same time without immediate drying (Madhavi and Wickremasinghe, 2014). These detrimental cultural beliefs harm enormously the infant exposing him or her to undue severe hypothermia.

Moreover, in Lufwanyama in rural Zambia breastfeeding was not practiced immediately until the mother felt well, hence the baby was given plenty water. Other offensive practices as potential ways to prevent cold in mother and neonate such as lighting the fire inside the house were used by a great number of households in rural Zambia exposing instead the neonate to respiratory patterns; oil massage has been practiced to prevent heat loss but researches found that it is responsible of painful skin impairments for the neonate (Lunze *et al.*, 2014).

However suitable thermal care practices are ignored; although skin to skin is known as a genuine strategy to safeguard newborn' life, there are obvious gaps in practicing KMC mainly observed in resource-limited settings; a study done in India found that only 11% of women practiced skin to skin and the overall newborn care practices were identified as poor in 14% of

the mothers where 66% had poor breastfeeding practices and 45% had poor thermal care practice (Devi, 2015).

In Rwanda, poor practices regarding neonatal hypothermia are not well revealed due to the inadequacy of its literature in this field; available literature addressing hypothermia focuses mainly on preterm babies while the problem of hypothermia is general in all newborns (Binagwaho, A, Farmer, PE, Nsanzimana S, Karema, C, Gasana, 2014). Maintaining a good thermal care at birth is crucial in preventing hypothermia, hypoglycemia and neonatal infections. Although in Rwanda data are scarce due to the paucity of literature in the field, Rwandan neonates are also exposed and may die from hypothermia due to poor practices (Khurmi, Sayinzoga and Berhe, 2017).

2.3.4. Factors associated to neonatal hypothermia

According to Karsten 2014 those factors should be classified in behavioral, socioeconomic, physiologic, and environmental factors. The first pointed behavioral factor contributing to the application of preventive measures of neonatal hypothermia was reported to be mother's poor practice rooted from the lack of knowledge or local cultural beliefs. Mothers' level practice is very important in the prevention of neonatal hypothermia because the mother is the one who provides baby care like bathing after delivery where this practice should be normally delayed more than 6 hours after delivery to prevent hypothermia. (Sacks *et al.*, 2015).

World health organization recommends that bathing should be delayed and the newborn baby should not be washed in the first 24 h whereas this good practice is less observed in some parts of the world especially in low and middle income countries.

Considering the socio economic factors, the families with low income status with a lower educational level, low antenatal consultation attendance are likely to have low knowledge and limited practice skills about prevention of neonatal hypothermia; this is worsened because in addition to lack of knowledge and practice skills, the materials to prevent neonatal danger conditions including hypothermia are obviously limited due to poverty.

Furthermore very young mothers with lack of experience in terms of baby care, reveal low practice for hypothermia prevention. Researchers have reported that the mothers who have

also too many children are likely to not apply the preventives measures of neonatal hypothermia, due to the lack of time to care for the neonate (Yego F, D'Este C, Byles J, Nyongesa P, 2014).

The innate physiology of the infant creates another challenge whereby the preterm, low birth weight neonates become easily hypothermic owing to their immature, thin and permeable skin exposing consequently the newborn to heat loss. Beside this, the immature thermal centers impede the thermoregulation mechanisms. The role of environmental factors is evident in the mechanisms of heat loss. These mechanisms have long been explained whereby babies exposed to a cool environment, objects and air get immediately cold (Perlman& Kjaer, 2016).

2.4. CRITICAL REVIEW AND RESEARCH GAP IDENTIFICATION

This literature is built from multiple databases around the topic of the researcher's interest that aim at assessing mother's knowledge and practices regarding neonatal hypothermia. The researcher was motivated by the works of Karsten Lunze who talked more about neonatal hypothermia in his systematic reviews among them the most known is "Global burden of neonatal hypothermia" (Lunze *et al.*, 2014). Other studies addressed immediately the knowledge of mothers using quasi experimental research where pretest and post test were administered to measure mother's knowledge and practice for instance a study done in Nepal, knowledge were measured before and after teaching mothers about neonatal hypothermia (Devi, 2015). These articles even not very current are the best evidences level I and III.

Current best evidences was from Cochrane reviews level I and are talking about the neonatal hypothermia prevention; but there are few controversies in these articles; on one side they argued that all newborns are prone to hypothermia regardless of climates while other side their preventive measures addressed namely preterm infants (McCall *et al.*, 2018).

Other currently used materials are from 2014 to 2019 and cover other levels of best evidence such as non-experimental, randomized controlled studies, guidelines research known as level, II, III and IV. All of them recognized neonatal hypothermia as a danger sign for neonate as it is most of the time associated or worsens severe conditions known to kill babies in neonatal period (birth asphyxia, prematurity, neonatal infections...). Many researches about neonatal hypothermia have been done in LMIC such as Ethiopia, Zambia, Uganda, Indian and the

mother's poor knowledge have been pointed to be the underpinning determinant. A study done by Yadav et al., (2016) in Nepal has found that the poor knowledge and practice skills of mothers in terms of neonatal hypothermia remain a challenge in LMIC, this is poorly reported.

A study done in an Asian country like Sri-Lanka by Madhavi and Wickremasinghe, 2014 found that 69% mothers were wrongly practicing the preventive measures of neonatal hypothermia and that can lead to neonatal hypothermia, those reported wrong practices include, washing the baby's head and body together simultaneously without immediate drying. Cultural beliefs were also found in sub-Sahara Africa, for instance in Zambia neonates were considered as dirty and were washed hardly to remove odors of delivery process or were separated from mothers (Lunze *et al.*, 2014). All these practices put the neonate into the burden of undue hypothermia. However, this should be controlled by promotion and awareness of preventive measures of neonatal hypothermia and their application to prevent that silent killer. Nevertheless all assessed articles even whom from best level of evidence, none of them couldn't explain whether neonatal hypothermia is a direct or indirect cause of mortality, thus remains a global challenge (Lunze *et al.*, 2014).

In Rwanda, poor practices regarding neonatal hypothermia are not well known due to the scarcity of its literature in this field, even though available literature addressing hypothermia focuses mainly on preterm babies while the problem of hypothermia is general in all newborns (Mccall *et al.*, 2018). Therefore, the literature addressed a bit that global public health challenge; this gap has triggered the researcher to undertake this study to deeply address the mother's knowledge and practice of preventive measures of neonatal hypothermia, as well as its contributing factors.

2.5. CONCEPTUAL FRAMEWORK

The conceptual framework is a "map" or "rudder" that will guide the researcher towards realizing the objectives or intent of the study (Regonel, 2015). It was adopted from Essential Newborn Care (ENC) developed by WHO and also adopted by Gulema, 2018 in a study to assess the mother's level of knowledge and practice and associated factors regarding essential newborn care; and this includes the thermal care as a component of the care given to neonate. Therefore its use in assessing the knowledge and the practice about neonatal hypothermia is

valuable. The three main factors are first the socio-demographic and obstetrical characteristics of the mothers; the second is the kind of information given to the mothers to increase the knowledge and practice on prevention of neonatal hypothermia; the third or dependent variable is knowledge and practice.

These characteristics are determinants of positive or negative knowledge and subsequently good or low level of practice and contributing factors to neonatal hypothermia, the lack of knowledge and poor practice are pointed out as presented in the figure 2.1. The three parts comprise:

Social demographic characteristics: Age, Occupation, Level of education, Religion and Mother and husband occupation.

Obstetrical characteristics of mothers: ANC attendance, Age and Sex of the baby.

Information given to mothers: Identify the signs of hypothermia, protect the new-born against heat loss, the consequences of heat loss in new-born and body temperature measurement.

The whole body of the literature consulted expresses an obvious link between, socio demographic characteristics and mothers' knowledge and practice regarding neonatal hypothermia. Hence the literature review or the clinical researcher's experiences have shown that the characteristics of the mothers affect positively or negatively the knowledge and the practice regarding neonatal hypothermia.

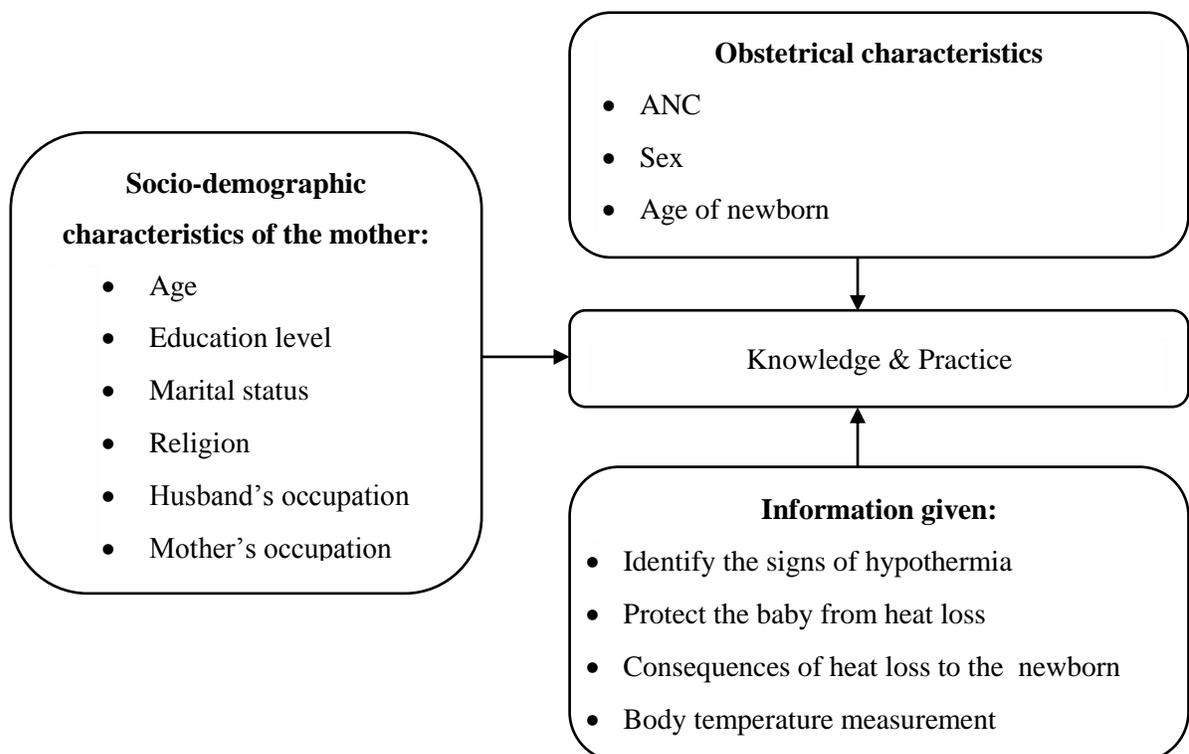


Figure 2. 1: Conceptual framework (Gulema, 2018)

2.6. CONCLUSION OF CHAPTER TWO

This chapter constitutes a basis of the body of the entire research around the topic mothers' knowledge and practice regarding neonatal hypothermia. All material used in this paper aimed at to identify and summarize findings related to the topic of interest and mainly addressed the study objectives to answer the research questions. Most of these materials were reviewed or were original articles, publications, guidelines that have been used in other researches in the field. Through the literature review new knowledge are gained and the gaps are identified from the theories comprised in these materials. Empirical researches are used to sustain or reject the research hypothesis. The literature review will serve in drawing an explicit map that gives a real picture of the overall investigation by showing the role and the association between research variables.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. INTRODUCTION

Research Methodology is the process or plan for conducting the specific steps of the study (Grove, Burns and Gray, 2013:p23). This chapter widely discussed the methodology used to shape our study in order to achieve the predetermined objectives and included: the research setting, the population of interest, the inclusion and the exclusion criteria, research design, research approach, sample size and the sampling strategies, data collection tool and procedures, data analysis, dissemination, ethical considerations and limitations of the study.

3.2. RESEARCH APPROACH

Research approaches are plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation.(Grove, Burns and Gray, 2013:p23). A quantitative approach was used in this study. (Polit and Beck, 2012) describes quantitative research as a formal, objective, systematic process in which numerical data are used to obtain information about the world; moreover, it's appreciated for its high level of accuracy and objectivity through measures of central tendency.

3.3. RESEARCH DESIGN

A research design is a blueprint for maximizing control over factors that could interfere with a study's desired outcome (Grove, Burns and Gray, 2013 p.214). Designing a study helps the researcher to plan and implement the study in a way that will help the researcher to obtain intended results, thus increasing the chances of obtaining the information that could be associated with the real situation (Ajay and Micah, 2014).

A descriptive cross-sectional study design was used to determine the knowledge, practice and to establish the relationship between the dependent variable and the participants' characteristics in a sample of 161 mothers of live babies. The cross-sectional study was appropriate and easy to use as in this study; the data were collected once on time.

3.4. STUDY SETTING

Rwamagana provincial hospital is located in the Eastern province of Rwanda. According to the hospital records 2014, it comprises 14 health centers and 17 health posts that cover the catchment area of 369,671 inhabitants, including men representing 153,607 of the population and women representing 216,854 with 78,398 women of reproductive age. It comprises also two private clinics and one prison dispensary. It has a capacity of two hundred eighteen beds. The study setting involved the maternity and neonatology units which have respectively a hosting capacity of 42 and 21 beds per unit. Maternity register 2018, shown 3,246 deliveries of live babies, while neonatal units received 1103 neonates among them 419 outborn were recorded from January to December. The site has been chosen because the provincial hospital receives a great number of patients and as a provincial and referral hospital, it is supposed to encompass the Eastern Province health needs.

3.5. STUDY POPULATION

The study population is all elements (individuals, objects, or substances) that meet certain criteria for inclusion in a given universe. (Grove, Burns and Gray, 2013 p.44). That population involved all mothers who are able to procreate including adolescents as they are also invoked in our study. WHO classifies adolescent into two classes that are first younger adolescence between 10–14 years and secondly late likely hoods between 15–19 years. We preferably delimited our study population from 15 years old based on several previous researches that targeting to quantify the incidence of teenage pregnancies by country and they often give rates per 1000 adolescents aged 15–19 years. Moreover, even if the conception may occur at a period below 15 years old, logically at that period, younger adolescents are educated on the awareness of the current change in their own body and may be on how to prevent unwanted pregnancies but the matter on how to handle babies is unfortunately not yet addressed.

The target population was made of mothers of live neonates hospitalized in maternity and neonatology wards at the provincial hospital who were available in post-partum period, during the study data collection period. Data from January to December 2018 from records of that selected hospital accounts a basis mothers of 3,246 lives births; thus the total population was 270 mothers of live newborns based on monthly estimate.

3.5.1. Selection criteria

3.5.1.1. Inclusion criteria

Inclusion criteria are defined as the conditions that specify the under-study population characteristic. In this study, the inclusion criteria were:

All mothers, 15years old and above from the selected provincial hospital who gave birth to live babies;

Those who were in postnatal period, within the first 28 days post-delivery.

Those who were willing to participate in the study.

Those who were in post caesarean, post-delivery and neonatology but their babies are not severely sick.

3.5.1.2. Exclusion criteria

Exclusion criteria are those characteristics that the study population has not to possess.

Exclusion criteria were:

All mothers who gave birth of died babies or mothers who are not from catchment area.

Those who were not willing to participate in the study.

Those who were not neither in post caesarean, post-delivery, postnatal care and their babies are severely sick.

3.6. SAMPLING

3.6.1. Sample size

A sample is a subset of a population selected for a population study, and sampling defines the process for selecting a group of people event, behaviors, and other element with which to conduct a study (Grove, Burns and Gray, 2013).

161 mothers with live babies have been selected out of the entire population to participate in the survey and have been calculated on a monthly basis of 270 mothers of live babies from the hospital records. The hospital can receive 270 mothers of live babies monthly which represent the total population of the present study according to Rwamagana hospital book report 2018.

The target sample size has been calculated using the formula of Taro Yamane namely:

$$n = \frac{N}{1 + N(e^2)}$$

n = sample size, N = number of total population, e = value of accepted error.

$$n = \frac{270}{1 + 270(0.05)^2}$$

n = 161

The estimated sample size corresponded to 161 participants.

3.6.2. Sampling strategy

Sampling strategy is defined as the process of selecting a group of people, events, behaviors or other elements that represent the population being studied (Grove, Burns and Gray, 2013:P 349). In the present study, a sample of 161 mothers of living babies in neonatal period were selected using convenience sampling strategy which is a non-probability sampling.

The convenience sampling method consists of selecting a group of individuals who are most conveniently available and who are ready during the period of research. It is also a less expensive technic and easy to apply for this study.

3.6.3. Data Collection instruments

According to Burns and Grove, 2013:271, they are serves, test, questionnaire and records used to collect informations needed from participants to conduct a research in a specific field. In this study, a structured questionnaire guide translated in Kinyarwanda for its accuracy was used to collect the data.

The present questionnaire is made of items related to socio-demographic characteristics, 15 questions of Knowledge of mothers on neonate hypothermia, and 16 questions of practice of mothers on neonate hypothermia. A sample of questionnaire used in a study in Zambia was obtained by email from Karsten LUNZE as seen on appendix number 3 who authorised its use with permission to modify in order adapt it to the context of Rwanda and to the present research.

3.7. VALIDITY AND RELIABILITY OF RESEARCH INSTRUMENT

3.7.1. Validity of the tool

Malone, Nicholl and Coyne, 2016 defined validity as a measure of truth or falsity of the data obtained through using the research instrument. In this study, validity refers to the measure of objectivity or plausibility of the assumption that stipulates mothers' knowledge and practice regarding hypothermia to be low.

The author of the original tool has reported its validity and reliability; hence an adopted and slightly modified tool using other aspects of in-depth literature review was used. The validity of the tool has been evaluated in terms of face validity, content validity and constructive validity.

3.7.1.1. Face validity

Face validity refers to investigator's subjective assessments of the presentation and the relevance of the questionnaire (Ann Bowling, 2014:p174). The interview tool was given to colleagues to check whether the questions were relevant, unambiguous and clear.

The senior supervisor and the co-supervisor further critically evaluated it, and the suggestions made have been implemented and reassessed.

3.7.1.2. Construct validity

Construct validity has traditionally been defined as the experimental demonstration that a test or the instrument is measuring the construct it claims to be measuring (Taherdoost and Group, 2017). In this study, the items within the instrument really measured the knowledge or the practice regarding neonatal hypothermia as well as the association between knowledge, practice and social demographic variables such as age, religion, level of education, marital status, mothers' and husbands' occupation including the obstetrical data.

3.7.1.3. Content validity

Jason S, Wrench, 2016: 208 stated that content validity is the extent to which the content of the instrument appears to comprehensively examine the scope it is intended to measure. All the useful informations were represented in the tool content to respond to the research questions by achieving the formulated objectives.

Otherwise, the content of the tool answered the research questions and covered mothers' knowledge, practice and it lastly examined their association with social demographic variables (age, marital status, obstetrics factors...).

The tool consisted of 3 sections:

Section A: demographic data made of 6 items related to the age, education level, marital status, religion, occupation both for the mother and her husband, obstetrical data and was made of 4 items related to antenatal attendance, chronologic age of the baby, whether term or preterm, gender of the baby.

Section (B): knowledge that comprised 15 items regarding the WHO chain of warm

Section (C): 16 items addressing practice of mothers regarding neonatal hypothermia. The variables were assessed using closed-ended questions (yes/no), also involves items comprised in the steps of drying and keeping the baby warm.

Table 3. 1: Table of content validity

Study objectives	Variables	Relevant questions
1. To determine the mothers' level of knowledge regarding neonate hypothermia at a selected provincial hospital.	Knowledge	Questions in section B
2. To identify the level of practice of mothers regarding neonate hypothermia prevention at a selected provincial hospital.	Practice	Questions in section C
3. To establish an association between knowledge, practice and demographic characteristics, obstetrical data.	Socio-demographic characteristics obstetric data association with (Practice, Knowledge)	Questions in section A, B

3.7.2. Reliability of the tool

Reliability is the degree of consistency with which the instrument measures an attribute. It further refers to the extent to which independent administration of the same instrument yields the same results under comparable conditions. The less variation the instrument produces in repeated measurements of an attribute the higher the reliability. (Jason S, Wrench, 2016: 189). In the present research, reliability has been evaluated by pretesting the instrument with a pilot study which refers to the initial stage to test the feasibility of a research. The questionnaire has been translated and back translated into local language and then pretested among 20 delivered mothers in a pilot study to ensure reliability of the questionnaire has been done. For internal reliability or internal consistency. Cronbach's ALFA which is a coefficient analysis to measure the internal consistency of the instrument was 0.88 calculated by the researcher that is in normal range as the acceptable value varies from 0 to 1. Correction and adaptation have been made according to the pilot study.

3.8. DATA COLLECTION

3.8.1. Data collection procedure

Data collection helped the investigator obtain informations from participants to answer the problem of interest. A guided questionnaire for data collection was used and participants in a private room, voluntarily answered to them. During the period of data collection scheduled twice a week, the participants were met during postpartum period in the maternity ward and were requested willingly to consent for the study participation. The pre-prepared questionnaire was filled by the researcher and the completed questionnaire were collected for data entry and analysis. Thereafter, all answered and entered questionnaires were stored in a secured area.

3.9. DATA ANALYSIS

Data were cleaned, coded and entered into the SPSS version 21 by the researcher. Scientific tests such as descriptive and inferential statistics were used to analyze data. Frequency, percentages, proportions and standard deviation were summarized in form of tables or graph to describe the demographic variables, the level of knowledge and practice presented in percentage after transforming and scoring related variables.

The median was used as a cut off to categorize knowledge and practice into two levels adequate or inadequate as per (Gulema, 2018). 1: correct answer (reliable with WHO chain of warm); 0: incorrect answer (not in agreement with WHO chain of warm), any mother who did not know the response was considered to have an incorrect response.

The median score of 7 marks was used as the cutoff to categorize respondents as inadequate or adequate. Those who were scored below the median had inadequate knowledge and a having adequate knowledge for those who were scored equal or above the median.

For practice the cut off was 8 and who were scored below 8 marks were considered to having inadequate practice and who were scored equal or above the median were categorized to having adequate knowledge.

A Bivariate analysis was carried out assess the relationship between socio demographics and mothers knowledge and practice (the dependant variable). The variables who shown statistical significance were recruited into multiple logistic regressions to determine their effects on the dependent variable which is the mothers' knowledge or practice at CI of 95% and a p value 0.05.

3.10. ETHICAL CONSIDERATIONS

This sections requires ethical measures towards participants' rights and institutional boards.

3.10.1. Institutional boards

The researcher applied for ethical clearance from IRB/CMHS. Rwamagana provincial hospital ethical committee board provided opportunity to meet mothers and a private room for data collection and keeping research tools was offered.

3.10.2. Participant's rights

The following aspects were considered:

Confidentiality: To ensure confidentiality to participants, the codes were used on questionnaires and kept in locked box; the soft copies were kept in computer locked by a password and data collected were treated with confidentiality.

Anonymity and privacy: In this study, anonymity and privacy were not respected at 100% as it was concerned of a face to face technic but the researcher at least conducted the inquiry individually in a closed and protected room and data were analyzed in privacy.

Self-determination: This was another kind of respect to human dignity in which participant has the right to full disclosure. The right to self-determination was followed by providing the participants with the right to refuse to participate in the study, the right to discontinue the study if they felt uncomfortable.

Beneficence: The participants were guaranteed the right to withdraw from the study at any stage without any negative consequences or harm, therefore participation were totally voluntary. The researcher informed the participants about research purpose and objectives, procedures involved, their rights regarding study participation or withdrawal including potential risks and how they will be mitigated.

For example, this study involved minimal risk of interruption of mother's routine activities and were provided opportunity to ask questions.

Consent to conduct research: Mothers voluntarily signed a consent form after receiving appropriate informations.

3.11. DATA MANAGEMENT

All hard copies used are kept in a room and keys in hands of researcher. Five years later, all hard copies will be destroyed in a supervised manner. Soft material will be deleted by the investigator five years after research completion according to academic regulations.

3.12. DATA DISSEMINATION

The study results will be available to all stakeholders for use notably to the University of Rwanda and the research setting in order to raise awareness and application of preventive measures to address the problem of neonatal hypothermia. Researchers who are interested by the field will beneficiate data from this research.

3.13. LIMITATIONS AND CHALLENGES

Recall bias and information bias were possible because during a face to face technique asking mother her knowledge or practice regarding neonatal hypothermia she may respond what she really do not practice.

Generalizability of the study will not be established because the study involved one hospital and representativity is affected hindering benefits for all districts. The paucity of Rwandan literature in the field was a big challenge to the researcher. The grand majority of articles were from Asia and few articles were from Africa.

As the problem of hypothermia in neonate is evident and crucial, there is a need to conduct an observational qualitative research among mothers at community level, in their homes.

3.14. CONCLUSION TO CHAPTER THREE

This part described the methodology undertaken to shape and direct this investigation in conformity with ethical measures towards institutional boards and participants' rights. A quantitative approach was used with a cross sectional design.

161 post-partum mothers of live babies delivered at a selected provincial hospital and fulfilling inclusion criteria were recruited using a convenience sampling strategy to voluntarily participate in the study. A same closed ended questionnaire pretested first among 20 mothers to ensure its reliability was used. Results shown that mothers 'knowledge and practice were both inadequate.

CHAPTER FOUR: PRESENTATION OF RESULTS

4.1. INTRODUCTION

This part presents a summary of the results found from the study: mother's knowledge and practices regarding neonatal hypothermia. It comprises demographic informations, obstetrical data, knowledge and practice of mothers towards neonatal hypothermia as well as they association with demographic and obstetric data that are independent variables.

The results were elucidated in form of tables, graphs, and descriptive statistics and inferential statistics were used to describe and interpret the data collected from 161 postpartum mothers with live babies hospitalized at a selected provincial hospital namely in postpartum ward.

4.2. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Table 4.1 describes socio-demographic characteristics of participants. The age ranged from 21-30 is presented in greater proportion with 75 (46.6%), followed by those who are between 31 and 40 with 66(41%). Regarding level of education, the majority of mothers were educated at the primary level 125 (77.6%).

Among participants, who are married were 114 (70.8%). Most of the participants 84 (52.2%) were catholic. Husband's occupation was asked in this study and most of participants 113 (70.2%) depend on agriculture. Concerning mother's occupation a large number 95 (59%) were farmers.

Table 4. 1: Socio-demographic characteristics of participants (n=161).

Variables	n (%)
Age	
≤20	18(11.2)
21-30	75(46.6)
31-40	66(41.0)
≥41	2(1.2)
Level of education	
Illiterate	11(6.8)
Primary school	125(77.6)
Secondary school	25(15.5)
Marital status	
Married	114(70.8)
Single	26(16.1)
Separated/Divorced	21(13.0)
Religion of participants	
Catholics	84(52.2)
Protestants	18(12.2)
Adventists	12(7.5)
Muslims	47(29.2)
Mother's occupation	
Agriculture	95(59.0)
State & private employed	4(2.5)
Self-employed	11(6.8)
Household	36(22.4)
Student	15(9.3)
Father's occupation	
Agriculture	113(70.2)
State & private employed	26(16.1)
Self-employed	22(13.7)

Table 4. 2: Maternity and child bearing or Obstetrical characteristics

Information concerning maternity and child bearing was assessed in this study. When asked the number of ANC attendance, most of them 104 (64.6%) reported 2-3 times. Baby's age in days, a large number 84 (52.2%) reported 2 days, Mean =2.2, SD±0.7. Babies born on term were 152 (94.4%). More than a half of them 87(54.0%) were Female.

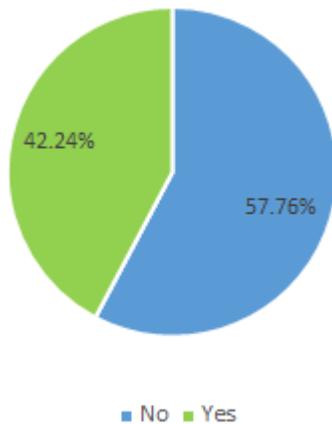
Variables	n (%)
ANC attendance	
None	15(9.3)
1 time	30(18.6)
2-3 times	104(64.6)
4 and plus	12(7.5)
Baby's age (in days)	
1	20(12.4)
2	84(52.2)
3	53(32.9)
4	4(2.5)
The baby born on term	
Yes	152(94.4)
No	9(5.6)
Baby's gender	
Male	74(46.0)
Female	87(54.0)

4.3. MOTHER'S KNOWLEDGE ABOUT NEWBORN HYPOTHERMIA

4.3.1. Information about newborn hypothermia

Participants were asked whether they received any information about thermal care (figure 4.1). More than half (57.7%) did not receive information.

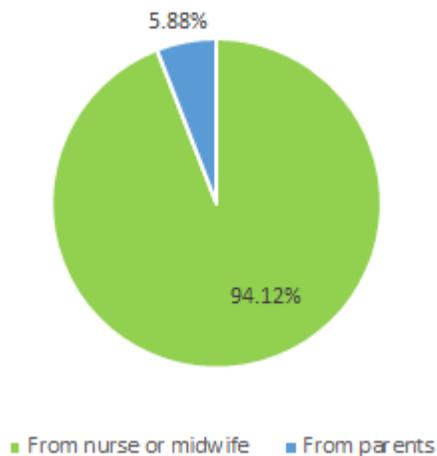
Figure 4. 1: Receiving information about thermal care (n=161)



4.3.2. Source of information about newborn hypothermia

Respondents were asked source of information about newborn hypothermia. Among them 94.12% reported that they received information from nurse or midwife

Figure 4.2: Source of information (n=68)



4.3.3. Information received

Respondents who reported being informed about newborn hypothermia were asked the information received. The totality 68 (100.0%) reported that they have been informed about identifying the signs of hypothermia, protecting the baby from heat loss and body temperature measurement. Only 15 (22.1%) said that they have been informed about the consequences of heat loss to the baby.

Table 4. 3: Received information

Received information	Frequency n (%)	
	Yes	No
Identify the signs of hypothermia	68(100.0)	0(0.0)
Protect the baby from heat loss	68(100.0)	0(0.0)
Consequences of heat loss to the baby	15(22.1)	53(77.9)
Body temperature measurement	68(100.0)	0(0.0)
Assuming that you didn't get any information about hypothermia; are you able to recognize that the newborn is experiencing heat loss	118(73.3)	43(26.7)

4.3.4. Mother's knowledge about hypothermia in new born (n-161).

Correct answers to the knowledge about hypothermia in newborn are presented in (table 4.4). Among participants only 43 (26.7%) reported that they can recognize baby's hypothermia when nurse reports body temperature. Regarding causes of hypothermia 98 (60.9%) of them could not know that washing the baby immediately after birth can cause hypothermia. A large proportion 151(93.8) responded correctly about covering the baby with a cold towel, lying the baby in a cold area was answered by 142 (88.2%), while 99 (61.5%) do not know that lying the baby alone can cause hypothermia. The signs and symptoms of hypothermia were assessed in this study, cyanosis and cold extremities were answered correctly by 141(87.6%) while 107 (66.5%) do not know that poor feeding and lethargy are signs and symptoms of hypothermia and most of respondents do not know the complications of hypothermia. Most of them 97(60.2%) do not consider that no bathing immediately after birth can prevent hypothermia.

A large majority, 140 (87.0%) believe that drying the baby after bathing and wrap in a warm clothe can prevent hypothermia. However the majority of them 152 (94.4%) do not believe that skin to skin can prevent hypothermia, who do not believe that early initiation of breastfeeding within the first four hours can prevent hypothermia were 142(88.2%).

Table 4. 4: The proportion of correct answer to the knowledge about hypothermia in newborn

Knowledge assessment items	Correct answer n (%)	Wrong answer n (%)
Recognize baby's hypothermia when nurse reports body temperature	43(26.7)	118(73.3)
Causes of hypothermia in newborn		
Washing the baby immediately after birth	63(39.1)	98(60.9)
Covering the baby with a cold towel	151(93.8)	10(6.2)
Lying the baby in a cold area	142(88.2)	19(11.8)
Lying the baby alone	62(38.5)	99(61.5)
Signs and symptoms of hypothermia		
Cyanosis and cold extremities	141(87.6)	20(12.4)
Poor feeding	54(33.5)	107(66.5)
Lethargy	54(33.5)	107(66.5)
Complications of hypothermia		
Dyspnea	60(37.3)	101(62.7)
Hypoglycemia	0(0.0)	161(100.0)
Decrease in weight	0(0.0)	161(100.0)
Death	125(77.6)	36(22.4)
Prevention of hypothermia		
No bathing immediately after birth	64(39.8)	97(60.2)
Dry the baby after bathing and wrap in a warm clothe	140(87.0)	21(13.0)
Skin to skin	9 (5.6)	152(94.4)
Early initiation of breastfeeding within the first 4 h	19(11.8)	142(88.2)

4.4. MOTHER'S PRACTICE ABOUT NEWBORN HYPOTHERMIA

Mother's practice about newborn hypothermia was assessed in this study. (Table 4.5). Regarding practices on thermal care, the majority 151(93.8%) do not have a thermometer at home.

Among those who have thermometer at home 6 (60.0%) do not know how to use it. Concerning bathing the baby, 90 (55.9%) know the time of bathing the baby, maintaining the baby warm were 94 (58.4%). Concerning drying the majority 117 (72.7%) has correctly reported the time of drying and wrapping the baby. The majority 142 (88.2%) do not know the best practice after washing the baby.

Regarding breastfeeding, who reported correctly how soon after birth breastfeeding should be initiated were 107 (66.5%); who do not know the best option when they do not have enough colostrum after birth were 98 (60.9%); the majority 126 (78.3%) reported correctly when a baby should breastfeed.

The matter regarding skin to skin practice 140 (87.0%) do not know the practice and specific treatment when at home the baby gets cold. Of them 88 (54.7%) do not know how long the mother or another caregiver should practice skin-to-skin daily with the baby. Concerning benefits of skin to skin technique, the majority of women who participated in the study do not know the benefits of skin to skin technique. Practices towards care during transport were assessed in this study, and the majority 155 (96.3%) do not know the best way to prevent heat loss if the baby is transported at home or for advanced care.

Table 4. 5: The proportion of good practice towards hypothermia in new born.

Practice items	Good practice	Poor practice
Practice on thermal care		
Temperature measurement		
Who have a thermometer at home	10(6.2)	151(93.8)
Who know how to use it	4(40.0)	6(60.0)
Bathing the baby		
How soon after birth a baby is first bathed	90(55.9)	71(44.1)
The best correct statement about maintaining the baby warm (Baby shares the same bed with the mother)	67(41.6)	94(58.4)
Drying		
How soon after birth do you expect your baby to be dried and wrapped (0-10 min)	117(72.7)	44(27.3)
After washing your baby the best practice (dry, wrap and breastfeed)	19(11.8)	142(88.2)
Breastfeeding		
Timing of initiation of breastfeeding and contact with the mother		
How soon after birth should breastfeeding be initiated (in the first hours)	107(66.5)	54(33.5)
When you do not have enough colostrum after birth, what should be the best option (Rest, drink and maintain breastfeeding without formula supplementation)	63(39.1)	98(60.9)
How often should a baby breastfeed (Immediately after birth generally 3hourly)	126(78.3)	35(21.7)
Skin to skin		
At home when the baby gets cold, the best and specific treatment is (Put the baby skin to skin and cover with clean and warm clothes)	21(13.0)	140(87.0)
How long do you or another caregiver should practice skin-to-skin daily with your baby (At least one hour or whenever possible)	73(45.3)	88(54.7)
During skin to skin technique		
Can you feel your baby is warm?	91(56.5)	70(43.5)
Can you initiate breastfeeding?	43(26.7)	118(73.3)
Can you feel Baby's heart and breathing?	149(74.5)	12(25.5)
You and your baby feel comfortable?	46(28.6)	115(71.4)
Care during transport		
If your baby is transported at home or for advanced care, the best way to prevent heat loss	6(3.7%)	155(96.3)

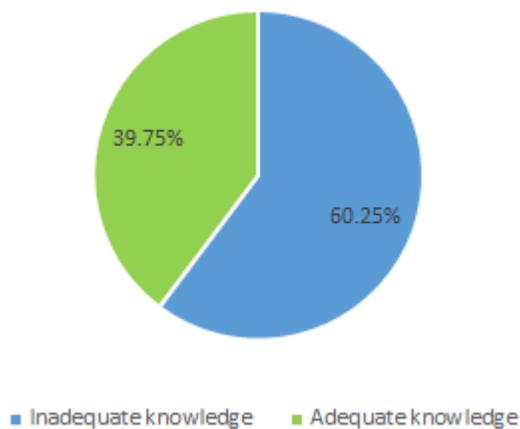
4.5. DISTRIBUTION OF KNOWLEDGE LEVEL AMONG MOTHERS

Only 64 (39.75%) of the mothers had adequate knowledge, around 97 (60.2%) had inadequate knowledge. Respondents who scored between 0-7 were considered to have inadequate knowledge and above 7 were considered to have adequate knowledge.

The level of knowledge were obtained after transforming and scoring all variables related to knowledge. 1: correct answer (reliable with WHO chain of warm); 0: incorrect answer (not in agreement with WHO chain of warm), any mother who did not know the response was considered to have an incorrect response.

The median score of 7 was used as the cutoff for inadequate and adequate knowledge. This method has been also used in a study measuring the level of knowledge and practice of mother regarding essential new born care whereby mothers scoring below the median were considered to have poor knowledge and above or equal to the median are considered to have adequate knowledge (Gulema, 2018).

Figure 4. 3: Distribution of knowledge level among mothers



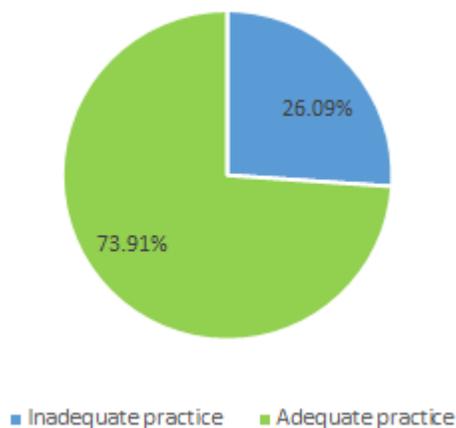
4.6. DISTRIBUTION OF PRACTICE LEVEL AMONG MOTHERS

Figure 5 describes the level of practice of mothers, who scored between 0-8 were considered to have inadequate practice. Who scored above 8 were considered to have adequate practice. Only 42 (26.1%) of the mothers had adequate practice, and a large number 119 (73.9%) had inadequate practice.

The level of practice were obtained after transforming and scoring all variables related to practice. 1: correct answer (reliable with WHO chain of warm); 0: incorrect answer (not in agreement with WHO chain of warm), any mother who did not know the response was considered to have an incorrect response.

For practice, the median of 8 was used as the cutoff for inadequate and adequate practice. This method has been used in a study measuring the level of knowledge and practice of mother regarding essential new born care whereby mothers scoring below the median are considered to have poor knowledge and above or equal to the median are considered to have good knowledge (Gulema, 2018).

Figure 4. 4: Distribution of practice level among mothers



4.7. STATISTICALLY SIGNIFICANT BIVARIATE ANALYSIS BETWEEN INDEPENDENT VARIABLES AND MOTHERS' KNOWLEDGE OF NEONATAL HYPOTHERMIA

Bivariate analysis was carried out to assess the association between independent variables and mothers knowledge of neonatal hypothermia (dependent variable) as presented in (table 4.6) Bivariate analysis indicated statistical significance with socio demographic variables age ($p = 0.002$), level of education ($p = 0.002$), marital status ($p=0.000$), religion of participants ($p =0.000$), husband's occupation $p = (0.014)$ wife's occupation ($p=0.002$), and number of ANC attendance ($p< 0.001$). All variables were significantly associated with the level of knowledge (P value <0.05).

Table 4. 6: Statistically Significant Bivariate Analysis between Independent Variables and mothers' Knowledge of Neonatal hypothermia

Variables	Adequate knowledge	Inadequate knowledge	P value
Age			
20 and below	6(33.3%)	12(66.7%)	0.002
Between 21-30	41(54.7%)	34(45.3%)	
Between 31-40	17(25.8%)	49(74.2%)	
41 and above	0(0.0)	2(100.0%)	
Level of education			
Illiterate	0(0.0%)	11(100.0%)	0.002
Primary school	49(39.2%)	76(60.8%)	
Secondary school	15(60.0)	10(40.0)	
Marital status			
Married	34(29.8%)	80(70.2%)	0.000
Single	26(100%)	0(0.0%)	
Separated /Divorced	4(19.0%)	17(81%)	
Religion of participants			
Catholic	10(11.9%)	74(88.1%)	0.000
Protestant	11(61.1%)	7(38.9%)	
Adventist	0(0.0%)	12(100.0%)	
Muslim	43(91.5%)	4(8.5%)	
Husband's occupation			
Agriculture	49(43.4%)	64(56.6%)	0.014
State and private employed	4(15.4%)	22(84.6%)	
Self employed	11(50.%)	11(50.0%)	
Wife's occupation			
Agriculture	42(44.2%)	53(55.8%)	0.002
State and private employed	4(100.0%)	0(0.0%)	
Self employed	0(0.0%)	11(100.0%)	
Household	14(38.9%)	22(61.1%)	
Students	4(26.7%)	11(73.3%)	
ANC attendance			
None	1(0.0%)	14(100.0%)	< 0.001
1 time	2(6.9%)	27(93.1%)	
2-3 times	52(50.0%)	52(50.0%)	
4 and plus	12(92.3%)	1(7.7%)	

4.8. STATISTICALLY SIGNIFICANT BIVARIATE ANALYSIS BETWEEN INDEPENDENT VARIABLES AND MOTHERS' PRACTICE OF NEONATAL HYPOTHERMIA

Bivariate analysis was carried out to assess the association between independent variables and mother's practice of neonatal danger signs (dependent variable) (table 4.7). Bivariate analysis indicated statistical significance with variables: Education level ($p = 0.001$), marital status ($p = 0.000$) religion of participants $p = (0.000)$, mother's occupation ($p = 0.004$), ANC attendance (< 0.001) were statistically significant with mother's level of practice. There was no statistical significance identified for age (0.507), husband occupation ($p = 0.146$). P value > 0.05 .

Table 4. 7: Statistically Significant Bivariate Analysis between Independent Variables and mothers' practice of Neonatal hypothermia

Variables	Level of practice about hypothermia		P value
	Adequate practice	Inadequate practice	
Age			
20 and below	6(33.3%)	12(66.7%)	0.507
Between 21-30	22(29.3%)	53(70.7%)	
Between 31-40	14(21.2%)	52(78.2%)	
41 and above	0(0.0)	2(100.0%)	
Level of education			
Illiterate	0(0.0%)	11(100.0%)	0.001
Primary school	29(23.2%)	96(76.8%)	
Secondary school	13(52.0)	12(48.0)	
Marital status			
Married	10(11.9%)	74(88.1%)	0.000
Single	24(92.3%)	2(7.7%)	
Separated /Divorced	4(19.0%)	17(81%)	
Religion of participant			
Catholic	10(11.9%)	74(88.1%)	0.000
Protestant	11(61.1%)	7(38.9%)	
Muslim	0(0.0%)	12(100.0%)	
Adventist	21(44.7%)	26(55.3%)	
Mother's occupation			
Agriculture	22(23.2%)	73(76.8%)	0.004
State and private employed	4(100.0%)	0(0.0%)	
Self employed	0(0.0%)	11(100.0%)	
Household	12(33.3%)	24(66.7%)	
Students	4(26.7%)	11(73.3%)	
Father's occupation			
Agriculture	29(25.7%)	84(74.3%)	0.146
State and private employed	4(15.4%)	22(84.6%)	
Self employed	9(40.9%)	13(59.1%)	
ANC attendance			
None	1(6.7%)	14(93.3%)	< 0.001
1 time	0(0.0%)	29(100.0%)	
2-3 times	30(28.8%)	74(71.8)	
4 and plus	12(92.3%)	1(7.7%)	

4.9. RESULTS FROM MULTIPLE LOGISTIC REGRESSION OF VARIABLES THAT HAVE EFFECT ON KNOWLEDGE TOWARDS HYPOTHERMIA PREVENTION IN NEW BORN.

Table 4. 8: Results from multiple logistic regression of variables that have effect on knowledge towards hypothermia prevention in new born.

Variables	OR	95%CI	P. value
Age			
Between 21-30	0.942	0.778-1.686	0.093
Between 31-40	1.262	0.973-1.786	0.078
41 and above	1.567	1.211-1.985	0.067
Level of education			
Illiterate (Ref)			
Primary school	1.061	0.872-1.676	0.058
Secondary school	1.787	1.521-2.187	0.032
Marital status			
Married (Ref)			
Single	1.474	0.988-1.785	0.122
Separated /Divorced	1.168	0.893-1.687	0.231
Religion of participants			
Catholic (Ref)			
Protestant	1.261	0.834-1.984	0.433
Adventist	1.112	1.081-2.111	0.211
Muslim	0.978	0.921-1.911	0.321
Husband's occupation			
Agriculture (Ref)			
State and private	1.576	1.021-2.006	0.133
Self employed	1.376	1.121-2.123	0.231
Attendant's occupation			
Agriculture (Ref)			
State and private	1.062	0.978-1.731	0.784
Self employed	0.932	0.795-2.001	0.334
Household	0.818	0.613-1.586	0.422
Students	1.386	0.934 -1.675	0.483
ANC attendance			
None (Ref)			
1 time	1.553	1.112-1.876	0.543
2-3 times	1.518	1.211-1.936	0.053
4 and plus	1.884	1.675-2.565	0.042

Variables which show significant association with the dependent variable were recruited to multiple logistic regressions for to identify their effects on knowledge about hypothermia in new- born. The results shown that those who completed secondary school are more than one time knowledgeable than those who reported being illiterate1 (OR=1.787, P=0.032, 95% CI=1.521-2.187). Participants who attended ANC 4 times and plus are more than 1 time knowledgeable than those who did not attend (OR=1.884, P=0.042, 95% CI=1.675-2.565).

4.10. RESULTS FROM MULTIPLE LOGISTIC REGRESSION OF VARIABLES THAT HAVE EFFECT ON PRACTICE TOWARDS HYPOTHERMIA PREVENTION IN NEW BORN.

Variables which shown significant association with the dependent variable were recruited to multiple logistic regressions for to identify their effects on practice about hypothermia in new born. The results shown that those who completed secondary school are more than one time knowledgeable than those who reported being illiterate1 (OR=1.987, P=0.037, 95% CI=1.722-2.689).

Table 4. 9: Results from multiple logistic regression of variables that have effect on practice towards hypothermia prevention in new born.

Variables	OR	95%CI	P. value
Level of education			
Illiterate (Ref)			
Primary school	1.162	0.971-1.971	0.113
Secondary school	1.987	1.722-2.689	0.037
Marital status			
Married (Ref)			
Single	1.273	0.818-1.375	0.322
Separated /Divorced	0.964	0.593-1.797	0.222
Religion of participants			
Catholic (Ref)			
Protestant	1.162	0.731-1.881	0.073
Adventist	0.742	0.501-1.611	0.112
Muslim	1.278	0.721-1.813	0.061
Wife's occupation			
Agriculture (Ref)			
State and private employed	1.176	0.778-1.632	0.894
Self employed	0.942	0.595-1.611	0.223
Household	0.731	0.413-1.382	0.123
Students	1.102	0.724 -1.574	0.643
ANC attendance			
None (Ref)			
1 time	0.953	0.413-1.316	0.212
2-3 times	1.317	0.912-1.731	0.323
4 and plus	1.281	1.072-1.664	0.432

CHAPTER FIVE: DISCUSSION OF RESULTS

5.1. INTRODUCTION

The present study intended to assess mothers' knowledge and practice towards neonatal hypothermia at a selected provincial hospital in the Eastern Province of Rwanda. Our findings shown that despite the implementation of the World Health Organization chain of warm across the country, mothers nearest caregivers of neonates remain unknowledgeable about neonatal hypothermia leading to poor practices for hypothermia prevention. This has a crucial impact on neonatal survival.

5.2. DEMOGRAPHIC FINDINGS

This chapter describes socio-demographic characteristics of participants. The category of age that ranged from 21-30 years old was presented in greater proportion with 75 (46.6%), followed by those who are between 31 and 40 with 66 (41%). This shown that the large majority of participants were proficient in terms of childbearing process and hence aware of newborns management.

Regarding level of education a large number 125 (77.6%) had primary school level and this is contrary to the study done by (Amolo, Lucia, Irimu, Grace, Njai, 2017) where they found out that the majority of mothers had 48.2% secondary educational level.

The present study shown that the majority 114 (70.8%) of respondents were married; which is similar to the cross sectional study done on knowledge of mothers on newborn essential practices by (Amolo, Lucia, Irimu, Grace, Njai, 2017) where he found out that the majority (75.8%) of participants were married.

Marital status has long been known as a significant impact in newborn health improvement; this is supported by a study done in Bangladesh highlighting the importance of men in increasing mothers' knowledge in terms of neonatal danger signs including hypothermia (Zaman *et al.*, 2018). Our research found out that the majority of participants 84 (52.2%) were

Christians; of the remaining 47 (29.2% were Muslims. Husband's occupation was asked in this study and most of participants; 113 (70.2%) depended on agriculture. Concerning mother's occupation a large number 95 (59%) was farmer.

This may have positive impact on babies whose mothers are self-employees or farmer because the study done by (Madhavi and Wickremasinghe, 2014) shown that the risk of babies of having hypothermia is minimum for those whose mothers are working, staying at home or self-employees (P=0.6) in comparison with those working in private sectors.

5.3. MOTHERS LEVEL OF KNOWLEDGE TOWARDS NEONATAL HYPOTHERMIA

Neonatal hypothermia has been pinpointed for decade as a serious threat for infant survival, but less attention has been given to this health challenge notably in resource limited settings; mothers nearest caregivers of neonates remain unknowledgeable. In this study although (58%) of mothers reported having received informations regarding thermal care, data shown that only (39.75%) of the mothers had adequate knowledge, around (60.2%) had inadequate knowledge. This is similar to a cross sectionnall study done in Kenya by (Amolo, Lucia, Irimu, Grace, Njai, 2017) that classified mother's knowledge to be low in terms of neonatal hypothermia. The package of information regarding thermal care was ,the definition and the meaning of hypothermia, the causes of neonatal hypothermia, the signs and symptoms,prevention as well as its consequences.

5.3.1. Neonatal hypothermia meaning

In terms of neonatal meaning, (73 %) of women reported to recognize hypothermia by simple touch; what is inconsistent with WHO 2014 neonatal hypothermia definition as a decrease of axillary body temperature below 36.5⁰ Celsius. In this study, the neonatal hypothermia meaning was reported by 43(26.7%) of participants, this means that neonatal hypothermia is the most neglected among all danger conditions that affect the new born. This is consistent with a study done on the low awareness of hypothermia where among delivered mothers only 4% of the participants were knowledgeable about neonatal hypothermia (Shukla and Nair, 2017).

Another study conducted in Bangladesh found that About (51.4%) of postnatal mothers recognized hyperthermia as more dangerous whereas only (26.1%) of respondents reported hypothermia to be a risky sign in babies (Zaman *et al.*, 2018). Despite the difference in numbers all these studies turn around the ignorance about the problem of hypothermia as a danger sign. There is a need to increase its awareness among mothers.

5.3.2. Signs and symptoms of hypothermia

In this study cyanosis and cold extremities were known by the majority 141 (87.5%); poor feeding, lethargy were known by only 54(33.5%) respectively. Controversially to those findings, a study done by (Qazi, Saqib and Raina, 2019c) reported (52%) of mothers to know poor feeding; nearly a quarter of them (22%) identified lethargy and only a least of a half (15%) relied on felling neonate's extremities cold to identify hypothermia.

There is a small difference but in spite of this several studies have identified that mothers are unknowledgeable about signs and symptoms of hypothermia. Despite the known severity of that problem of neonatal hypothermia, even the experts in medical research did not yet in nowadays identified hypothermia as a sign of a disease or a pathology a part. What is known is that hypothermia most of the time accompanies or worsens severe conditions that are known to kill infants in neonatal period such as prematurity, birth asphyxia. This misclassification leads to its negligence (Vilinsky-redmond and Sheridan, 2014).

5.3.3. Causes of neonatal hypothermia

This study shown that mothers are aware of the classic causes of the newborn heat loss. Hence wrapping in cold towel and lying the baby in a cold environment was successfully stated respectively by 151(94%) and 142 (88%) whereas washing at birth and lying the baby alone were still a challenge and known by almost 38.5 and 39% of participants. This is consistent with several articles that address neonatal hypothermia. For instance, in Dhaka, Bangladesh all newborn were promptly cleaned at delivery for removing the child bearing pathway odors. Similar to a study done in Zambia, babies were washed immediately after birth and kept away from the mother until mother feels well (Lunze *et al.*, 2014).

The causes of neonatal hypothermia go beyond classical causes and involve also multiple factors that influence the occurrence of hypothermia and those include physiological,

behavioral and social economic factors. The own physiology of the baby is another challenge that expose all babies at risk for hypothermia regardless of climates or gestational age. This implies that all babies must be kept warm to prevent heat loss.

5.3.4. Complications of neonatal hypothermia

Regarding hypothermia complications, the study shown that 125 (77.6%) of mothers recognized that hypothermia may lead to death; while dyspnea is known only by 60 (37.3%) of them, other complications were not reported. This is consistent with all literature regarding hypothermia; they argue that hypothermia is a silent killer for babies. (Lunze et al 2014). Concerning dyspnea, there is also a confusion because it is classified by World Health Organization as a danger sign present in most of serious illnesses rather than a complication. This misclassification also may confuse the mothers.

Although mothers assured that they have received the information regarding hypothermia in infant from nurses, the problem is to ensure whether the required information have been really provided. This is consistent with a study done by (Sapkota, Babu and Goyal, 2017) arguing that knowledge and practice of mothers regarding neonatal hypothermia depend largely on the quality of the health package they receive from nurses.

5.3.5. Prevention of neonatal hypothermia

Prevention of hypothermia in this study was assessed; 140 (87%) of mothers reported drying the baby and wrapping in a warm towel to be a way of preventing heat loss while 64 (40%) of them recognized delaying bath, Skin to skin, early breastfeeding were reported respectively by 9 (6%), and 18 (12%) of mothers. This is a bit consistent with a study conducted in India where results found that only (44%) of mothers dried the neonate at birth; eleven percent of them practiced the kangaroo mother care technique (Qazi, Saqib and Raina, 2019b). In these two cases, breastfeeding and skin to skin were unrecognized as heat producers. This is not consistent with WHO chain of warm that includes skin-to-skin contact, breastfeeding as ways to prevent heat loss in neonates.

5.4. PRACTICE OF MOTHERS TOWARDS NEONATAL HYPOTHERMIA

Practice of mother towards neonatal thermal care constitutes a significant determinant for the newborn positive or negative outcomes. In this study, the majority of participants 119 (73.9%)

had poor practices towards thermal care. The area of focus was practices on thermal care that include temperature measurement, bathing drying the baby, keeping baby and mother together, breastfeeding; skin to skin, transporting the baby.

5.4.1. Temperature measurement

In the study the majority 151 (94%) do not have a thermometer at home. Among 10(6.2%) women who have thermometer only 4 (40%) of them know how to use it. Mothers, even those with a certain level of education do not have nor know using thermometer neither able to recognize the interpretation of numerical findings from a temperature measuring. This also is inconsistent with World Health Organization steps for maintaining the chain of warm that include temperature measurement. Mothers should gradually be initiated to the infant temperature measurement.

5.4.2. Bathing the baby, drying, maintain warm

Concerning bathing the baby, 90 (56%) knew the time of bathing the newborn. Similar to a study done in Sri-Lanka, more than a half (69%) of mothers were practicing wrong ways that can lead to hypothermia such as washing the baby's body immediately at birth without drying the wet head, and washing the baby's head and body together at the same time without immediate drying (Madhavi and Wickremasinghe, 2014).

A current study by (Sapkota, Babu and Goyal, 2017) stated that (92%) of babies had been bathed within the first hour while WHO recommends postponing bath at least for 24 hours after birth.

Furthermore, studies done in Tanzania and Ghana reported that traditional birth attendants kept new-borns lying on the floor until placenta is delivered; babies are washed soon after delivery since they are considered dirty (Lunze *et al.*, 2014). This is also inconsistent with WHO recommendations. The majority 142 (88.2%) do not know the best practice after washing the baby.

5.4.3. Keeping baby and mother together

Keeping baby and mother together were 67 (41.6%) of all participants knew that lying the baby with the mother is the best practice to maintain warm in infants. This contradicts a bit the

WHO chain of warm that includes keeping mother and baby together. A study done by (Mccall *et al.*, 2018) that found keeping baby and mother together and encouraging breastfeeding are vital in maintaining baby warm; this study supports the WHO chain of warm.

5.4.4. Early initiation of breastfeeding

Regarding breastfeeding 98 (61%) of participants do not know the best practice when they do not have enough colostrum after birth. This is inconsistent with a study done in Sri Lanka where only (90%) of postnatal mothers rely on continuous breastfeeding; Similarly in Ethiopia nearly the majority of mothers (85.2%) have positive behaviors towards breastfeeding as more than a half of them (68.4%) mothers were aware of exclusive breastfeeding and nurse on demand (Qazi, Saqib and Raina, 2019b). In this study only 39% women reported to not resuming breastfeeding when milk is insufficient. The rest of mothers notably those who were economically stable used pre lacteal feeds and the poorest relied on the use of plenty water. Even though, breastfeeding is practiced by a large number of women not for hypothermia prevention but for nutritional purpose.

There is a need to spread that information in order to strength the use of breastfeeding as an easier, cost effective way to ensure adequate thermal sustainability. Mothers should be educated repeatedly that baby suckling is the most affordable fuel for milk production.

5.4.5. Skin to skin care and new-born transport

Practice regarding skin to skin is seemingly low even used frequently in our health settings or our home. More than half 88 (54.7%) of mothers in the present study do not know how long a session of practice of skin to skin should last. Several authors stated that Kangaroo mother care should be practiced continuously the full day for health benefits and the growth of the high risk neonate (Urmila, Ravikumar and Karunakaran, 2018). Similar to these studies, World Health Organization viewed KMC as a persistent skin to skin contact between the mother and the baby. Controversially, evidence based studies assessing knowledge, attitudes and practices towards skin to skin contact among mothers argued that one hour session should help accomplish desired outcomes for the infant (Shah, Sainju and Joshi, 2017).

Another observed gap in our study is that the majority 155 (96.3%) do not know the best way to prevent heat loss if the baby was transported at home or for advanced care. This is consistent with a study done in India where only (11%) of mothers observed Kangaroo mother care during transport hence disrupting the WHO chain of warm (Qazi, Saqib and Raina, 2019c).

5.5. ASSOCIATION OF KNOWLEDGE WITH SOCIO DEMOGRAPHIC CHARACTERISTICS

Results from bivariate analysis shown that variables such as age, level of education, marital status, religion of participants, husband's occupation, and wife's occupation and number of ANC attendance were associated to the level of knowledge about hypothermia in newborn (P value <0.05). In this study, multiple logistic regressions analysis shown that those who completed secondary school are more than one time knowledgeable than those who reported being illiterate (OR=1.787, P=0.032, 95% CI=1.521-2.187). This is supported by the study done in Kenya that asserted mothers knowledge regarding essential newborn care including thermal care to increase significantly with education level; those with secondary education were more knowledgeable (OR 3.3,95% CI 2.0-5.2) with p <0.001 than those with only primary education (Amolo, Lucia, Irimu, Grace, Njai, 2017).

LMIC countries have scaled up the antenatal care attendance at an encouraging rate and this has a noticeable impact on child positive outcomes as many health messages are delivered preferably during antenatal care. In this study participants who attended antenatal consultation 4 times and plus were more than 1 time knowledgeable than those who did not attend (OR=1.884, P=0.042, 95% CI=1.675-2.565). This is similar to a study done in Laos which argued that mothers' knowledge in terms of new born care were more enhanced by educational informations received during pregnancy (Qazi, Saqib and Raina, 2019c). These findings are inconsistent with a study done in Sri Lanka that reported no association between knowledge and antenatal consultation attendance.

Although this study seemed to contrast many others that recognize antenatal consultation education to enhance mothers 'knowledge; education from antenatal consultation sessions has been known to be an effective opportunity where the mothers may acquire the knowledge and

practices that aim to ensure safe child health. If such gaps are still observed it is due to negligence or resistance to change.

5.6. ASSOCIATION OF PRACTICE WITH SOCIO DEMOGRAPHIC CHARACTERISTICS

Results from bivariate analysis shown that variables such as level of education, marital status, religion of participants, wife's occupation and number of ANC attendance were associated to the level of practice towards hypothermia in newborn (P value < 0.05).

Socio demographic variables such as age, husband's occupation, were not significantly associated to the level of practice (P value > 0.05). The results from multiple logistic regressions shown that those who completed secondary school are two times more likely to have adequate practice than those who reported being illiterate (OR=1.987, P=0.037,95% CI=1.722-2.689). Poor practices in terms of neonatal hypothermia remain a challenge in LMIC as most of them are often rooted from lack of knowledge closely linked to the educational level. A study done in China highlighted the valuable impact of education in improving health in all areas across nations (Huang, 2015).

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1. INTRODUCTION

This chapter comprises a summary conclusion of the study and related recommendations.

6.2. CONCLUSION

The majority of participants 60% had inadequate knowledge while only (39.75%) of mothers revealed adequate knowledge. Regarding the level of practice (26.1%), the mothers had adequate practice. The bivariate analysis of socio demographic variables such as age, level of education, marital status, religion of participants, husband and wife's occupation, number of ANC attendance shown a significantly association with the level of knowledge regarding neonatal hypothermia (P value < 0.05). Multiple regressions shown that those who completed secondary school were more than one time knowledgeable than those who reported being illiterate¹ (OR=1.787, P=0.032, 95% CI=1.521-2.187). Mothers who attended ANC 4 times and plus were more than 1 time knowledgeable than those who did not attend (OR=1.884, P=0.042, 95% CI=1.675-2.565).

The level of practice was significantly associated with variables such as the level of education, marital status, religion of the participants, and wife's occupation and number of ANC (P value <0.05). On multiple regressions, the results shown that those who completed secondary school were two times more likely to have adequate practice than those who reported being illiterate (OR=1.987, P=0.037, 95% CI=1.722-2.689). The findings of this study conclude that ANC attendance and the level of education were the most significant predictors to mother's knowledge towards neonatal hypothermia while only educational level was a predictor for the level of practice.

According to these findings, there is a need to continue strengthening ANC attendance and reinforce health package of information to deliver. Fostering education will improve the health of the whole community namely newborn.

6.3. RECOMMENDATIONS

6.3.1. To the selected study setting.

Mothers' knowledge and practices regarding neonatal hypothermia is obviously low in the study population, thus a structured education with a predetermined full package among mothers is required and the message should be extended at community level by mass media. Continuous professional development on neonatal hypothermia prevention should be implemented in nurses and midwives as hypothermia is a global burden in neonates regardless of climates; emphasizing on observed gaps among mothers. These areas consisted of signs, symptoms, complications and preventive measures of neonatal hypothermia. Certain areas for practice were also pointed to characterize mothers inadequate practice namely temperature measurement, breastfeeding and KMC.

The WHO chain of warm must be strongly observed by users and leaflets must be distributed to all mothers attending ANC, labor ward, Neonatal intensive care unit and community. A local policy for neonatal hypothermia should be implemented in all catchment areas notably in all maternal and childcare services. Post natal care should be performed holistically taking into consideration newborn vitals including the body temperature. The mothers should be gradually initiated to neonate's body temperature measurement.

6.3.2. To Schools of Nursing and Midwifery

Neonatal hypothermia concept should be incorporated into nursing and midwifery program curriculum and training program for nurses in order to improve their knowledge in terms of neonatal hypothermia enabling them to deliver to mothers a consistent health package.

Further observational studies addressing mother's knowledge and practices in Rwanda are needed. Schools have to include in their package a community outreach program for young students in order to assist and empowering mothers in prevention of neonatal hypothermia.

6.3.3. Administration and international community.

The results of this study namely gaps identified will be extended at stakeholders' level in order to ease its implementation in routine care and ensure the quality of message delivered by health care providers, and empower mothers who are not able to provide adequate thermal

care. The experimented medical researchers have to conduct deep research to understand the burden and meaning of neonatal hypothermia as it is even in nowadays not yet understood thus it remains a silent killer for the neonates. As the number of neonatal nurses increases, they have to go beyond neonatal intensive care units and assist postpartum mothers in their homes.

6.3.4. Community

The whole community should be sensitized on the problem of neonate hypothermia in order to increase its awareness and willing to empower mothers in case of eminent risk of hypothermia in newborn.

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Appendix A –

Hey Chart B . Appendix B – The Mechanism of Non-shivering Thermogenesis C . Appendix C – The Effects of Cold Stress D . Appendix D – Criteria for Cooling E . Appendix E – Kamed equipment competency’.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE ENGLISH VERSION

MOTHERS' KNOWLEDGE AND PRACTICE REGARDING HYPOYHERMIA IN NEONATES

I am Emerthe MUSABYEMARIYA, a University student in the Faculty of Medicine and Health Sciences, Department of Nursing, Master of Neonatology. I am conducting a research dissertation on “**Mother’s knowledge and practices regarding neonatal hypothermia at Rwamagana Provincial hospital**”. This is important because babies are likely to die in that period of 28 days called neonatal period. Mothers as nearest caregivers are supposed to be aware of neonatal hypothermia.

SECTION A: SOCIAL DEMOGRAPHIC DATA

1. How old are you?
2. What level of education did you attain? (*Tick where that apply*)
 - a. None
 - b. Primary school
 - c. Secondary school
 - d. University
 - e. Others (Specify).....
3. What is your marital status? (*Tick where that applies*)
 - a. Married
 - b. Not married legally
 - c. Single
 - d. Separated/Divorced
 - e. Widowed
4. How many children do you have?
5. What is your religion? (*Tick where that apply*)
 - a. Catholic
 - b. Protestant
 - c. Adventist
 - d. Muslim
 - e. Other (specify).....
6. Occupation

6.1. Husband's occupation

- a. Agriculture
- b. State & private employed
- c. Self-employed
- d. Household
- e. Other

6.2. Wife's occupation

- a. Agriculture
- b. State & private employed
- c. Self-employed
- d. Household
- e. Other

SECTION B: OBSTETRIC DATA

7. How many times did you attend ANC? (*Tick all that apply*)

- a. None
- b. 1 time
- c. 2-3 times
- d. 4 and plus

8. Baby's age (days):

9. Was the baby born on term?

- a. Male
- b. Female

10. Baby's gender:

- a. Male
- b. Female

SECTION C: MOTHER'S KNOWLEDGE ABOUT NEWBORN HYPOTHERMIA

3.1. Information about newborn hypothermia

1. Have you ever received, heard any information about thermal care?

- a. Yes
- b. No

2. If yes in the question above, the information you received was about what?

- a. Identify the signs of hypothermia
- b. Protect the baby from heat loss
- c. Consequences of heat loss to the baby
- d. Body temperature measurement

3. If yes in the question above, where did you get the information? (Tick all that apply)

- a. From doctor
- b. From the nurse or midwife
- c. From HCW
- d. From peers
- e. Others (Specify)

4. Assuming that you didn't get any information about hypothermia; are you able to recognize that the newborn is experiencing heat loss?

- a. Yes
- b. No

3.2 Mothers 'knowledge

1. You recognize baby's hypothermia when nurse reports that body temperature is: (**Choose one**)

- a. 36.4⁰C and below
- b. 36.5⁰ C - 37.5⁰C
- c. 37,6⁰C and above
- d. I do not know anything about it

Causes of hypothermia

2. What are the causes of hypothermia in newborn? (**Tick all that apply**)

- a. Washing the baby immediately after birth
- b. Covering the baby with a cold towel
- c. Lying the baby in a cold area
- d. Lying the baby alone

Signs and symptoms of hypothermia

3. What symptoms do babies with hypothermia often show? (**Tick all that apply**)

- a. Cyanosis and cold extremities
- b. Poor feeding
- c. Lethargy

Complications of hypothermia

4. What complications may arise to a baby with hypothermia? (**Tick all that apply**)

- a. Dyspnoea
- b. Hypoglycaemia
- c. Death

Prevention of hypothermia

5. What are the measures to prevent a baby from cooling off? (**Tick all that apply**)

- a. No bathing immediately after birth
- b. Dry the baby after bathing and wrap in a warm clothe
- c. Skin to skin
- d. Early initiation of breastfeeding within the first 4 h

SECTION D: PRACTICES ON THERMAL CARE

Temperature measurement

1. Do you have a thermometer at home?

- a. Yes
- b. No

2. If yes, do you know how to use it?

- a. Yes
- b. No

Bathing the baby

3. How soon after birth a baby is first bathed? **Choose one**

- a. Immediately after birth
- b. In the first hour
- c. 2-4 hours
- d. After 24 hours
- e. I don't know anything about it

4. What best statement is correct about maintaining the baby warm? **Choose one**

- a. Application of oil around the baby's body after birth
- b. Bathing the baby to remove the vernix caseosa
- c. Baby is washed with warm water immediately after birth
- d. Baby shares the same bed with the mother

Drying

5. How soon after birth do you expect your baby to be dried and wrapped? **Choose one**

- a. 0 - 10 minutes
- b. 10-20 minutes
- c. 20-30 minutes
- d. Greater than 1 hour

6. After washing your baby what is the best practice among the following? **Choose one**

- a. Shaking and drying the baby
- b. Dry, then wrap with same cloth
- c. Dry, then wrap with different cloth
- d. Do not dry and breastfeed the baby

Breastfeeding (Timing of initiation of breastfeeding and contact with the mother)

7. How soon after birth should breastfeeding be initiated? **Choose one**

- a. In the first hour
- b. After the first hour, but in less than 6 hours
- c. 6-12 hours
- d. When mother's condition becomes stable

8. When you do not have enough colostrum after birth, what should be the best option? **(Choose one)**

- a. Immediately pass to formula for several days
- b. Offer the baby some sucrose for several days
- c. Rest, drink and maintain breastfeeding without formula supplementation
- d. Rest, drink, maintain breastfeeding with formula supplementation

9. How often should a baby breastfeed? **(Choose one)**

- a. On demand for stable baby or Generally, 3 hourly
- b. Generally after 3 hours
- c. Others (specify).....

Skin to skin

10. At home when the baby gets cold, the best and specific treatment is: **Choose one**

- a. Lying the baby in a coat and cover with new and luxury clothes
- b. Lying the baby on a hot surface and cover with warm clothes
- c. Put the baby skin to skin and cover with clean and warm clothes
- d. Simply cover the baby and wait

11. How long do you or another caregiver should practice skin-to-skin daily with your baby? :

(Choose one)

- a. At least for 60 minutes
- b. At least for 15 minutes
- c. It depends on mother's will
- d. It depends on the mother's availability
- e. It is not necessary if the baby is not premature

During skin to skin technique. (Tick all that apply)

- 12. Can you assess whether your baby get warm?
- 13. Can you initiate breastfeeding?
- 14. Can you monitor Baby's heart and breathing?
- 15. Do you feel comfortable you and your baby?

Care during transport (Thermal protection during transport and after discharge)

16. If your baby is transported at home or for advanced care. The best way to prevent heat loss is: *Choose one*

- a. Covered in blanket(s) and a hat
- b. Placed skin-to-skin with mother or other person
- c. Others

APPENDIX 2: QUESTIONNAIRE KINYARWANDA VERSION

IBIBAZO BY'UBUSHAKASHATSI

IBIBAZO: Ubumenyi bw' ababyeyi n' ibyo bakora ku bijyanye no kurinda abana gutakaza ubushyuhe

IGICE CYA 1: IMIBEREHO RUSANGE Y' UMUBYEYI

1. Ufite imyaka ingahe?

2. Ni uruhe rwego uriho mu myigire? (*Shyira akamenyetso ku kazu kabanyane n' igisubizo nyacyo*)
 - a. Sinize
 - b. Nize amashuri abanza
 - c. Nize amashuri yisumbuye
 - d. Nize Bachelors
 - e. Nize masters
 - f. Nize ibindi (*bigaragaze*).....

3. Ese waba : (*Shyira akamenyetso ku kazu kabanyane n' igisubizo nyacyo*)
 - a. Mbana n' uwo twashakanye
 - b. Ndi ingaragu
 - c. Natandukanye n' uwo twashakanye
 - d. Ndi umupfakazi

4. Ufite abana bangahe?
 - a. 1
 - b. 2-3
 - c. 4-5
 - d. Barenze batanu (5)

5. Garagaza idini ryawe
 - a. Gatorika
 - b. Umuporotesitanti
 - c. Umudivantisiti w' umunsi wa karindwi
 - d. Umusilamu
 - e. Irindi dini (*Rigaragaze*)

6. Akazi kabatunze

6.1. Akazi k' umugabo

- a. Umuhinzi-mworozi
- b. Umukozi
- c. Uwikorera ku giti cye
- d. Imirimo yo mu rugo
- e. Ibindi

Sobanura

6.2. Akazi k' umugore

- a. Umuhinzi-mworozi
- b. Umukozi
- c. Uwikorera ku giti cye
- d. Imirimo yo mu rugo
- e. Ibindi

Sobanura

7. Umwana amaze iminsi ingahe avutse?

- a. 0-6
- b. 8-14
- c. 15-21
- d. 22-28

8. Umwana yavutse ashytse?

- a. Yego
- b. Oya

9. Igitsina cy' umwana

- a. Gabo
- b. Gore

10. Igihe wari utwite mbere yo kubyara, wisuzumishije inshuro zingahe?

- a. Nta na rimwe
- b. Inshuro imwe
- c. Inshuro 2-3
- d. Inshuro 4 kuzamura

11. Hari ubumenyi wigeze uhabwa ku bijyanye no kurinda umwana ubukonje?

- a. Yego
- b. Oya

12. Niba ubyemeza mu kibazo cya 11, ubwo bumenyi wabuhawe nande ?

- a. Dogiteri
- b. Umuforomo cyangwa umubyaza
- c. Umujyanama w' ubuzima
- d. Abo twagiye tunganira
- e. Ahandi

(Havuge)

IGICE CYA KABIRI: UBUMENYI BW'UMUBYEYI

2.1. AMAKURU K' UBUKONJE BW' URUHINJA

13. Waba warigeze ubona amakuru ku bijyanye n' ubukonje bw' uruhinja?

- a. Yego
- b. Oya

14. Niba ari yego, yari ajyanye n' iki?

- a. Ibimenyetso by' ubukonje ku ruhinja
- b. Uburyo bwo kurinda umwana ubukonje
- c. Ingaruka z' ubukonje ku ruhinja
- d. Gupima ubukonje

15. Niba ari yego, ninde waguhaye amakuru?

- a. Dogiteri
- b. Umubyaza cyangwa umuforomo
- c. Umujyanama w' ubuzima
- d. Urungano
- e. Abandi

..... (Havuge)

16. Ubusanzwe washobora kumenya ko umwana akonje?

- a. Yego
- b. Oya

2.2. UBUMENYI BW'UMUBYEYI KU BUKONJE BW'URUHINJA

2.3.

17. Umenya ko uruhinja rwatakaje ubushyuhe iyo umuganga avuze ko igipimo cy'ubushyuhe kiri kuri: (Vuga kimwe)

- a. Kuva kuri dogere 36.4 kumanuka
- b. Hagati ya dogere 36.5 na dogere 37.5
- c. Kuva kuri dogere 37,6 kuzamura
- d. Ntacyo mbiziho

2.4. IMPAMVU ZITUMA URUHINJA RUTAKAZA UBUSHYUHE

18. Gutakaza ubushyuhe ku mwana w' uruhinja biterwa n' iki? (*Shyira akamenyetso ku bisubizo bikwiriye*)

- a. Kumwoza akimara kuvuka
- b. Gufubika uruhinja igitenge
- c. Kuryamisha uruhinja ahantu hakonje
- d. Kuryamisha uruhinja rwonyine
- e. Ikindi (*Kigaragaze*)

2.5. IBIMENYETSO BIGARAGAZA GUTAKAZA UBUSHYUHE KU RUHINJA

19. Uruhinja rwatakaje ubushyuhe rugaragaza ibihe bimenyetso?

- a. Gukonja ibirenge, intoki no kwirabura
- b. Kutabasha konka
- c. Gucika intege
- d. Ibindi (*Bigaragaze*)

2.6. INGARUKA ZO GUTAKAZA UBUSHYUHE

20. Ni izihe ngaruka zishobora kugera ku ruhinja rwatakaje ubushyuhe?

- a. Guhumeka nabi
- b. Gutakaza isukari
- c. Gutakaza ibiro
- d. Urupfu
- e. Ibindi (*Bigaragaze*)

2.7. KURINDA URUHINJA GUKONJA

21. Wabigenza ute ngo urinde uruhinja gutakaza ubushyuhe?

- a. Kutamwoza akimara kuvuka
- b. Kumutsa umwana ukimara kumwoza, ukamufubika
- c. Kumushyira mu gituzo
- d. Kumwonsa mu masaha ane ya mbere nyuma yo kuvuka
- e. Ibindi

(*Bigaragaze*)

IGICE CYA GATATU:

IBIKORWA BIJYANYE NO KUBUNGABUNGA UBUSHYUHE BW' UMWANA

3.1. GUPIMA UBUSHYUHE BW' UMUBIRI

22. Ese ugira igikoresho gipima ubushyuhe bw' umwana (*igipimo*)?

a. Yego

b. Oya

23. Niba ari yego, uzi kugikoresha?

a. Yego

b. Oya

3.2. KWOZA UMWANA

24. Ni ryari bikwiriye ko watangira koza umwana wavutse? (*Hitamo kimwe*)

a. Akimara kuvuka

b. Mu isaha ya mbere

c. Hagati y' amasaha 2 n' amasaha 4

d. Nyuma y' amasaha 24

25. Hitamo uburyo buboneye bwo kubungabunga ubushyuhe bw' umwana. (*Hitamo kimwe*)

a. Gusiga umwana amavuta akimara kuvuka

b. Koza umwana ugakuraho ibinure yavukanye

c. Gukarabya umwana amazi ashyushye akimara kuvuka

d. Kuryamisha umwana mu buriri bumwe na nyina

3.3. KUMUTSA UMWANA

26. Umwana ukivuka yagakwiriye kumutswa no gufubikwa mu gihe kingana iki?

a. Hagati y' iminota 0 na 10

b. Hagati y' iminota 10 na 20

c. Hagati y' iminota 20 na 30

d. Nyuma y' isaha

27. Nyuma yo kwoza uruhinja, hitamo igikorwa kimwe kiboneye wakora mu bikurikira:

a. Kumutsa uruhinja urusimbiza

b. Kumuhanagura, ukamugumisha mu byo wamuhanaguje

c. Kumuhanagura, ukamwambika ukamuryamisha

d. Kumuhanagura, ukamwambika, ugahita umwonsa

3.4. KWONSA UMWANA

Igihe bifata ngo umwana yonswe bwa mbere no kumuhuza na nyina

28. Bifata igihe kingana iki ngo umwana ukivuka ashwirwe ku ibere? (*Hitamo kimwe gusa*)
- a. Mu isaha ya mbere akimara kuvuka
 - b. Nyuma y' isaha ya mbere ariko bitarengeje amasaha 6
 - c. Hagati y' amasaha 6 na 12
 - d. Nyuma y' uko umubyeyi amaze kumererwa neza
29. Iyo umubyeyi adafite amashereka ahagije nyuma yo kubyara yabigenza gute? (*Hitamo kimwe*)
- a. Guha umwana amata mu gihe ugitegereje ko amashereka yiyongera
 - b. Guha umwana amazi arimo isukari mu gihe ugitegereje ko amashereka yiyongera
 - c. Kuruhuka, ukanywa bihagije, ugakomeza konsa umwana utamushyize ku mata
 - d. Kuruhuka, ukanywa bihagije, ukonsa umwana, ugakoresha n' amata
30. Uruhinja rugomba konswa mu gihe kingana gute? (*Hitamo ibishoboka byose*)
- a. Iyo umwana abishatse igihe adafite ikindi kibazo
 - b. Muri rusange ni inshuro 3 mu isaha
 - c. Inshuro 3 mu isaha imwe
 - d. Ibindi (*Bigaragaze*)
-

3.5. GUHUZA UMUBIRI W'UMWANA N'UW'UMUBYEYI

31. Iyo muri mu rugo, umwana akagira ikibazo cy' ubukonje wabigenza ute? (*Hitamo kimwe*)
- a. Kumwambika umupira n' indi myenda myiza mishya
 - b. Kumuryamisha mu buriri bwe, ukamworosa imyenda imushusya
 - c. Kumushyira mu gituzo, ukamworosa imyenda imushyushya
 - d. Kumuryamisha, ukamworosa ugategereza
32. Iyo bibaye ngombwa umwana ashwirwa mu gituzo, ibyo byamara igihe kingana gute ku muni? (*Hitamo kimwe*)
- a. Byibuze mu gihe cy'iminota 60 (1h)
 - b. Byibuze mu gihe cy'iminota 15
 - c. Singombwa iyo umana avutse ashwitse
 - d. Biterwa n'ubushake bwa nyina

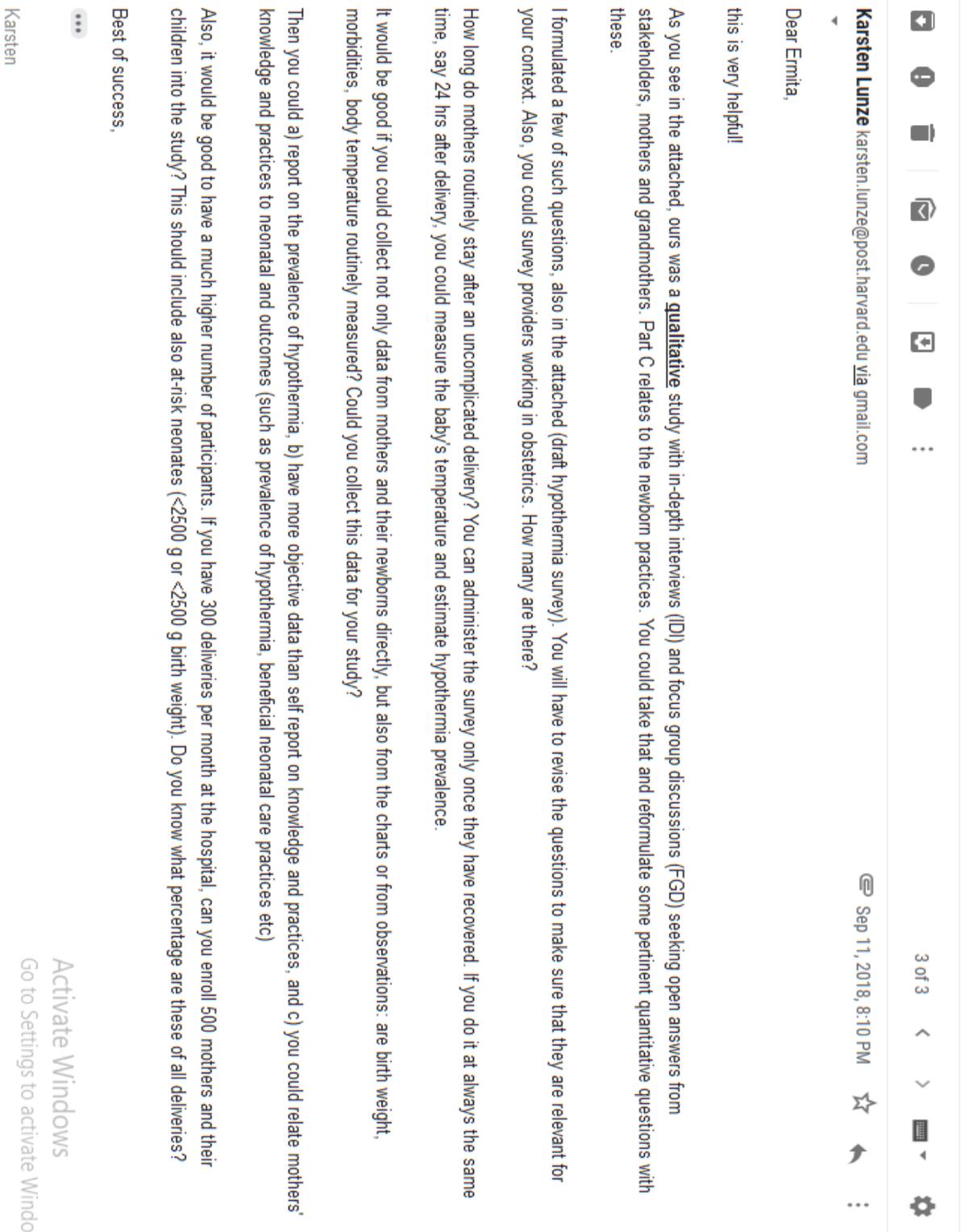
33. Kugaragaza ubumenyi ku byiza byo gushyira umwana mu gituzi
(*hitamo ibisubizo byose bishoboka*)
34. Ubasha kumenya ko umwana asusurutse?
35. Birakorohera kosa umwana umwana?
36. Ubasha kunva niba umwana ahumeka cgw ko umuyima utera?
37. Wunva usabanye n' umwana?

3.6. UKO BATWARA UMWANA

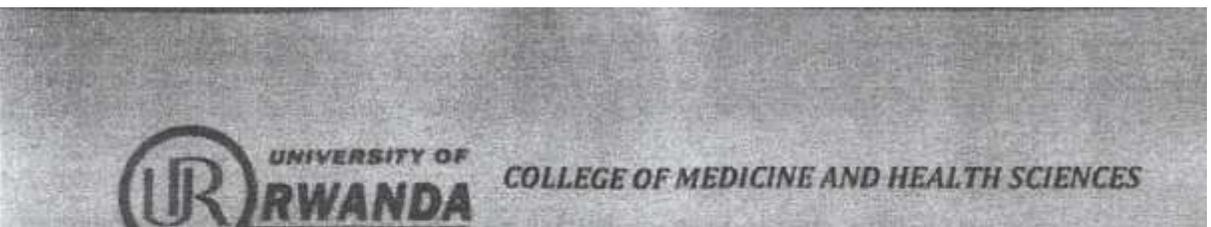
Uko barinda umwana ubukonje igihe bamwimuye cyangwa bamaze gusezererwa kwa muganga

38. Iyo uruhinje barwimuriye mu kindi cyumba cyo mu bitaro cyangwa se umubyeyi asezerewe kwa muganga, uburyo bwiza bwo kumurinda gutakaza ubushyuhe ni: (*Hitamo kimwe*)
- a. Kumufubbika umupira cyangwa ikigoma
- b. Kumutwara mu gituzi cya nyina cyangwa cy' undi muntu
- c. Kumuha umurwaza akamugutwaza
- d. Ubundi buryo
- (Bugaragaze)

APPENDIX 3: PERMISSION TO USE QUESTIONNAIRE: Karsten email



APPENDIX 4: ETHICAL CLEARANCE FROM ERB



APPENDIX 5: CERTIFICATE NIH

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Emerthe MUSABYEMARIYA** Successfully Completed the NIH Web-based training course "Protecting Human Research Participants. "

Date of Completion : 09/25/2018

Certification Number : 29533857



APPENDICE 6: CONSENT FORM (English version)

I Emerthe MUSABYEMARIYA, master's student in Neonatal track, school of nursing and midwifery in the college of medicine and health sciences/University of Rwanda guided by my research supervisors Prof. Dr. Donatilla MUKAMANA, Dr. Geldine CHIRONDA and Mrs. Claudine MUTETELI and authorized by the University of Rwanda and this hospital authorities, I am motivated to investigate on "Mother's knowledge and practices regarding neonatal hypothermia at Rwamagana Provincial hospital" for fulfilment of my studies.

Your voluntary participation to this inquiry is valuable because this will raise awareness on the issue and will encourage researchers to further conduct deep research on the topic in order to tackle neonatal mortality related to hypothermia. At this selected provincial hospital we hope to learn more about mother's knowledge and practices regarding neonatal hypothermia as they are close care givers for babies.

I ensure entire confidentiality and no anticipated risks from this study risks.

Date and Signature of Participant __/__/2018

UMUGEREKA WA 7: ICYEMEZO CYO KUJYA MU BUSHAKASHATSI KU

BUSHAKE

Njyewe Emerthe MUSABYEMARIYA, umunyeshuri muri KAMINUZA Y' URWANDA, ISHAMI RYITA KU IMPINJA ZITARENGEJE IMINSI 28, Mbifashijwemo n' abarimu b'inzobere bakorera muri iyo Kaminuza, aribo Dr Donatilla MUKAMANA, Dr Geldine CHIRONDA na Claudine MUTETELI, Ndifuzza gukora ubushakashatsi nise "Ubumenyi bw'ababyeyi ku bukonje bw'impinja zitarengeje iminsi 28 y' amavuko mu bitaro by' Intara bya Rwamagana" mu rwego rwo gusoza amashuri y'ikiciro cya 3 cya kaminuza. Nifuzaga gufatanya namwe kuko bizatuma inararibonye mu ubushakashatsi zita by'umihariko kuri icyo kibazo hagamijwe kugabanya impfu z'impinja zo muri icyo kigero.

Tugamije rero kumenya uko ubumenyi bw'ababyeyi bungana mu bijyanye n'ubukonje bw'impinja kuko nimwe mubana kandi mukita kuri abo bana umunsi ku wundi. Ubu bushakashatsi buzagaragaza uburemere bw'ikibazo hasuzumwe n'impanvu zose zibangamira imyumvire y'ababyeyi mu kurinda abana ubukonje. Mubyemeye, nifuzaga ko mwatanga amakuru ashoboka kuri iki kibazo musubiza neza ibibazo mubazwa.

Gufasha muri ubu bushakashatsi ni ubushake. Nta gihano cyangwa ingaruka zaba ku muntu wese wakumva atafasha muri ubu bushakashatsi nkuko nta gihembo giteganyirijwe umuntu ku giti cye uretse inyungu rusage mu kubungabunga ubuzima bw'abo bana.

Turabizeza ko amakuru muzatanga ari ibanga, azifashishwa gusa mu bushakashatsi, nta n'umwirondoro w'umuntu uzagaragara muri ubwo bushakashatsi. Wemerewe gusobanuzza ibyo utumva byose no kuba wavamo igihe cyose ubishakiye.

Nasobanukiwe kandi nemeye gufasha muri iki gikorwa ku bushake.

Italiki n'umukono w'uwemeye kujya mu bushakashatsi __/__/2018

APPENDIX 8: ETHICAL CLEARANCE FROM STUDY SETTING

Republic of Rwanda



Eastern Province
Rwamagana District
Rwamagana provincial Hospital
PoBox: 06 Rwamagana
Email : rwamagana.hospital@moh.gov.rw

01th/ 03/2019

To: Musabyemariya Emerthe

C/O UR/CMHS/SoNM

RE: Approbation to carry out health research in Rwamagana Provincial Hospital

Dear Madam

Reference is made on your letter of 25th February 2019, requesting for Ethical clearance and permission to carry out research in Rwamagana Provincial Hospital, base on Ethics committee requirements, we are glad to inform you that the permission to carry out a research on **“Mothers’ knowledge and practices regarding Neonatal hypothermia in Rwamagana Provincial Hospital”**, is given to you.

Therefore, you are requested to provide to Rwamagana Provincial Hospital a copy of your research findings at the end of your work.

Best regards.

Dr Utumatwishima J.N. Abdallah

Director General



CI

- Ethics committee Chair Person