FACTORS INFLUENCING WEIGHT GAIN AMONG LOW BIRTHWEIGHT NEONATES UNDER KANGAROO MOTHER CARE IN THE LAKE BASIN ECONOMIC BLOCK, KENYA.

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A Thesis Submitted in Partial Fulfilment for the Requirements of the award of the Degree of Master of Science in Advanced Nursing Practice (Midwifery Nursing) of Masinde Muliro University of Science and Technology

August, 2025

DECLARATION

This thesis is my original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a degree or any other award.

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HNR/G/01-54501/2020

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a thesis *entitled "**Factors Influencing Weight Gain Among Low Birthweight Neonates Under Kangaroo Mother Care in Lake Basin Economic Block, Kenya".***

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DEDICATION

The study is dedicated to my family and friends for their moral support which contributed greatly to the success of this study.

ABSTRACT

Kangaroo Mother Care (KMC) is a beneficial method for bonding, breast-feeding and temperature control of all neonates, regardless of weight, gestational age and clinical condition. In low-income neonatal units, the method is used 24 hours a day (continuous KMC), but in affluent settings with high tech equipment (incubator use), the method is usually implemented as shorter sessions (intermittent KMC). It was recommended that midwives initiate continuous KMC, even in a high tech-unit, as soon as possible after the infant is born and after initial resuscitation and stabilization. In Western Kenya, (Busia, Kisii and Migori Counties), were selected due to their high burden of neonatal mortality associated with low-birth-weight neonates. The KMC practice outcomes were not well elaborated yet there was an increasing trend of low birthweight neonates (birth weight below 2500gm), Busia County 20% -30%, Kisii 15.9%-20%, and Migori at 16% in the period 2018 to 2020 respectively. There was limited systemic information available on the outcomes of KMC practice. This was a mixed-method research design that examined maternal, midwife and facility related factors that influenced outcomes of KMC in Western Kenya (Busia, Kisii and Migori). Data was collected through semi-structured, pretested interviewer-administered questionnaires. Quantitative data was analyzed using SPSS version 26. Bivariate and multivariate logistic regression analysis identified significant predictors of KMC utilization. Variables with $P< 0.05$ in bivariate analysis was included in multivariate models, results were reported using Adjusted Odds Ratios and 95% CI. The study involved a representative sample size of 275 mothers of low-birth-weight neonates, that was determined through power analysis, of mothers and midwives in the three counties. Ethical approval was secured, and participants were provided with informed consent before data collection. Qualitative data was analyzed thematically to explore contextual barriers and enablers to achieving better KMC outcomes. The study findings generated evidence-based recommendations for strengthening KMC practices, informed policy adjustments and enhancing community health education in Western Kenya. The study aims to determine the mother, health facility and midwife factors and their influence on weight gain among neonates as the key indicator of KMC outcomes.

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LIST OF ABBREVIATIONS AND ACRONYMS

AOR	Adjusted Odds Ratio
COR	Crude Odds Ratio
ERC	Ethics Review Committee
GA	Gestation Age
KDHS	Kenya Demographic Health Survey
KMC	Kangaroo Mother Care
LBW	Low Birth Weight
MMUST	Masinde Muliro University of Science and Technology
OR	Odds Ratio
PLBW	Preterm Low Birth Weight
RR	Relative Risk
SDGs	Sustainable Development Goals
SPSS	Statistical Package of Social Science
SSC	Skin-to Skin Contact
UK	United Kingdom
UNICEF	United Nations International Children's Emergency Fund
USA	United States of America
VLBW	Very Low Birth Weight
WHO	World Health Organization

OPERATIONALIZATION OF KEY TERMS

Midwives' factors: refers to the characteristics of the nurses offering the KMC service that may affect the outcome amongst mothers with preterm or LBW neonates. These characteristics include knowledge, skills and competence; motivation, job satisfaction and attitude.

Infant: this is the childhood period from birth (1st day of life) up to 12 months

Institutional factors: refers to health facility factors that may affect the outcome of KMC. These factors include availability of drugs, equipment, medicine, staff, health facilities and financial resources required for service delivery.

Kangaroo mother care (KMC): is a method, which involves placing the neonate with a hat and diaper on the parent's chest to provide warmth to the neonate. The infant is placed in an upright position under the parent's clothes on the naked skin.

KMC Outcomes: refers to the observable changes on the neonate whose mother practices KMC

Low birth weight (LBW): is defined as a body weight at birth of less than 2500grams.

Maternal factors: characteristics relating to the mother especially during pregnancy and shortly after childbirth that may affect the outcome of KMC. These factors include social, economic or health factors.

Neonate: This is a newborn baby in their first 28 days of their life.

Preterm: is the term used to signify infants born before 37 weeks of gestational age.

Skin-to-skin contact (SSC): is the practice of placing an infant only in a diaper and hat 5chest-to-chest on the parent's bare skin

Very low birthweight (VLBW): Refers to a baby born weighing less than 1500grams

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter describes the background information, statement of the problem, objectives, hypothesis, justification of the study, limitations, conceptual framework and operationalization of the variables.

1.2 Background to the study

Low Birth Weight (LBW) is a birth weight less than 2500 grams. It affects approximately 15% to 20% of all births worldwide. The low-birth-weight neonates are vulnerable to health problems including hypothermia, respiratory distress, and infections. Kangaroo Mother Care is a universally available and biologically sound method of care for all newborns, particularly for premature neonates. It facilitates longer duration of breast feeding and has great effect on improving the health of the neonates submitted to KMC.

Kangaroo Mother Care (KMC) involves care of Low Birth Weight (LBW) infants through early and prolonged Skin-to-Skin Contact (SSC) with the mother or a caregiver, it's an important part of parent and infant care during neonatal period into infancy (Altit *et al.,* 2024). Kangaroo Mother Care (KMC) serves as a substitute for conventional neonatal care, namely the use of incubators, for low birth weight (LBW) newborns. This alternative was preferred due to its cost-effectiveness and the absence of requirements for highly trained staff and continuous logistical assistance to maintain optimal humidity and thermal conditions (Lawal *et al.,* 2023). There was compelling evidence indicating that Kangaroo Mother Care (KMC) is both safe and beneficial in lowering newborn mortality through early initiation and prolonged use of more than 8

hours a day. Furthermore, no detrimental effects were reported in relation to KMC (Sivanandan & Sankar, 2023). In addition to decreasing neonatal mortality, Kangaroo Mother Care (KMC) was suggested as an intervention that decreased neonatal morbidity and enhanced neonatal growth in low birth weight (LBW) infants, enhancing neonatal survival and a decrease in neonatal morbidity and an improvement in neonatal growth (Charpak & Montealegra-pomar, 2023).

The current global incidence of low birth weight (LBW) is 15.5%, resulting in approximately 20 million LBW newborns annually, with 96.5% of them being born in poor nations. Approximately 35% of neonatal deaths globally was attributed directly to low birth weight, particularly from preterm birth (UNICEF, 2022). Preterm birth significantly increased the risk of newborn mortality due to infection, contributing to a higher percentage of deaths. The incidence of preterm births increased worldwide, in both affluent and impoverished regions (WHO, 2021). The nations with the greatest rates of low birth weights encompassed a range of low-income level, the incidence being the highest in Asian sites (India and Pakistan) compared to African and Central America (Marete *et al.,*2020). Among the high-income countries was the USA, middle-income countries included India, China, the Philippines, Indonesia, and Brazil. Low-income countries in this category were Nigeria, Kenya, Pakistan, Bangladesh, and the Democratic Republic of Congo (Kampikaho *et al.,* 2021).

Western Kenya, data collected from Busia (20%-30%), Kisii (15.9%-20%), and Migori (16%) Counties. It indicated a consistent increase, with average percentages of 15.3%-30.6% in the years 2018, 2019, and 2020 respectively with the Kenya (countrywide) prevalence recorded at 11.5% (KDHS, 2023).

There was a strong demand for interventions that are both practical and suitable for implementation in both high-income and low-income contexts. Kangaroo Mother Care (KMC) is initiated in the hospital and, if required, can be continued at home until the infant no longer requires it for regulating body temperature, which is typically until the infant reaches full term age. After being discharged, it is important for the newborn to receive breast milk for nutrition and be taken care of by either the mother or relatives at home. It is crucial to provide proper follow-up for the infant's well-being (Sinha *et al.,* 2021). Kangaroo Mother Care (KMC) assists in the transition of low birth weight (LBW) infants from the womb to the outside world and helps parents in their role of caring for the newborn (Mwangi *et al.,* 2021). KMC offers an alternative to incubator care by promoting skin-to-skin contact between the infant and the mother (or parents), thus preventing their separation. Kangaroo Mother Care (KMC) is an approach that actively incorporates parents in the care of their infants and empowers them to assume responsibility for their infants' well-being (Asare *et al.,* 2021).

Kangaroo mother care is the process of caring for neonates weighing less than 2.5 kg. The intervention included exclusive and regular breastfeeding, skin-to-skin contact and support for mother and baby. Hospital studies in low- and middle-income countries have shown that it reduces death rate (Ramanathan e et al.,2020). Kangaroo Mother Care (KMC) facilitates health benefits of preterm and low birth weight neonates and it was pioneered in Bogotá, Colombia (Charpak & Montealegra-pomar,2023). World Health Organization recommends Kangaroo Mother Care (KMC) practice in which there is prolonged skin-to-skin contact between mother and neonate. It emphasizes exclusive breastfeeding which helps to early discharge from the hospital with observation and help (Sivanandan & Sankar, 2023). Kangaroo Mother Care (KMC) led to 40-41% reduction in preterm mortality at 40-41 weeks corrected

gestational age as shown by a meta-analysis. In addition to standard neonatal care, KMC has been documented to reduce the risk of severe infection, sepsis and increase attachment among mothers, as well as improve weight gain among preterm neonates (Vesel et al., 2021). Another meta-analysis shows a similar survival benefit, although the number of papers included is reduced (Kalito et al., 2024). Kangaroo Mother Care (KMC) is a cost-effective method for managing premature newborns. Mothers in low-resourced settings greatly appreciated it as it was associated with reductions in morbidity and mortality as well as greater breastfeeding durations (WHO, 2023).

KMC is a very relevant intervention and should be considered for wide acceptance in various areas. The World Health Organization (WHO) has defined Kangaroo Mother Care (KMC) as the care that is initiated in a facility setting. However, there were various studies and trials investigating the effectiveness of KMC when initiated in the community. However, the effects of KMC in this case were not established (WHO, 2021). In western Kenya (Busia, Kisii and Migori counties) the results were not recorded.

1.3 Statement of the Problem

Low-birth-weight neonates (LBW) is a significant public health concern globally, affecting 15% to 20% of all births worldwide, its worse in developing countries. In Kenya, its ranging at 11.5% to 12%. In Western Kenya, in the study sites, there is an increasing trend of low birthweight neonates, Busia County reporting between 20% to 30%, Kisii County at 15.9% to 20% and Migori County at 16%. LBW neonates are at a higher risk of morbidity, mortality and long-term health complications. Kangaroo Mother Care (KMC) has been recommended as a cost-effective intervention to improve outcomes for LBW neonates. Kangaroo Mother Care (KMC) involves care of Low Birth Weight (LBW) infants through early and prolonged Skin-to-Skin Contact

(SSC) with the mother or a caregiver. However, despite its growing implementation, there is need to investigate the specific outcomes of KMC on weight gain in LBW neonates, in resource limited facility settings. The study aims to examine the KMC care on weight gain in low-birth-weight neonates.

1.4 Main Objective

To assess factors influencing weight gain among low birthweight neonates under kangaroo mother care in Western Kenya.

1.5 Specific objectives.

i. To determine the outcome of KMC on weight gain among low-birth-weight neonates in Western, Kenya
ii. To determine mother and neonate factors influencing weight gain among low birthweight neonates under Kangaroo Mother Care in Western Kenya
iii. To examine institutional related factors influencing weight gain among low birthweight neonates under Kangaroo Mother Care in Western Kenya.
iv. To analyze midwives' related factors influencing weight gain among low birthweight neonates under Kangaroo Mother Care in Western Kenya

1.6 Research Question

1. "What is the outcome of KMC on weight gain among low-birth-weight neonates in Western, Kenya?

2. What mother and neonate factors influence weight gain among low birthweight neonates under Kangaroo Mother Care in Western?

3. What institutional related factors influence weight gain among low birthweight neonates under Kangaroo Mother Care in Western Kenya?

4. What midwives' related factors influence weight gain among low birthweight neonates under Kangaroo Mother Care in Western Kenya?

1.7 Justification

Children are the future of the human race, and everyone should ensure that they survive, grow and live a healthy life. About one in every 26 Kenyan children died before their first birthday, most of them when they were just a few days old (KDHS, 2023). Most of the LBW neonates die within 24 hours of due to limited access of incubators in newborn units and trained health care providers.

This study provides useful information that informs health facilities to prepare special care for KM

No previous studies about the outcomes and associated factors of KMC among newborn neonates have been conducted in the study area. Therefore, this study sought to provide baseline data on the KMC practice on weight gain in low-birth-weight neonates in Western Kenya.

Furthermore, the identification of possible factors for KMC practice in the study areas provides input to program managers and policy makers for designing, proper implementation and evaluation of programs on reduction of child mortality and improvement of new born care to achieve Sustainable Development Goal 3 of ensuring healthy lives and promoting well- being for all at all ages.

One of the significances of this study for health profession is assisting in providing evidence-based practice on newborn care services that improves the promotive, preventive and curative care of mothers and neonates. The findings create awareness in the community about the KMC uptake and the clinical outcomes and contribute towards formulating locally appropriate interventions to assist mothers of low-birth-weight neonates on its utilization for better clinical outcomes.

1.8 Limitation of the study

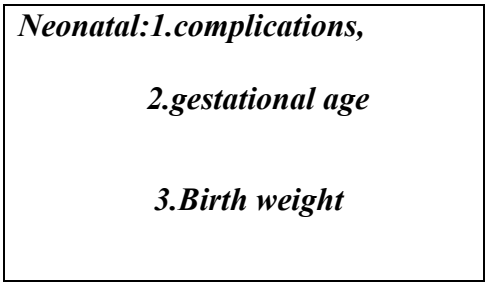
The cross-sectional approach captured data at a single point in time, restricting the ability to establish casual relationships between facility factors and neonatal weight gain. Self-reported data from the mothers and midwives may have introduced recall and social desirability bias, affecting response accuracy.

In terms of sampling technique, purposive sampling was used to select the study area and facilities which is non probability, therefore, researcher would recommend future studies to use probability sampling selected.

The sample size was small and the researcher would recommend future studies to have large samples.

1.9 Conceptual Framework

This is a written or visual representation of an expected relationship between variables in a study. Variables are simply the characteristics or properties that you want to study. In this study, the dependent variable is the outcome of KMC amongst mothers with LBW neonates in selected county hospitals in Western Kenya. The framework below illustrates the relationship between the independent variables, confounding variables and the outcome of KMC in the selected hospitals within the study area. The framework falls under implementation science as it considers relation between the intervention of KMC, the implementers and the context.



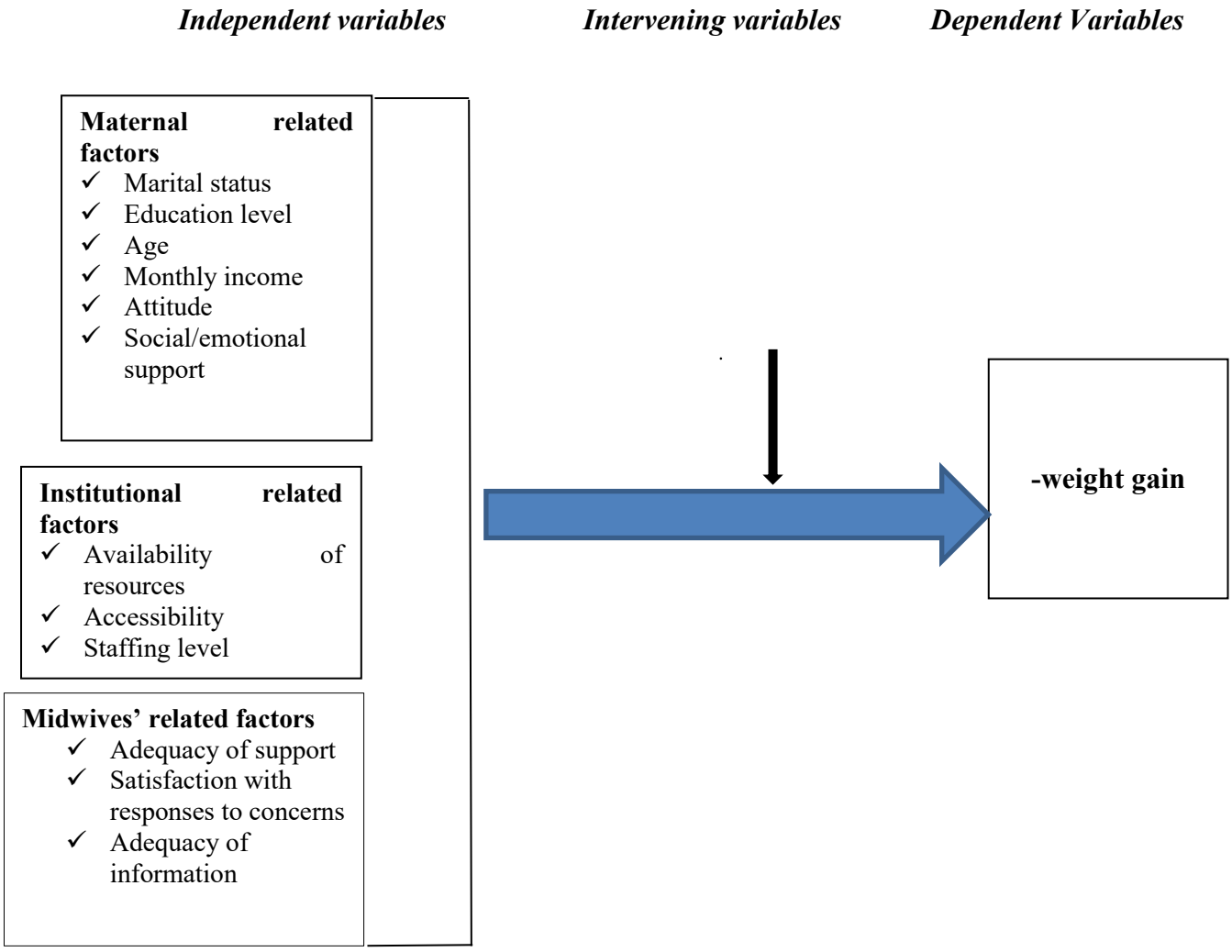


Figure 1: Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter reviews literature from other studies done in relation to the specific objectives of the study which include the maternal related factors, facility related factors, midwives related factors and the clinical outcomes in relation to the objectives. The reflection and collection of the literature review endeavors to introduce a review of different past investigations that have been embraced in connection to Kangaroo Mother Care.

Background

Low birth weight defines a newborn with less than 2500grams. Low Birth Weight neonates are prone to various health complications like infection, respiratory distress, hypothermia and due to these complications, the mothers stay in hospital for long before discharge. Kangaroo mother care has been extensively studied for its benefits in improving outcomes for low-birth-weight neonates. These gains include enhanced weight gain, increases exclusive breastfeeding due to the positioning of the neonate on the mother's chest and help reduce the rat e of morbidity and mortality

2.1 Weight Gain as an Outcome of Kangaroo Mother Care Among Low-Birth-Weight Neonates

Kangaroo Mother Care (KMC) involves care of Low Birth Weight (LBW) neonates through early and prolonged Skin-to-Skin Contact (SSC) with the mother or a caregiver (UNICEF, 2020). KMC is used as an alternative to conventional neonatal

care of LBW neonates which is expensive and needs both highly skilled personnel and permanent logistic support to maintain both humidity and thermal environmental stability (WHO, 2023). Kangaroo Mother Care (KMC) emerged as a crucial intervention for managing low birthweight neonates, demonstrating significant improvements in various physiological parameters and overall health outcomes, these clinical outcomes depend on the mother's ability to practice KMC efficiently, the midwife offering guidance, support and education to the mother and the availability of the KMC practice conducive rooms, adequate resources to support the practice, management goodwill and sufficient staffs well conversant with the KMC practice. Recent studies across diverse global settings provided compelling evidence of KMC's effectiveness in promoting weight gain, maintaining optimal body temperature, stabilizing respiratory rates, and reducing the length of hospital stay.

In the United States, a large-scale study across five neonatal intensive care units in California examined 400 very low birthweight neonates (<1500 grams) and found that those under KMC reached full enteral feeding (150 ml/kg/day) at an average of 3.8 days earlier than those in incubator care, contributing to shorter hospital stays (Johnson *et al.,* 2023). The same study noted that KMC neonates exhibited more stable body temperatures, with 92% maintaining temperatures within the normal range without additional interventions, compared to 78% in the control group.

A study at the Universidad Nacional de Colombia Hospital in Bogotá, Colombia, examined 350 neonates with a birth weight of 1000 to 2000 g. According to research, the respiratory rate of KMC neonates was more stable as 82% of them had respiratory rates within the normal range of 40-60 breaths per minute, compared to 69% of the conventional care. (Ruiz et al., 2022) The study found that only 8% of KMC neonates

developed clinically significant apnea, compared to 19% of control neonates, indicating a statistically significant reduction.

A study conducted in Sweden with a national cohort of 1000 late preterm neonates (34-36 weeks of gestation) reported that neonates who received KMC stayed in the hospital for an average of 5.2 days. Whereas, the average hospital stay of neonates receiving conventional care was 7.8 days (Andersson et al., 2021). According to the Swedish study, there was also consistency with KMC neonates in achieving weight gain of 25-30 grams per day as compared to CMC neonates.

In Brazil, the Fernandes Institute in Rio de Janeiro performed a study on 300 neonates of low birthweight under KMC. The study showed that KMC neonate gained weight, on average, 30 grams per day, whereas the normal incubator neonate gained weight, on average, 18 grams per day. The research found that 85 percent of babies given Kangaroo Mother Care (KMC) maintained their normal body temperature with zero percent additional warming as against 62 percent from study or standard care (Bilal et al;2021). The effects of KMC on hospital stay were studied and it was found that KMC is a safe low-cost intervention which effectively reduces hospital stay of preterm and low birth neonates. The study also revealed that early discharge from the hospital can help with neonatal unit overcrowding. This potentially lowers the chances of neonates picking up hospital infections and improves weight gain (J. Pediatr Rio J). 2022).

In Japan, a multi-center study across Tokyo, Osaka, and Fukuoka examined 300 very low birthweight infants (<1500 grams) and found that those receiving KMC required mechanical ventilation for an average of 3.5 fewer days compared to those in conventional care (Tanaka *et al.,* 2020). The Japanese research also reported that KMC

neonates achieved room air breathing (without any supplemental oxygen) 2.8 days earlier on average.

The Italian researcher noted that KMC neonates demonstrated more stable weight gain patterns, with 88% consistently gaining 20-30 grams per day after regaining birth weight, compared to 72% in the control group.

In India, a multi-center study across Delhi, Mumbai, and Chennai, involving 500 low birthweight neonates, found that those under KMC achieved temperature stability (defined as maintaining temperature between 36.5°C and 37.5°C for 24 consecutive hours) an average of 3.2 days earlier than those in conventional care. The same study noted that KMC neonates exhibited more stable respiratory rates, with 78% maintaining rates within the normal range (40-60 breaths per minute) compared to 65% in the control group (Patel *et al.,* 2021). The impact of KMC on the length of hospital stay and the time required to achieve the target discharge weight was well-documented across various countries. In Bangladesh, a large-scale study conducted across rural and urban centers in Dhaka Division followed 600 low birthweight neonates and found that those receiving KMC achieved an average daily weight gain of 23 grams, compared to 16 grams for those in conventional care (Rahman *et al.,* 2023). The study also reported that KMC neonates reached full breastfeeding (defined as eight successful feeds per day) an average of 4.2 days earlier than the control group. In Italy, a multi-center assessment was conducted in Rome, Milan, and Naples including 400 moderately preterm infants (32-34 weeks of gestational age). It was shown that infants under KMC achieved their birth weight 2.5 days earlier than the incubator care (Rossi et al., 2021).

In South Africa, a comprehensive study conducted at Chris Hani Baragwanath Hospital in Johannesburg followed 350 very low birthweight neonates (<1500 grams) and found that those receiving KMC reached a weight of 1800 grams (a common discharge criterion) an average of 6.1 days earlier than those in conventional care. The study also reported that KMC neonates had a higher rate of exclusive breastfeeding at discharge (76% vs. 58%) and maintained this advantage at the three-month follow-up (68% vs. 47%) (Mbatha *et al.,* 2022).

In Ghana, a comprehensive study across four regional hospitals in Accra, Kumasi, Tamale, and Cape Coast involved 450 low birthweight neonates and revealed that those under KMC achieved respiratory stability (defined as maintaining normal respiratory rates without supplemental oxygen for 48 consecutive hours) an average of 2.7 days earlier than those in incubator care (Asare *et al.,* 2021). The Ghanaian study also noted that KMC infants had a lower incidence of respiratory infections during their hospital stay, with only 11% developing infections compared to 23% in the control group.

2.2 Maternal Factors Influencing Weight gain among Neonates under Kangaroo Mother Care

Maternal factors are characteristics relating to the mother especially during pregnancy and shortly after childbirth. These factors include marital status, residence, religion, education level, age, occupation, monthly income, knowledge, attitude, social/emotional support and sociolect-cultural setups. Kangaroo Mother Care (KMC) has become a significant intervention for low birthweight newborns, especially in the resource-limited setting. Skin-to-skin contact between a mother and neonate and exclusive breastfeeding with early discharge; this strategy has been proven to reduce mortality and morbidity in preterm and low birthweight neonates. Nevertheless,

several maternal factors influence the effectiveness of KMC such as socio-demographic characteristics, knowledge and attitude as well as social support. Recent studies performed on a large-scale in various countries have demonstrated the diverse patterns of these factors and their respective impact on KMC-related outcomes. In the United States, a study at the University of California San Francisco found that maternal age was an important factor KMC adherence where mothers 25-34 has the highest adherence (Johnson et al., 2020). The Brazilian KMC survey where 2500 mothers operated KMC was done. Educational level was a strong KMC outcome predictor in the survey.

73% of mothers who were a secondary level were satisfied with KMC operators. 51% of mothers who were a primary level had a positive outcome from KMC.

The survey also reported 68% mothers in older age group frequently performed KMC.

52% of mothers below 25 gave skin to skin contact KMC.

59% of mothers above 35 practised KMC.

KMC was done continuously since birth and intermittently in case of baby health.

Studies across different cultures have documented the effect of marital status and social support on the KMC outcome. A nationwide study in India across five major cities (Mumbai, Delhi, Bangalore, Kolkata and Chennai) found that married mothers successfully performed KMC more than single mothers. According to a study which involved 3,000 mothers of low birthweight neonates, 82% of the married mothers used KMC consistently for the duration advised as opposed to 61% of single mothers (Patel et al., 2022). Researchers said this difference happened because of more support from spouses and extended family members. In Sweden, a national cohort study involving

1200 mothers found that, those with strong social support networks were 2.5 times more likely to continue KMC after hospital discharge (Andersson et al, 2023). The study said that when the fathers got involved in the process, most mothers, or 79% of them, reported a successful KMC practice in the long run. A study done in Kenyatta National Hospital Nairobi County, Kenya states that residence is one of the contributors to KMC adherence. The study found that urban mothers complied with KMC at a higher rate (71%) than rural mothers at (58%). The authors suggest that this is due to urban mothers having greater access to health facilities (Ochieng et al., 2021).

Maternal knowledge, attitudes and cultural beliefs are likely to influence the outcomes of KMC. A study involving four regional hospitals in Ghana (Accra, Kumasi, Tamale, and Cape Coast) showed strong bond between maternal knowledge of benefits of KMC and mother's successful practice of KMC. A total of 1500 mothers of low birthweight neonates participated in the study. The 76% of mothers who received adequate teaching on KMC and KMC-related benefits and who actually moderately practised it for the required duration (Asare et al., 2020). What is interesting to note from the study is that a positive influence of their religious beliefs on the outcome of KMC was seen. In this regard, positive attitude towards KMC was reported by 1 out of 3 mothers. 83% of the respondent Christian mothers, 79% of the Muslim mothers were found to have a positive attitude. Comparatively, the number of mothers who follow traditional beliefs was only 65%. However, a research conducted in rural Bangladesh noted that certain cultural beliefs obstructed KMC implementations. In Sylhet Division, research carried out on 800 mothers found that 48% mothers were continually practicing KMC. Traditional practices after delivery restricted skin-to-skin contact (Rahman et al., 2022). On the other hand, the study also found that the adoption of KMC increased to

67 per cent when community health workers were provided with culturally sensitive education.

According to Akter et al. (2024), the KMC outcome is significantly influenced by maternal occupation and maternal monthly income with respect to the time and resources being able to practice KMC. A national survey of 2,000 mothers in Mexico, from rural and urban areas, found differences in KMC adherence based on occupation and income. According to Gonzalez et al. (2021), mothers in formal employment with maternity leave benefits were 1.8 times more likely to consistently practice KMC, than those with informal or no employment. The study reported that 72% of the mothers with a monthly income above the national average of 16,921 Mexican pesos (990 USD) implemented KMC. By contrast, it was 53% of those with a monthly income less than the national average. In like manner South Africa study in three provinces Gauteng KwaZulu-Natal and Western Cape mothers in professionally occupied had greater KMC compliance 81 which was higher than manual labour or unemployed 59 Mbatha et al 2023 Keith nrites 2024. The researchers say this is because they were more likely to get information, money, and employee policies. A study which involved France, Germany and Italy in Europe found that KMC outcomes were exhibited significantly due to maternal employment status. According to the study of 3,500 mothers across the three countries, 78% of mothers with access to extended paid maternity leave (>20 weeks) successfully practised KMC for the recommended duration, compared to 61% of those with shorter or unpaid leave (Rossi et al., 2022).

The effects of a mother's age on KMC outcomes varied according to culture and socioeconomic status. In a countrywide study carried out in Canada involving 1,800 mothers from different ethnic groups, it was realized that maternal age was significantly associated with KMC adherence in a non-linear fashion. The researchers

conducted the study in various major cities that included Toronto, Vancouver, and Montreal. The study revealed that mothers aging between 30 and 35 had the highest rates of consistent KMC practice with a percentage of 77. Following them were those ageing between 25 and 29 with 71 percentage. Finally, the study revealed that under-25 and over-35 mothers had lower rates of KMC practice with 62 and 65 percent respectively. (Thompson et al, 2023). According to researchers, the pattern has to do with life experience, job stability, and physical health. (22 words) On the other hand, the current study conducted in rural Ethiopia, Oromia Region showed that mothers aged 18-24 accepted and continued to practice KMC more than older mothers. In a study where 600 mothers of low birthweight neonates were included, it was reported that 68% younger mothers were able to implement KMC as compared to 54% of 25-35 years old mothers and 49% of older than 35 (Desta et al 2021). The researchers attributed it to the flexibility and approach of younger mothers to new practices in this cultural context. In Kenya, in Kiambu County, specifically at Thika Level 5 Hospital, maternal age interacted significantly with educational level in affecting KMC outcomes. In a context where most mothers have elementary schooling, the mothers aged (25-34) reported mostly doing KMC (76%) whereas, in the younger age of (18-24), better outcomes were reported (63%) compared to older aged mothers (Wanjiru *et al*., 2022).

2.3 Midwives' Factors Influencing Weight Gain among Neonates under Kangaroo Mother Care

The results of Kangaroo Mother Care (KMC) on the newborns with low birthweight were significantly influenced by midwives who applied and supported KMC. The professionals' knowledge, skills, competencies, motivation, job satisfaction and attitudes were critical success factors in KMC programme implementation at global

levels. Recent research over countries showed that these midwife-related factors have influence over KMC outcomes (Akter et al, 2024). A broad study was conducted in Brazil in which 15 neonatal intensive care units were contacted in São Paulo. It showed that the shrewdness of midwives on KMC principles was directly related to their success rate in implementation. In a study, three hundred nurse midwife and one hundred and fifty doctors were involved. It was found that those who scored above 80% on a standardized KMC knowledge assessment were associated with a seventy two percent success rate of initiating and maintaining KMC among mothers. In comparison those who scored below 60%, had a fifty-three percent success rate (Silva et al., 2020) The multi-center study performed in India including Delhi, Mumbai and Bangalore demonstrated that the competence of the midwives in demonstrating the KMC techniques is a key factor in maternal adherence. A study with 500 healthcare professionals reported that mothers receiving assistance from highly competent nurse midwives (as judged by standardized practical examinations) were 2.3 times more likely to continue KMC after discharge from the hospital than those who received assistance from less skilled staff (Patel et al. 2021).

The midwives' motivation and job satisfaction are critical factors on the successful implementation of KMC. In Kenya, a study done at Kenyatta National Hospital (Nairobi County) showed that midwives' job satisfaction and quality of KMC support offered to mothers were strongly related. The study involved 150 neonatal nurse midwives. The ones with high job satisfaction scores (>75 on a 100-point scale) had mothers who practiced KMC long-term at a success rate of 68%. This is against a success rate of 49% for midwives with low job satisfaction scores (<50) (Ochieng et al., 2022). On the other hand, a United States study, performed at five hospitals in California, observed the effect of burnout on KMC. A study of 250 NICU staff

indicated that staff experiencing high levels of burnout (based on the Maslach Burnout Inventory) were linked with 15% reduced odds of a successful KMC initiation among mothers of low birthweight neonates (Johnson et al., 2023). Research in South Africa had found that the midwife's motivation was a key factor in sustained practice of KMC since higher motivation levels were associated with better adherence to KMC protocols and better maternal and neonatal outcomes (Bergh et al, 2023). In Kisumu County in Kenya, a study showed that the presence of KMC in hospitals was determined by midwives reporting high job satisfaction. The high job satisfaction midwives correlate to improved neonatal weight gain, while also imparting maternal satisfaction (Ochieng et al., 2020).

Midwives' attitude towards KMC impacted its implementation and outcome significantly. A study in Columbia found that midwives' positive disposition towards KMC was associated with higher rates of KMC practice among parents and better neonatal outcomes in America (Camacho et al., 2020). A recent Philippine study showed that in Asia, midwives who believed KMC (Kangaroo Mother Care) to be useful were more likely to promote it, resulting in better neonatal health indicators (Reyes et al., 2021).

One study done in Italy found that midwives with a positive attitude towards KMC helped to make it more acceptable to mothers. This helped to enhance maternal emotional bonding with the neonate and decrease neonatal morbidity (Lecannelier et al., 2022). A study conducted in Africa, Nigeria, found that health care workers who see KMC as an essential component of neonatal care are likely to use it consistently, which results in a higher survival of LBW neonates (Onalo et al., 2021). In an

assessment carried out in Mombasa County, Kenya, it was found out that facilities with a positive attitude toward KMC had improved adherence to KMC as well as outcomes for neonates (Mwangi et al., 2020).

2.4 Health Facility Factors Influencing Weight Gain Among Neonates under Kangaroo Mother Care

Institutional factors are health facility factors that could impact KMC outcomes. The availability of drugs, equipment, medicine, personnel, health facilities and finances for service delivery was important. KMC or Kangaroo Mother Care has to begin with mothers within the health system context, and mothers may interact with any of the health system core components. KMC cannot be effectively executed without the availability of essential drugs and medicines. A research study in Brazil among hospitals in the Americas showed that hospitals equipped with constant supply of antibiotics, vaccines and nutritious supplements had better success in infection management and growth of LBW neonates thereby improving overall outcomes of KMC (Silva et al., 2021). Research from India showed that lack of essential medicines, particularly for neonatal infections, greatly hampered effective KMC (Sharma et al., 2020) In Asia.

A study from Europe (Italy) found that neonatal outcomes among LBW infants undergoing KMC were better in hospitals which had a well-stocked pharmacy and timely access to essential drugs (De Luca et al., 2020). A study was conducted in Sub-Saharan Africa to examine the barriers and facilitators to kangaroo mother care practice at the health systems level, midwives experience and perspective of mother and their families. It was vital for local leaders to make strong decisions to overcome barriers of inadequate space, a budget for supplies that was too small, limited staffing, lack of guidance and policies and also poor supportive supervision (Kinshella MLW,

2021). In Kenya, Kisumu County data confirmed that the availability of drugs to treat common neonatal conditions has enhanced the outcome of KMC programs (Wambugu et al., 2021).

The proper equipment represented another key factor that helped KMC to meet with success. A study conducted in Bangladesh found that most low-birth-weight neonates were not monitored properly in KMC units largely due to lack of basic equipment like thermometers and scales (Islam et al., 2020). A Spanish study showed that the presence of sufficient neonatal care equipment in hospitals, including phototherapy units and respiratory support devices, was more successful in preventing complications among LBW neonates undergoing KMC (Martínez-García et al., 2020). In South Africa, a study in Africa showed that essential equipment such as oxygen concentrators and neonatal resuscitation devices often compromised the effectiveness and outcomes of KMC (Bergh et al., 2021). A study conducted in Nairobi County, Kenya, found that hospitals with well-resourced neonatal units had better success rates in the implementation of KMC, with LBW neonates showing improvements in survival and growth rates (Mwangi et al., 2020).

The provision of adequate staff has an important role to play in the effective KMC service delivery. In Canada, having enough trained nurses and midwives in hospitals helped provide more continuous support to mothers practicing KMC, leading to positive neonatal outcomes (Smith et al., 2020). In Asia, a study from Nepal found that the lack of trained midwives in neonatal care units significantly impacted the effectiveness of KMC (Shrestha et al., 2021). According to a German study, hospitals with a high nurse-to-patient ratio in neonatal units achieve a higher implementation of KMC which in turn is linked with the weight gain and reduction of mortality of LBW infants (Müller et al., 2021). In Nigeria, understaffing of neonatal units was a key

barrier to the effective implementation of KMC in Africa. An understaffed hospital has higher rates of neonatal morbidity and mortality (Kalito et al., 2024). In Mombasa County, Kenya, hospitals with neonatal units sufficiently staffed had higher compliance with KMC protocols and better neonatal outcomes than hospitals that were not so staffed (Wanjala et al., 2020).

The availability and accessibility of health infrastructure influence the effectiveness and outcomes of KMC services. Research from Mexico has revealed that in America, hospitals located in urban areas with good infrastructure were successful at implementing KMC. This is because the survival rate of LBW infants was higher in urban populations compared to rural regions which had limited access to healthcare facilities (López-Hernández et al., 2021). A study conducted in Asia particularly in the Philippines showed that the provision by hospitals of a KMC ward substantially improved the effectiveness of KMC. Moreover, a study found that hospitals with specialized KMC facilities report better neonatal health outcomes (Reyes et al., 2020). The study carried out in France found that those hospitals which had a well-equipped NICU and a dedicated space for KMC were more effective in managing LBW infants which resulted in lower neonatal morbidity and mortality (Blondel et al., 2021). In a study conducted in Africa in Ethiopia, it was revealed that health facilities, especially in rural areas, present a challenge to effective implementation of KMC and its outcome (Gebremariam et al., 2021) According to a study performed in Kakamega County, Kenya, hospitals with enhanced neonatal units and KMC ward experience better destinies (survival and growth) in LBW neonates (Ochieng et al., 2021).

Getting the funds was an important point to help KMC implement effectively in varying contexts. It helped them to purchase drug, equipment, and staffing (Tian et al, 2024). A study in the United States states that adequately funded hospitals were more

successful in hospitals in implementing KMC programs and that well-funded hospitals reported improved neonatal outcomes (Johnson et al, 2020). Research conducted in India shows that in Asia, due to financial deficits in public hospitals, KMC is not adequately implemented. It was noted that the neonatal mortality was higher in less-funded hospitals (Patel et al., 2020). According to a study from the UK, hospitals that had money were more able to keep their neonatal units well equipped and keep midwives trained. This resulted in better outcomes in LBW neonates (Jones, et al, 2021). Limited funding for KMC in public hospitals plays a pivotal role in affecting its implementation in Ghana. A research in Ghana in public hospitals shows that when financial resources are limited, these hospitals experience high neonatal mortality rate (Tawiah et al., 2021). Statistics from Bungoma County in Kenya show that hospitals with sufficient funds implemented KMC and achieved better survival rates and health outcomes for LBW neonates. (Owino et al., 2021).

2.5 Research Gaps

Kangaroo Mother Care (KMC) has become an intervention that is essential and cost-effective for the improvement of survival as well as health of low birthweight (LBW) and preterm neonates. Multiple studies have proven KMC effective in decreasing neonatal mortality, increasing the bonding of mother and neonate and improving breastfeeding. However, the evidence-based benefits are not enough to ensure universal adoption and regular practice of KMC among different regions and populations. This contradiction points to a gap in the research that needs to be further investigated. The results of KMC can depend on the mother of the LBW neonate.

Many factors, like society, culture and how people live, affected the adoption of KMC. Studies rarely touched on cultural beliefs, social norms and demographic details like marriage, religion and education. There were a lack of studies on how these factors interact with maternal characteristics and socio-economic status. We often ignore factors related to the healthcare system such as health facilities and resources. The impact of KMC on babies and their mothers in resource-limited settings over the long-term is also unexplored. Most studies were one-off in nature and location. Comprehending these long-term outcomes was important to advocate for continuous support of KMC and sustainability.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter describes and justifies the research design and methodology that were used to carry out the study. It presents the research design, target population, sample and sampling procedures, description of research instruments, description of data collection procedures and data analysis procedures.

3.1 Study Design

This study adopted analytical cross sectional research design incorporating both qualitative and quantitative research approaches. This mixed methods design, presented procedures for collecting, analyzing and linking both quantitative and qualitative data in a single study (Wang & Cheng, 2020). The combination of both forms of data provided a better understanding of the variables under study. This design established conditions as they were on the ground and made it possible to obtain information of large samples of the population. Cross-sectional approach allowed the assessment of existing conditions and associations at a specific point in time, capturing data on maternal and neonatal care in the selected health facilities.

3.2 Study Area

The study was conducted in Migori, Kisii and Busia Counties of Western Kenya. These facilities were selected due to their high burden of neonatal mortality associated with low birthweight (LBW) neonates Busia 20%-30%, Kisii 15.9%-20%, Migori 16%. These counties have a mix of urban and rural population and varying levels of healthcare infrastructure, making them ideal for examining the mother, facility and midwives related factors influencing outcomes of KMC. The study focused on county referral hospitals and level 4 public health facilities to ensure representation across

different healthcare service levels. Migori County is a county in the former Nyanza Province of Kenya. It is located in Southwestern Kenya and borders Homa Bay County (North), Kisii County (North Eastern), Narok (South East), Tanzania (West and South) and Lake Victoria to the West. Its capital is Migori, its largest town. The county has a population of 917,170. Migori County is perhaps the most diverse in Nyanza after Kisumu. The inhabitants include Suba-Luos, Luos, Kuria, Kisiis, Luhya, Somalis, small pockets of Indians, Arabs, and Nubians. Migori town serves as an important link between Kenya and Tanzania and the second most viable commercial center in Luo-Nyanza after Kisumu. The coordinates of Migori County Latitude: 0°39'59.99"N and Longitude: 34° 49' 59.99" E.

Busia County is located in the Western Region of Kenya. It borders three Counties - Bungoma County and Kakamega County to the East and Siaya County to the South East. It also shares its Western, North and North Eastern border with Uganda and Lake Victoria to the South West.

According to the 2019 Kenya Population and Housing Census, the population of Busia County was estimated at 743,946 with a population density of 439 people per km^2 and an annual growth rate of 2.9%. Age distribution is; 0-14 years (47.9 %), 15-64 years (48.4 %), and 65+ years (3.7 %). The County is endowed with vast tracts of arable land, livestock, forests and water from rivers Malakisi, Malaba, Sio and Nzoia. The coordinates of Busia, Kenya are: 00°45'48.0"N, 34°06'19.0"E (Latitude:0.463333; Longitude:34.105278). Busia, Kenya sits at an average elevation of 1,227 meters (4,026 ft), above sea level.

Kisii County is a county in the former Nyanza Province in southwestern Kenya. Its capital and largest town is Kisii. The county has a population of 1,266,860 people. It

borders Nyamira County to the North East, Narok County to the South, and Homabay and Migori Counties to the West. The county covers an area of 1,317.5 km. The county is inhabited mostly by the Gusii people.

3.3 Study Population

Study population constitutes all the items or people under considerations in any field of inquiry (Jilcha Sileyew,2020). In this study, the study population comprised of all mothers with low-birth-weight neonates who met the inclusion criteria in the newborn units and all midwives who were involved in the provision of newborn care in the selected facilities within Busia, Kisii and Migori Counties.

3.3.1 Inclusion Criteria

- Mothers with low-birth-weight neonates in the selected public health facilities
- Mothers who consented for the study and gave a written informed consent.
- Midwives working in labour ward and newborn unit for at least six months.

3.3.2 Exclusion Criteria

- Mothers who did not consent for the study
- Mothers who were mentally unstable or not comprehending.

3.4 Sampling Method

The study employed a combination of purposive sampling technique. Purposive sampling was used to select three Counties in the Lake Basin Economic Block, Kenya, that is Busia (205-30%), Kisii (15.9%-20%) and Migori 16%, based on their high burden of neonatal deaths associated with low-birth-weight neonates. Proportionate stratification technique was then used to allocate sample size per health facility based on their projected workload. This approach ensured that each facility contributed to the sample in proportion to its patient volume, thereby enhancing the generalizability

of the findings. Simple random was then employed to select respondent, ensuring that every eligible participant had an equal chance of inclusion. This minimized selection bias and increased the validity of the study results.

The final quantitative sample size was 275 mothers of low-birth-weight neonates distributed across the selected health facilities as follows:

Table 1.0: Proportionate Sample Allocation for Quantitative Sampling

Health facility		**Study population**	**Sample Size**
County Referral Hospitals	Busia county Referral	265	103
	Kisii County Referral	240	93
	Migori County Referral	202	79
	Total	**707**	**275**

Key informant interviews (KII) were conducted for midwives providing newborn care services in the newborn units.

3.5 Sample Size Calculation

The study sample size was determined using the modification of Cochran's formula, adjusted for finite population correction formula $n= (NZ^2pq)/ (e^2 (N-1) +Z^2pq)$, considering a 95% confidence interval (Z = 1.96), a study population (N) of 707, a margin of error (e) of 0.05, and an assumed population proportion (p) of 50% [13]. The calculated sample size was 250, with an additional 10% (25 participants) added to account for non-responses, bringing the final sample to 275 caregivers of low-birth-weight neonates.

Additionally, 12 key informant interviews were conducted with medical officers and nurse in-charges from the selected health facilities to provide qualitative insights into facility-based factors influencing KMC implementation.

$$n = \frac{NZ^2pq}{e^2(N-1) + Z^2pq}$$

Where:

- Z is the normal standard deviation at the desired confidence interval. In this case it was taken at 95% confidence interval.
- N is the study population
- n is the sample size
- e is the desired level of precision (i.e., the margin of error),
- p is the (estimated) proportion of the population with particular characteristics to be measured which is 50% if the proportion is unknown.
- q is 1 – p.

From the above, the sample size for this study were calculated as:

- Z at 95% CI = 1.96
- N = 707 (average monthly deliveries for LBW and pre-term neonates) and non-response or those not filled due to unknown reasons.
- n = 249.06
- =250
- 10% of the sample size was added to cater for non-responses = 25
- Therefore, a minimum of 275 caregivers with low birthweight neonates were sampled.

- For the Key informant interviews (KII), 12 respondents (midwives) were interviewed, four midwives from each county hospital.

Table 2.0: Interview Method

Target population	Interview Method/Tool	Total Sample
Mothers/caregivers	Face-to-face interview	275
Midwives	Key Informant Interview Guide	12
Grand Total		**287**

3.6 Data Collection Instruments

Questionnaires were used as the primary data collection instrument because of its convenience to capture a lot of information with ease. The questionnaires were designed in such a way that they contained at least five sections; with first section containing demographic details of respondents and other sections containing questions to elicit responses in line with the research questions. The questionnaires were mainly closed-ended but also with spaces for qualitative data in form of comments, clarifications or additional information that was provided by respondents. While closed-ended questions were easy to analyze statistically, open-ended questions offered opportunities for comments or suggestions that were very critical in enriching the data.

For qualitative data, data collection methods included interview schedule for key informants. KII was used to collect information from the midwives. No photos of participating respondents were taken. The respondents were chosen randomly by giving a unique number. A guide for use on the key informants addressing issues under questions in the study site were developed. The researcher used a reflective process to manage data generated in qualitative research for better synthesis of the data. This process involved interviews with concurrent note taking, reflective journalism and revising field notes.

3.7 Data Collection Procedure

On receiving authorization for the study, three research assistants were trained to assist the researcher in data collection. The research assistants were selected among third year midwifery students who were on placement at the study sites during the data collection period. The research assistants were trained on the purpose of the study, how to seek informed consent, interviewing skills, how to use the questionnaire, data collection and data management. They were given two days training and orientation on the above.

Study participants were approached to voluntarily participate in the study. The interviewer explained to the mothers the importance of the study and why their participation was significant. Those who agreed to participate in the study, signed a consent form before the questionnaire was administered via face-to-face interviews.

Data collection was carried out by use of questionnaires, which addressed issues regarding knowledge of the respondents, socioeconomic factors, institutional factors and health provider factors associated with Outcome of KMC practice. Clinical records were also reviewed to verify information on the respective newborns and other clinical information given by the mothers. Some of the information obtained from the clinical records included; participants' age, weight, infections suffered during pregnancy including vaginal infections, UTIs, syphilis infection, chronic illness, HIV status, any complications that had affected the pregnancy, birth status i.e., if singleton or multiple birth, neonate's gestational age, neonate's birth weight, any complication and deformities present in the neonate.

The principal investigator was personally involved in conducting the Key Informant Interviews. The Key informants were approached and requested if they were willing

to participate in the study. For those who agreed, an informed consent and permission to start the interviews was obtained and a preamble stating how the issues were to be explained, they were interviewed at their own places of convenience. This guaranteed their comfort and confidence for them to be able to give credible information. A questionnaire took approximately 15 minutes to fill while interviewing key informant took approximately 20-30 minutes. The actual data collection activities lasted for three months.

3.8 Data Management

Once data was collected, it was cleaned to ensure completeness and consistency across the respondents. The data collected was summarized, coded, and entered into a computer. Quantitative data was coded and processed using SPSS version 26.0. Descriptive statistics such as frequencies, standard deviation and means were used to summarize, organize, and simplify the data collected.

Significance in the differences in proportions was determined by Chi-Square test, p value set at $P \leq 0.05$ level of significance. Significant proportions of independent variables were regressed with the dependent variable to determine which ones had significant association. Odds Ratio (OR) and 95% Confidence Interval (CI) was used to estimate the strength of association between independent variables and the dependent variable. The threshold for statistical significance was set at $\alpha = 0.05$ and a two-sided p value at 95% confidence intervals (CI) reported for corresponding analysis.

Qualitative data generated from KII in form of notes (responses) from the participant's was cleaned and coded manually based on themes developed from responses (thematic

analysis) in accordance with the research objectives and reported in narrative form and additionally used to reinforce quantitative data.

3.9 Ethical Consideration

The study adhered to ethical standards, ensuring informed consent was obtained from all participants, with an emphasis on voluntary participation and confidentiality. Ethical approval was granted by Masinde Muliro University of Science and Technology (MMUST/IERC/105/2022) and the National Commission for Science, Technology, and Innovation (NACOSTI/P/22/21399). Approval to conduct the study from Busia, Kisii and Migori County governments was done. During data collection, informed consent was obtained from the respondents before administering the questionnaire. The right to participate in the study or not were rested with the respondents and this was respected at all times during the study. Respondents were informed that it is their right to choose whether to participate in the study or not and even withdraw from the study at any time. This would not affect the care they would receive. No inducements or rewards were given to participants to join the study.

Confidentiality and anonymity were maintained at all times. No identifying data were recorded and all information given was used strictly for research purposes only. Data collected was stored, analyzed and reported in formats that wouldn't allow identification of the individual participants. There were no invasive procedures carried out on the participants, so no physical risks were encountered. The study findings were communicated to MMUST and County Governments of Busia, Kisii and Migori. This was also disseminated to the participating health facilities. Furthermore, all attempts were made to publish the findings in different reputable journals.

CHAPTER FOUR

RESULTS

4.0 Overview

This chapter comprises report of the analysis for both quantitative and qualitative data. The reporting starts from respondent characteristics which include sociodemographic aspects, maternal and neonatal complications. This is followed by profiling the outcome of KMC and analysis of the factors influencing the outcome of KMC grouped as maternal and newborn factors, institutional factors and midwives' factors. The analysis of factors influencing weight gain in KMC culminates in binary logistic regression analysis to adjust for modifying variables in causality.

4.1 Respondents characteristics

4.1.1 Sociodemographic aspects of the mothers and neonates

Table 3 presents sociodemographic characteristics the responds (275 mothers). Majority of participants were over 30 years old, with 160 mothers (58.18%) falling into this age group, while 115 mothers (41.82%) were 30 years old or younger. In terms of education, the distribution was diverse, with 24 mothers (8.73%) having primary education, 76 (27.64%) having secondary education, 99 (36.00%) having college education, and the remaining 76 (27.64%) having attained a university degree. Marital status among the participants varied, with 31.27% being married, 34.91% cohabiting 26.91% single, and 6.91% widowed. The average number of other children among the mothers was 2.95 ±1.54, with 185 (67.27%) having three or fewer children and 90 (32.73%) having more than three children. Occupationally, the participants were engaged in various roles, including employment (25.45%), business (30.91%), farming (14.55%), and homemaking (29.09%). The primary sources of information on KMC were midwives, cited by 114 mothers (41.45%), followed by radio/TV

(24.73%), family and friends (18.91%), and phone text/internet (14.91%). The average household size was 4.59 ±1.64 individuals, with 197 mothers (71.64%) living in households with five or fewer people and 78 (28.36%) residing in larger households. About 18.55% mothers earned below KES 5000, 26.18% between KES 5000 and 10000, and similar proportions earning between KES 10000 to 20000, and above KES 20000. In terms of newborn characteristics, there were slightly more female neonates (58.91%) than males (41.09%). The average birth weight of the newborns was 1578.85 ±232.72 grams, with 113 (41.09%) weighing equal to or above 1500 grams and 162 (58.91%) weighing below 1500 grams. Additionally, the average gestational age at birth was 35.59 ±2.30 weeks, with 146 neonates (53.09%) born at or before 35 weeks' gestation and 129 (46.91%) born after 35 weeks.

Table 3.0: Summary of mothers and neonates' sociodemographic aspects

Characteristics	Grouping	Frequency	Percent
Age	</=30 Years	115	41.82
	> 30 Years	160	58.18
Level of education	Primary	24	8.73
	Secondary	76	27.64
	College	99	36.00
	University	76	27.64
Marital status	Single	74	26.91
	Married	86	31.27
	Widowed	19	6.91
	Cohabiting	96	34.91
Number of other children	</=3	185	67.27
	>3	90	32.73
Mothers' occupation	Employed	70	25.45
	Business	85	30.91
	Farmer	40	14.55
	Housewife	80	29.09
Information source on KMC	Radio/TV	68	24.73
	Phone Text/ Internet	41	14.91
	Midwives	114	41.45
	Family and friends	52	18.91
Number people in the house hold	</= 5	197	71.64
	>5	78	28.36
Monthly income	Below KES 5000	51	18.55
	KES 5000 – 10000	72	26.18
	KES 10000 – 15000	51	18.55
	KES 15000 – 20000	51	18.55
	Above KES 20000	50	18.18
Newborn's sex	Male	113	41.09
	Female	162	58.91
Newborn's Birth Weight	</=1500 grams	162	58.91
	> 1500 grams	113	41.09
Gestation at time of birth	</= 35 weeks	146	53.09
	> 35 weeks	129	46.91

Descriptive analysis of maternal and newborn sociodemographic characteristics. Maternal age mean =32.28 ±6.20 years, Average number of other children =2.95 ±1.54, average number of people in the household =4.59 ±1.64, average weight of the newborn =1578.85 ±232.72 grams, and average gestational age of the newborn =35.59 ±2.30 weeks.

4.1.2 Association of sociodemographic aspects of the mother and neonate and weight gain among neonates under KMC

The bivariate analysis conducted on sociodemographic aspects and the outcome of KMC has been summarized in the table below. Only three aspects had a significant relationship with recommended weight gain and other outcomes namely; education level, maternal complications and neonatal complications. Careers with a college or university education exhibited higher percentages meeting the recommended daily weight gain and other outcomes compared to those with primary or secondary education. This difference was statistically significant (X^2 (3) = 6.73, p = 0.030). Equally, the neonates whose mothers experienced postnatal complications had a significantly lower proportion meeting the recommended daily weight gain compared to those without complications (X^2 (1) = 4.66, p = 0.037). Neonatal complications were strongly associated with meeting the recommended daily weight gain criteria, with neonates without complications having a significantly higher proportion meeting the criteria (X^2 (1) = 29.00, p <0.0001). Mothers aged 30 years or younger had their infants having a slightly higher proportion meeting the recommended daily weight gain criteria compared to those above 30 years (41.74% vs. 35.63%), but this difference was not statistically significant (X^2 (1) = 1.06, p = 0.317). No significant association was found between marital status and meeting the recommended daily weight gain criteria (X^2 (3) = 0.23, p = 0.661), as was the case for the number of other neonates, (X^2 (1) = 0.39, p = 0.597), mothers' occupation, (X^2 (3) = 0.95, p = 0.355), source of information for mothers (X^2 (2) = 5.12, p = 0.529) and monthly income (X^2 (4) = 2.91, p = 0.273).

Table 4.0: Association of Sociodemographic aspects of the mother and neonate and weight gain

Sociodemographic characteristics	Grouping	Meets Recommended Daily Weight Gain (>=15g/Kg)		X^2	df	P Value
		Yes N (%)	No N (%)			
Age	</=30 Years	48 (41.74)	67 (58.26)	1.06	1	0.317
	> 30 Years	57 (35.63)	103 (64.38)			
Level of education	Primary	4 (16.67)	20 (83.33)	6.73	3	**0.03**
	Secondary	29 (38.16)	47 (61.84)			
	College	37 (37.37)	62 (62.63)			
	University	35 (46.05)	41 (53.95)			
Marital status	Single	29 (39.19)	45 (60.81)	0.23	3	0.661
	Married	34 (39.53)	52 (60.47)			
	Widowed	7 (36.84)	12 (63.16)			
	Cohabiting	35 (36.46)	61 (63.54)			
Number of other children	</=3	73 (39.46)	112 (60.54)	0.39	1	0.597
	>3	32 (35.56)	58 (64.44)			
Mothers' occupation	Employed	29 (41.43)	41 (58.57)	0.95	3	0.355
	Business	34 (40.00)	51 (60.00)			
	Farmer	14 (35.00)	26 (65.00)			
	Housewife	28 (35.00)	52 (65.00)			
Number in House hold	</= 5	73 (37.06)	124 (62.94)	0.37	1	0.583
	>5	32 (41.03)	46 (58.97)			
Monthly income (KES)	<5000	22 (43.14)	29 (56.86)	2.91	4	0.273
	5000 – 10000	30 (41.67)	42 (58.33)			
	10000 – 15000	16 (31.37)	35 (68.63)			
	15000 – 20000	21 (41.18)	30 (58.82)			
	> 20000	16 (32.00)	34 (68.00)			
Birth Weight Group	</=1500 grams	63 (38.89)	99 (61.11)	0.08	1	0.802
	> 1500 grams	42 (37.17)	71 (62.83)			
Gestation	</= 35 weeks	53 (36.30)	93 (63.70)	0.46	1	0.535
	> 35 weeks	52 (40.31)	77 (59.69)			
Neonatal complications	Yes	31 (22.46)	107 (77.54)	29.00	1	**<0.0001**
	No	74 (54.01)	63 (45.99)			

Bivariate analysis by cross-tabulation with Chi square statistic (X^2) as the inferential statistics, N (%) where N = counts, and %= percentage, $\dot{\alpha} \leq 0.05$, df=degrees of freedom, MV-Midwives

4.2 Weight gain among low birthweight neonates under KMC

The frequency table below provides comprehensive insights into neonatal weight gain under KMC, offering a detailed understanding of the effectiveness of this care method in promoting the health and well-being of neonates. The birth weight distribution revealed that 162 neonates (58.19%) had a birth weight of less than or equal to 1500 grams, while 113 infants (41.09%) had a birth weight exceeding 1500 grams. The average birth weight was 1578.85 ± 232.72 grams, and a range from 1202 to 2000 grams. At the time of data collection, 151 neonates (54.90%) exhibited a weight equal to or greater than 2000 grams, while 124 neonates (45.10%) had a weight less than 2000 grams. The average neonatal weight at data collection time was 2010.12 ± 258.82 grams, and a range from 1299 to 2539 grams. In achieving the recommended daily weight gain, 170 neonates (61.82%) achieved the criterion of at least 15 grams per kilogram, while 105 neonates (38.18%) did not meet this target. The average daily weight gain at the time of data collection was 12.96 ±4.85 grams, and a range from 5 to 21 grams. Regarding temperature, 146 neonates (53.09%) had temperatures within the normal range at the time of data collection, while 129 neonates (46.91%) did not. The average temperature at data collection was 36.46 ± 0.83 degrees Celsius, and a range from 35.1 to 37.9 degrees Celsius. A majority of neonates, accounting for 198 (72.00%), exhibited a respiratory rate within the normal range, while 77 neonates (28.00%) did not. The average respiratory rate at data collection was 52.70 ± breaths per minute, and a range from 35 to 70 breaths per minute. The number of days spent on KMC compared to the recommended length of stay to achieve appropriate weight gain based on birth weight, 151 neonates (54.91%) were within the recommended length of stay, while 124 neonates (45.09%) did not. The average number of days on KMC was 36.25 days ± 10.09 days, and a range from 20 to 61 days. The recommended

length of stay based on birth weight to attain appropriate weight gain had an average of 41.21 ± 16.02 days, and a range from 17 to 72 days.

Table 5.0: Weight gain among low birthweight neonates under KMC

KMC Outcome aspects		Frequency	Percent
Birth Weight	</=1500 grams	162	58.91
	> 1500 grams	113	41.09
Weight at time of data collection	>/=2000	151	54.90
	<2000	124	45.10
Meets Recommended Daily Weight Gain (>=15g/Kg)	Yes	170	61.82
	No	105	38.18
Temperature within normal range	Yes	146	53.09
	No	129	46.91
Respiratory rate within normal range	Yes	198	72.00
	No	77	28.00
Number of days on KMC is within recommended Length of stay to gain required weight on birth weight	Yes	151	54.91
	No	124	45.09

This frequency table for outcome variables weight, temperature, respiratory rate and length of stay. Birth weight in grams Mean (M)=1578.85, Standard deviation (SD)=232.72, Minimum (Min)=1202, Maximum (Max)=2000, infant Weight in grams at time of data collection M=2010.12, SD=258.82, Min=1299, Max.=2539, Recommended weigh for age at the time of data collection M=2079.51, SD=191.30, Min.=1429, Max.=2393, Average daily weight gain in grams as at time of data collection M=12.96, SD=4.85, Min.=5, Max=21, Temperature in degrees Celsius at time of data collection, M=36.46, SD=0.83, Min.35.1, Max.=37.9, Respiratory rate per minute at the time of data collection M=52.70, SD=10.11, Min.=35, Max.=70; Numbers of days on KMC M=36.25, SD=10.09, Min=20, Max=61; Recommended LOS based on birth weight to attain appropriate weight M=41.21, SD=16.02,Min=17,Max=72

4.3: Maternal Factors Influencing Weight Gain Among Low Birthweight Neonates under Kangaroo Mother Care

4.3.1 Maternal perceptions

Table 6 summarizes maternal perceptions of KMC on weight. Mothers who viewed KMC as very effective had a significantly higher proportion of neonates meeting

recommended daily weight gain criteria compared to those with other perceptions (X^2 (4) = 66.55, $p < 0.0001$). Similarly, mothers with high confidence in understanding and following KMC instructions had a higher proportion meeting weight gain criteria (X^2 (4) = 59.05, $p < 0.0001$). Those reporting excellent or good postnatal health also had a significantly higher proportion meeting weight gain criteria (X^2 (4) = 148.08, $p < 0.0001$). Lower stress levels and higher commitment to KMC were associated with meeting weight gain criteria (X^2 (4) 109.78 and 109.46, respectively, both $p < 0.0001$). Finding it easy to integrate KMC into daily routines and perceiving strong family support were also associated with meeting weight gain criteria (X^2 (4) = 91.49 and 110.14, respectively, both $p < 0.0001$). However, the perceived impact of cultural beliefs on postnatal care did not significantly affect meeting weight gain criteria (X^2 (4) = 3.84, $p = 0.428$).

Table 6.0: Maternal perceptions

Mothers' perceptions		Meets Recommended Daily Weight Gain (>=15g/Kg)		Chi	df	P Value
		Yes N(%)	No N(%)			
How effective do you think Kangaroo mother Care is in helping the infant gain weight	Very effective	39 (67.24)	19 (32.76)	66.55	4	**<0.0001**
	Somewhat effective	32 (56.14)	25 (43.86)			
	Neutral	32 (35.96)	57 (64.04)			
	Somewhat ineffective	2 (5.26)	36 (94.74)			
	Very ineffective	0 (0.00)	33 (100.00)			
How confident are you in your ability to understand and follow Kangaroo Mother Care instructions?	Very confident	24 (55.81)	19 (44.19)	59.05	4	**<0.0001**
	Somewhat confident	44 (63.77)	25 (36.23)			
	Neutral	34 (36.56)	59 (63.44)			
	Somewhat not confident	2 (5.88)	32 (94.12)			
	Not confident	1 (2.78)	35 (97.22)			
How do cultural beliefs affect your ability to utilize postnatal care?	Very positives impact	17 (29.82)	40 (70.18)	3.84	4	0.428
	Somewhat Positive impact	21 (42.86)	28 (57.14)			
	Neutral	20 (37.74)	33 (62.26)			
	Somewhat negative impact	25 (46.30)	29 (53.70)			
	Very negative impact	22 (35.48)	40 (64.52)			
How would you rate your current health status after childbirth?	Excellent	43 (82.69)	9 (17.31)	148.08	4	**<0.0001**
	Good	42 (87.5)	6 (12.5)			
	Fair	11 (17.74)	51 (82.26)			
	Poor	6 (10.34)	52 (89.66)			
	Very poor	3 (5.45)	52 (94.55)			
How would you rate your current stress levels	Very low	39 (78.00)	11 (22.00)	109.78	4	**<0.0001**
	Low	41 (75.93)	13 (24.07)			
	Neutral	15 (23.44)	49 (76.56)			
	High	5 (8.93)	51 (91.07)			
	Very high	5 (9.80)	46 (90.20)			
How would you rate your commitment to Kangaroo Mother Care?	Committed	41 (80.39)	10 (19.61)	109.46	4	**<0.0001**
	Somewhat committed	41 (71.93)	16 (28.07)			
	Neutral	13 (18.06)	59 (81.94)			
	Somewhat not committed	7 (12.96)	47 (87.04)			
	Not committed	3 (7.32)	38 (92.68)			
How would you rate the ease of integrating KMC in your daily routines	Easy	31 (75.61)	10 (24.39)	91.49	4	**<0.0001**
	Somewhat easy	43 (74.14)	15 (25.86)			
	Neutral	18 (26.09)	51 (73.91)			
	Somewhat not easy	5 (9.26)	49 (90.74)			
	Not easy	8 (15.09)	45 (84.91)			
How would you rate family support for KMC	Strong	41 (77.36)	12 (22.64)	110.14	4	**<0.0001**
	Somewhat strong	35 (77.78)	10 (22.22)			
	Neutral	20 (28.99)	49 (71.01)			
	Somewhat weak	9 (15.00)	51 (85.00)			
	Weak	0 (0.00)	48 (100.00)			

Bivariate analysis by cross-tabulation with Chi square statistic as the inferential statistics, N (%) where N = counts, and %= percentage, ȁ≤0.05, df=degrees of freedom

4.3.2 Mothers Practice Influencing Weight Gain among Neonates under KMC

Table 4.4 Reports the level of implementation of KMC by mothers of the underweight newborns. In terms of the duration of daily skin-to-skin care, the data indicate a diverse distribution, with 16.36% of the mothers providing over 6 hours of care, 17.45% providing exactly 6 hours, and 24.73% opting for 5 hours. Additionally, 60 mothers (21.82%) allocated 4 hours, while 54 (19.64%) offered between 0 to 3 hours of skin-to-skin contact per day. A significant majority 73.82% breastfed their neonates, while 26.18% did not. 104 mothers (37.82%) engaged in complimentary feeding, while the majority, 171 (62.18%), did not. The frequency of feeding varied among participants, with 34.18% opting for on-demand feeding, 33.45% feeding very often, and 32.36% feeding often. About 58% of the mothers ensured their neonates wore socks, a nappy, and a cap, while 116 (42.18%) did not. Similarly, 178 (64.73%) positioned their neonates between their breasts, chest to chest, while 97 (35.27%) did not. Mothers also paid attention to the positioning of the neonate's head, with 196 (71.27%) ensuring it was turned to one side in a slightly extended position. Moreover, 191 (69.45%) positioned the top of the binder just under the neonate’s ear. Many mothers adopted proper positioning techniques, with 193 (70.18%) flexing and extending the neonate's hips in a "frog" position, and 194 (70.55%) flexing the neonate's arms. More than 65% of the mothers used a clean soft cloth or carrying pouch, while 194 (70.55%) ensured the neonate's head and buttocks were secure. Additionally, 184 mothers (66.91%) applied appropriate tightness, and 180 (65.45%) positioned the neonate's abdomen at the level of the mother’s epigastric region. One hundred and eighty-three mothers (66.55%) provided additional warmth with a blanket or shawl, while 188 (68.36%) wore a top that was open at the front to facilitate skin-to-skin contact, 61.09% kept the neonate upright when walking or sitting, and 172 (62.55%) recognized the need for

continuous skin-to-skin contact for over 20 hours. The level of mother implementation of KMC was assessed, revealing an average score of 16.05 ±3.79 out of a possible 25, with a percent implementation of 64.19 ±15.16%.

Table 7.0: Mothers practice influencing weight gain

Characteristics	Grouping	Frequency	Percent
	> 6 hours	45	16.36
	6 hours	48	17.45
Number of hours of daily skin to skin care	5 hours	68	24.73
	4 hours	60	21.82
	0-3 hours	54	19.64
Breastfeeds	Yes	203	73.82
	No	72	26.18
Does complimentary feeding	Yes	104	37.82
	No	171	62.18
Frequency of feeding	On demand	94	34.18
	Very often	92	33.45
	Often	89	32.36
Neonate in socks, a nappy and a cap.	Yes	159	57.82
	No	116	42.18
neonate is between the mother's breasts chest to chest	Yes	178	64.73
	No	97	35.27
Head is turned to one side in a slightly extended position	Yes	196	71.27
	No	79	28.73
Top of the binder being just under the neonate's ear.	Yes	191	69.45
	No	84	30.55
Hips are flexed and extended in a "frog" position	Yes	193	70.18
	No	82	29.82
Arms are flexed	Yes	194	70.55
	No	81	29.45
Secure the neonate on to the mother's chest with a clean soft cloth/carrying pouch	Yes	182	66.18
	No	93	33.82
Secure the head	Yes	194	70.55
	No	81	29.45
Secure the buttocks	Yes	194	70.55
	No	81	29.45
Apply appropriate tightness	Yes	184	66.91
	No	91	33.09
Neonate's abdomen not constricted and is at the level of the mother's epigastric region.	Yes	180	65.45
	No	95	34.55
Has a blanket or a shawl on top for additional warmth	Yes	183	66.55
	No	92	33.45
Mother has a top that is open at the front	Yes	188	68.36
	No	87	31.64
Mother keeps the neonate upright when walking or sitting	Yes	168	61.09
	No	107	38.91
Mother notes need for continuous skin-to-skin >20 hours	Yes	172	62.55
	No	103	37.45

Descriptive summary of mothers of KMC. Level of mothers' practice is 16.05±3.79 out of a possible 25, Percent implementation if 64.19±15.16%

4.3.3: Association of Mothers practice and weight gain among neonates under KMC

Table 8 presents maternal implementation KMC and the association with meeting the recommended daily weight gain criteria. Caretakers who adhered to several specific care practices such as higher number of hours for daily skin-to-skin care, breastfeeding, ensuring the right positioning of the neonate, securing the head and buttocks, applying appropriate tightness, keeping the baby upright when the mother is upright, and keeping the neonate warm, had a significantly higher proportion meeting the recommended daily weight gain criteria compared to those who did not adhere to these practices (all had a $P < 0.0001$). On the other hand, there was no significant association between providing complimentary feeding and frequency of feeding and meeting on the recommended daily weight gain criteria ($p>0.05$).

Table 8.0: Association of Mothers practice and weight gain for neonates under KMC

Maternal KMC implementation Characteristics		Meets Recommended Daily Weight Gain (>=15g/Kg)		OR/ Chi	95% CI/ df	P Value
		Yes N (%)	No N (%)			
Number of hours of daily skin to skin care	> 6 hours	41 (91.11)	4 (8.89)	123.51 *	4	**<0.0001**
	6 hours	35 (72.92)	13 (27.08)			
	5 hours	19 (27.94)	49 (72.06)			
	4 hours	3 (5.00)	57 (95.00)			
	0-3 hours	7 (12.96)	47 (87.04)			
Breastfeeds	Yes	92 (45.32)	111(54.68)	3.76	1.94 - 7.29	**<0.0001**
	No	13 (18.06)	59 (81.94)			
Complimentary feeding	Yes	39 (37.50)	65 (62.50)	0.95	0.58 - 1.58	0.899
	No	66 (38.60)	105(61.40)			
Frequency of feeding	On demand	39 (41.49)	55 (58.51)	0.86*	2	0.355
	Very often	35 (38.04)	57 (61.96)			
	Often	31 (34.83)	58 (65.17)			
Neonate in socks, a nappy and a cap.	Yes	74 (46.54)	85 (53.46)	2.39	1.42 – 4.00	**0.001**
	No	31 (26.72)	85 (73.28)			
Neonate is between the mother's breasts	Yes	93 (52.25)	85 (47.75)	7.75	3.96 - 15.18	**<0.0001**
	No	12 (12.37)	85 (87.63)			
Head is turned to one side in a slightly extended position	Yes	96 (48.98)	100(51.02)	7.47	3.53 - 15.78	**<0.0001**
	No	9 (11.39)	70 (88.61)			
Top of the binder being just under the neonate's ear.	Yes	94 (49.21)	97 (50.79)	6.43	3.21 - 12.88	**<0.0001**
	No	11 (13.10)	73 (86.90)			
Hips are flexed and extended in a "frog" position	Yes	94 (48.70)	99 (51.30)	6.13	3.06 - 12.28	**<0.0001**
	No	11 (13.41)	71 (86.59)			
Arms are flexed	Yes	92 (47.42)	102(52.58)	4.72	2.45 - 9.10	**<0.0001**
	No	13 (16.05)	68 (83.95)			
Secures neonate to the mother chest with a clean cloth	Yes	80 (43.96)	102(56.04)	2.13	1.24 - 3.68	**0.006**
	No	25 (26.88)	68 (73.12)			
Secure the head	Yes	90 (46.39)	104(53.61)	3.81	2.03 - 7.13	**<0.0001**
	No	15 (18.52)	66 (81.48)			
Secure the buttocks	Yes	91 (46.91)	103(53.09)	4.23	2.23 - 8.03	**<0.0001**
	No	14 (17.28)	67 (82.72)			
Apply appropriate tightness	Yes	84 (45.65)	100(54.35)	2.8	1.59 - 4.94	**<0.0001**
	No	21 (23.08)	70 (76.92)			
neonate's abdomen not constricted	Yes	87 (48.33)	93 (51.67)	4.00	2.22 - 7.22	**<0.0001**
	No	18 (18.95)	77 (81.05)			
Has a blanket or a shawl on top for additional warmth	Yes	83 (45.36)	100(54.64)	2.64	1.51 - 4.63	**0.001**
	No	22 (23.91)	70 (76.09)			
Mother has a top that is open at the front	Yes	87 (46.28)	101(53.72)	3.30	1.83 - 5.97	**<0.0001**
	No	18 (20.69)	69 (79.31)			
Mother keeps the neonate upright when she's upright	Yes	76 (45.24)	92 (54.76)	2.22	1.32 - 3.75	**0.003**
	No	29 (27.10)	78 (72.90)			
Mother notes need for skin-to-skin for >20 hours	Yes	79 (45.93)	93 (54.07)	2.52	1.47 - 4.3	**0.001**
	No	26 (25.24)	77 (74.76)			

*Bivariate analysis by cross tabulation of maternal factors versus weight gain. N (%) where N= frequency, %= proportion/percentage, OR/Chi is Odds Ratio (for 2X2 aspects) or Chi-Square statistic (for those aspects not meeting 2x2 criteria), 95% CI/df for either OR or Chi-square statistic respectively. * Chi-square statistic used. ά<0.05*

4.3.4: Key informant views on maternal factors influencing weight gain among neonates under KMC

Maternal engagement and commitment were highlighted by the midwives as important. Participants highlighted the correlation between active maternal involvement and improved results, emphasizing that *"The dedication and commitment of the mothers practicing KMC play a significant role in the outcome... Mothers who are actively engaged... tend to have better outcomes with their neonates."* Moreover, maternal confidence in executing KMC procedures was identified as a contributing factor to favorable outcomes through anecdotes like *"...mothers who feel confident in their ability to care for their neonates through KMC tend to have better outcomes."* This illustrates the importance of empowering mothers within the care process.

I: Social support and socioeconomic status were identified as critical determinants. The influence of support from significant others on a mother's capacity to effectively practice KMC was acknowledged, with participants noting that *"Support from significant others... greatly enhances the mother's ability to practice KMC effectively."* Additionally, it was felt that the family condition also plays a vital role since the financial stability or instability may hinder the full KMC engagement of a mother through feeling; '*The socio-economic status of the family cannot be ignored… Financial stability or the lack of it affects the mother's full KMC engagement*'. The participation of the father/partner with the KMC was seen as beneficial for bonding and family support. One respondent shared, "*Involving fathers or partners in the KMC process can produce a great effect…. The family gets strengthened and there is a feeling of co-sharing*".

II: The mental health of mothers became a key influence on their capacity to implement KMC adequately. Participants said maternal stress, anxiety, or depression could affect the practice of KMC. This shows that these three issues will hinder effective practice. An expression which goes, "…*mothers who are stressed, anxious, or depressed may find it hard to practice KMC effectively…*" reiterates this perception of the importance of mental health on KMC implementation and possible influence on the outcome.

III: Neonate health status has become an important factor affecting their ability to practice KMC. Mothers who deal with stress, anxiety or depression can affect the practice of KMC. Mothers need the encouragement and support of the family. For mothers who are stressed, anxious or depressed, the practice of KMC may not be optimal – An adage such as this one conjures up our perception of the importance of mental health on KMC implementation and possible influence on the outcome.

IV: Education and training were considered essential for successful KMC adoption. Participants highlighted that mothers need knowledge and skills to execute KMC techniques properly. This was pointed out by one participants who was quote as saying "*proper education and guidance on KMC techniques are very important… When mothers feel empowered with knowledge and skills, they will be able to do it much better.*"

V: Cultural factors KMC use was influenced and adopted by various factors. Participants highlighted the importance of using a culturally sensitive approach in education and advocacy, as cultural beliefs and practices influence how KMC is viewed within communities. "*Cultural factors also come into play…that means*

educating not just the mothers but also their families and the community about the benefits and importance of KMC…," participants said.

Participants underscored the importance of community acceptance and collaboration in advancing KMC initiatives. They emphasized the need for the midwives to navigate cultural nuances sensitively, advocating for inclusive approaches to community engagement. That *"... cultural beliefs and practices regarding childcare within the community can influence how KMC is perceived and embraced..."* and *"…. midwives need to be sensitive to these cultural differences…"* was highlighted as critical.

VI: Emotional bonding between mother and neonate, coupled with maternal confidence, was identified as conducive to positive outcomes. Participants stressed the significance of nurturing emotional connections and fostering maternal self-assurance in the KMC journey where some stated that *"the emotional bond between the mother and the neonate is crucial... Mothers who feel confident... tend to have better outcomes."*

4.4: Health Facility factors influencing weight among low birthweight neonates under KMC

This section presents results for; Health facility factors influencing the outcomes of KMC.

4.4.1: Facility infrastructure and KMC

The findings provide insights into the infrastructure and support available for implementation of KMC within facilities in Busia, Kisii and Migori counties. A majority of facilities reported having breast pumps (61.09%), milk banks (59.27%), weighing scales (56.36%), and radiant heaters (62.55%). However, fewer facilities had weight charts (52.73%), warm water facilities (58.91%), and dedicated spaces for

KMC (58.55%). Regarding maternal support, just under half of the facilities reported providing adequate food for mothers (48.73%) and having seats available for mothers (61.82%). Similarly, approximately half of the facilities had rooms designated for breast milk expression (48.73%), while slightly more than half provided milk preparation equipment (57.09%). Hygiene and safety considerations were also assessed, with 60.00% of facilities promoting hygiene and 56.36% guaranteeing safety. Additionally, a majority of facilities displayed adequate information on KMC (60.73%) and ensured that the information displayed was easy to read and understand (51.27%). Hospital management involvement comprised hospital manager checking on the KMC mothers and outreach programs. Approximately half of the facilities reported hospital managers checking on KMC mothers (53.82%) and having outreach programs for KMC (50.18%). Moreover, a similar proportion of hospitals supported family-centered KMC (57.45%) and had adequate staff to support KMC (61.82%). The average facility implementation score was 10.78 ±2.59 out of a possible score of 19, with a percent facility implementation of 56.71 ±13.65%.

Table 9: Facility infrastructure for KMC

Facility implementation characteristics	Grouping	Frequency	Percent
Breast pump	Yes	168	61.09
	No	107	38.91
Milk bank	Yes	163	59.27
	No	112	40.73
Weighing scale	Yes	155	56.36
	No	120	43.64
Weight chart	Yes	145	52.73
	No	130	47.27
Warm water	Yes	162	58.91
	No	113	41.09
Radiant heater	Yes	172	62.55
	No	103	37.45
Space for KMC	Yes	161	58.55
	No	114	41.45
Adequate food for the mother	Yes	134	48.73
	No	141	51.27
Seats for the mother	Yes	170	61.82
	No	105	38.18
Room for breast milk expression	Yes	134	48.73
	No	141	51.27
Milk preparation equipment	Yes	157	57.09
	No	118	42.91
hygiene of the environment	Yes	165	60.00
	No	110	40.00
Guarantees safety	Yes	155	56.36
	No	120	43.64
Adequate information on KMC displayed in the KMC spaces	Yes	167	60.73
	No	108	39.27
Information displayed about KMC is easy to read and understand	Yes	141	51.27
	No	134	48.73
Hospital managers check on KMC mothers	Yes	148	53.82
	No	127	46.18
Hospital has outreach program for KMC	Yes	138	50.18
	No	137	49.82
Hospital support family centered KMC	Yes	158	57.45
	No	117	42.55
Hospital has adequate staff to support KMC	Yes	170	61.82
	No	105	38.18

Descriptive summary of facility implementation of KMC. Overall implementation was 10.78±2.59 out of a possible score of 19, Percent facility implementation 56.71±13.65

4.4.2: Association of facility factors and weight gain among low birthweight neonates under KMC

This outline institutional-related factors influencing weight gain for low birthweight neonates under KMC. Care facilities equipped with breast pump, milk bank, radiant heaters, adequate food for the mother, seats for the mother, rooms for breast milk expression, milk preparation equipment, promotion of hygiene, adequate information on KMC displayed, easy-to-understand KMC information, hospital managers checking on KMC mothers, hospitals having outreach programs for KMC, supporting family-centered KMC, and having adequate staff to support KMC were significantly associated with a higher proportion of neonates meeting the recommended daily weight gain criteria (all $p < 0.05$). Facilities with an implementation level of 50% or more had a substantially higher proportion of neonates meeting the recommended daily weight gain criteria compared to those with less than 50% implementation (Chi-square = 33.21, OR = 10.14 - 108.82, $p < 0.0001$). Some institutional-related factors such as having weighing scales, weight charts, warm water, and ensuring safety were not related with neonates attaining recommended weight gain ($P>0.05$).

Table 10.0: Association of facility factors and weight gain among low birthweight Neonates under KMC

		Meets Recommended Daily Weight Gain (>=15g/Kg)		OR	95% CI	P Value
		Yes N(%)	No N(%)			
Breast pump	Yes	80 (47.62)	88 (52.38)	2.98	1.74 - 5.12	**<0.0001**
	No	25 (23.36)	82 (76.64)			
Milk bank	Yes	73 (44.79)	90 (55.21)	2.03	1.21 - 3.39	**0.008**
	No	32 (28.57)	80 (71.43)			
Weighing scale	Yes	62 (40.00)	93 (60.00)	1.19	0.73 - 1.95	0.532
	No	43 (35.83)	77 (64.17)			
Weight chart	Yes	59 (40.69)	86 (59.31)	1.25	0.77 - 2.04	0.386
	No	46 (35.38)	84 (64.62)			
Warm water	Yes	69 (42.59)	93 (57.41)	1.59	0.96 - 2.63	0.078
	No	36 (31.86)	77 (68.14)			
Radiant heater	Yes	75 (43.60)	97 (56.40)	1.88	1.12 - 3.17	**0.021**
	No	30 (29.13)	73 (70.87)			
Space for KMC	Yes	70 (43.48)	91 (56.52)	1.74	1.05 - 2.88	**0.033**
	No	35 (30.70)	79 (69.30)			
Adequate food for the mother	Yes	75 (55.97)	59 (44.03)	4.7	2.77 - 7.98	**<0.0001**
	No	30 (21.28)	111 (78.72)			
Seats for the mother	Yes	79 (46.47)	91 (53.53)	2.64	1.54 - 4.51	**<0.0001**
	No	26 (24.76)	79 (75.24)			
Room for breast milk expression	Yes	70 (52.24)	64 (47.76)	3.31	1.99 - 5.52	**<0.0001**
	No	35 (24.82)	106 (75.18)			
Milk preparation equipment	Yes	70 (44.59)	87 (55.41)	1.91	1.15 - 3.16	**0.012**
	No	35 (29.66)	83 (70.34)			
Promotes hygiene	Yes	77 (46.67)	88 (53.33)	2.56	1.51 - 4.34	**<0.0001**
	No	28 (25.45)	82 (74.55)			
Guarantees safety	Yes	64 (41.29)	91 (58.71)	1.36	0.83 - 2.22	0.261
	No	41 (34.17)	79 (65.83)			
Adequate information on KMC is displayed	Yes	75 (44.91)	92 (55.09)	2.12	1.26 - 3.56	**0.005**
	No	30 (27.78)	78 (72.22)			
Information displayed about KMC is easy to understand	Yes	66 (46.81)	75 (53.19)	2.14	1.3 - 3.53	**0.003**
	No	39 (29.10)	95 (70.90)			
Hospital managers check on KMC mothers	Yes	65 (43.92)	83 (56.08)	1.7	1.04 - 2.8	**0.046**
	No	40 (31.50)	87 (68.50)			
Hospital has outreach program for KMC	Yes	65 (47.10)	73 (52.90)	2.16	1.31 - 3.55	**0.003**
	No	40 (29.20)	97 (70.80)			
Hospital support family centered KMC	Yes	70 (44.30)	88 (55.70)	1.86	1.12 - 3.09	**0.017**
	No	35 (29.91)	82 (70.09)			
Hospital has adequate staff to support KMC	Yes	79 (46.47)	91 (53.53)	2.64	1.54 - 4.51	**<0.0001**
	No	26 (24.76)	79 (75.24)			
Level of facility implementation (%)	≥50	102 (54.26)	86 (45.74)	33.21	10.14 - 108.82	**<0.0001**
	< 50	3 (3.45)	84 (96.55)			

Bivairate analysis by cross-tabulation with Chi square statistic as the inferential statistics, N (%) where N = counts, and %= percentage, ȧ≤0.05, df=degrees of freedom

4.4.3: Key informant views on the role of the facility in the provision of KMC

Thematic analysis of the midwives' responses regarding the role of the facility in the provision of Kangaroo Mother Care (KMC) revealed several key themes:

I. Management Support and Leadership the midwives emphasized as facilitators of effective implementation of KMC protocols. This support enables the allocation of resources, training of staff, and maintenance of necessary infrastructure for KMC units. One respondent highlighted this, stating, *"The facility plays a crucial role in the provision of KMC. Firstly, the management support system sets the tone for implementing KMC protocols effectively*." Strong leadership commitment at all levels of the facility was emphasized as essential for driving the implementation of KMC initiatives, fostering a culture of support and accountability, and ensuring long-term sustainability. This was highlighted by the sentiment that *"Leadership commitment is key. Strong leadership at all levels of the facility, from senior management to unit supervisors, is essential for driving the implementation of KMC initiatives, fostering a culture of support and accountability, and ensuring sustainability in the long run."*

Equally the midwives emphasized the importance of *"regular supervision and feedback sessions to ensure adherence to KMC protocols and identify areas for improvement."* One respondent stated, *"Supervision is another critical factor."* Provision of training opportunities was also highlighted as crucial for both new and existing midwives to stay *"...updated with the latest techniques and guidelines related to KMC."*. These two are management functions to enhance staff capacity and ensure continuous quality improvement.

Midwives stressed the importance of financial support for implementing KMC protocols, including investments in equipment, training programs, and hiring additional staff. Clear guidelines and protocols were also deemed essential for ensuring "*consistency in care delivery and minimizing errors*."

II. Resource appropriation such as the availability of resources like kangaroo chairs, breastfeeding support equipment, and monitoring devices, emerged as a significant factor influencing KMC provision. One of the midwives mentioned that, "*Resources are a significant aspect... Adequate provision of essential resources is essential for providing quality KMC*." Additionally, midwives discussed how rational allocation of midwives directly impacts the provision of KMC, as a heavy workload or allocation of nurses who are not specialized in KMC can lead to *"...less time spent on each infant, affecting the quality of care provided."*

III. Community Engagement and Cultural Sensitivity were recognized as important external factors in supporting KMC provision through anecdotes like "… *external factors such as community engagement and support also play a role.".* Equally, it was stated that "…*understanding and respecting the cultural beliefs and practices of the mothers and families receiving KMC is crucial for building trust and rapport. It can influence their willingness to engage in KMC and follow through with the recommended practices."*

IV. Infrastructure and Communication: Infrastructure, including the physical layout of the facility, was deemed crucial for promoting skin-to-skin contact between mother and baby. A nurse emphasized this, stating,

"Infrastructure is key. The physical layout of the facility should be designed in a way that promotes skin-to-skin contact between the mother and the neonate. This includes comfortable spaces for mothers to practice KMC, privacy when needed, and easy accessibility to support services like lactation consultants. " Effective communication channels within the facility were also highlighted as essential for smooth coordination in providing KMC as it *"…facilitates the transfer of information about mothers and neonates who need KMC, ensures timely interventions, and prevents any gaps in care."*

V. Maternal involvement and quality improvement was highlighted as key. The midwives discussed the importance of addressing barriers to maternal involvement in KMC and continuous quality improvement initiatives within the facility. One midwife highlighted the need to address barriers to maternal involvement, stating, *"Addressing barriers to maternal involvement is crucial."* Equally, ***"r**esearch and data collection"* within the facility was recognized as beneficial for monitoring the effectiveness of the KMC program and identifying areas for continuous improvement.

4.5: Midwives Factors Influencing weight gain among Low Birthweight Neonates under KMC

It provides insights into midwife's factors in relation to KMC implementation and outcomes, as perceived by mothers participating in the study. The perception of midwives' support in the practice of KMC varied among respondents. Approximately 23.64% rated the support as excellent, while 19.64% found it somewhat excellent. Conversely, 17.82% rated the support as not excellent, with 19.64% considering it somewhat not excellent. Regarding the timing of KMC initiation after delivery, responses were diverse. While 31.27% reported immediate initiation, significant proportions initiated KMC at 1 hour (20.73%), 2 hours (18.18%), and 3 hours (16.73%) post-delivery. Approximately 13.09% initiated KMC more than 3 hours after delivery. The satisfaction with the quality of KMC support received varied among respondents, with 25.82% being very satisfied and 22.91% satisfied. Conversely, 19.64% were very dissatisfied, and 15.64% were dissatisfied with the quality of care

received. A majority (64.00%) reported receiving support from midwives, indicating a significant level of involvement from healthcare professionals in the KMC process. Participants' satisfaction with the level of knowledge of midwives on KMC showed that 33.09% being very satisfied and 17.45% being very dissatisfied. More than half of the respondents (59.27%) felt that midwives addressed their concerns on KMC adequately, 40.73% felt otherwise. Similarly, 52.36% reported that midwives provided feedback on the progress of the baby, indicating active involvement and communication from healthcare professionals. Lastly, respondents rated the readiness of midwives to help with their KMC roles, with 54.18% considering midwives more than somewhat ready and 14.91% and 14.18% considering them somewhat not ready and not ready, respectively.

Table 11.0: Midwives' Factors Influencing Weight Gain Among Low-Birth-Weight Neonates under KMC

Midwives KMC support aspect	Grouping	Frequency	Percent
Rate midwives support in your practice of KMC	Excellent	65	23.64
	Somewhat excellent	54	19.64
	Neutral	53	19.27
	Somewhat not excellent	54	19.64
	Not excellent	49	17.82
How soon KMC initiated after delivery	Immediately	86	31.27
	1 Hour	57	20.73
	2 hours	50	18.18
	3 hours	46	16.73
	> 3 hours	36	13.09
Satisfaction with quality of KMC	Very satisfied	71	25.82
	Satisfied	63	22.91
	Neutral	44	16.00
	Dissatisfied	43	15.64
	Very dissatisfied	54	19.64
Received any support from midwives	Yes	176	64.00
	No	99	36.00
Satisfaction with level of knowledge of midwives on KMC	Very satisfied	91	33.09
	Satisfied	51	18.55
	Neutral	42	15.27
	Dissatisfied	43	15.64
	Very dissatisfied	48	17.45
midwives address my concerns on KMC adequately	Yes	163	59.27
	No	112	40.73
Rating readiness of the midwife to help with my KMC roles	Ready	91	33.09
	Somewhat ready	58	21.09
	Neutral	46	16.73
	Somewhat not ready	41	14.91
	Not ready	39	14.18
Midwife provides feedback on progress of the infant	Yes	144	52.36
	No	131	47.64

4.5.1: Association of midwives' factors and weight gain among low birthweight neonates under KMC

The timing of KMC initiation significantly influenced meeting weight gain criteria (X^2 (4) = 46.89, $p < 0.0001$), with immediate initiation leading to a notably higher proportion meeting criterion. Maternal satisfaction with KMC quality strongly correlated with meeting weight gain criteria (X^2 (4) = 43.72, $p < 0.0001$). Mothers who were very satisfied had a significantly higher proportion of neonates meeting criteria. Additionally, support from midwives (X^2 (4) = 2.47, $p = 0.001$) and satisfaction with midwives' knowledge (X^2 (4) = 36.84, $p < 0.0001$) were associated with meeting weight gain criteria. Maternal perception of midwives' readiness (X^2 (4) = 34.86, $p < 0.0001$) and feedback provision (X^2 (4) = 3.93, $p < 0.0001$) also significantly influenced meeting weight gain criteria. However, the level of support from the midwives didn't significantly correlate with meeting weight gain criteria (X^2 (4) = 0.61, $p = 0.446$).

Table 12.0: Association of midwives' factors and weight gain for low birthweight neonates under KMC

		Meets Recommended Daily Weight Gain (>=15g/Kg)				P Value
		Yes N (%)	No N (%)	OR/ Chi	95% CI/ df	
Rate the midwives support in your practice of KMC	Excellent	27 (41.54)	38 (58.46)	0.61*	4	0.446
	Somewhat excellent	21 (38.89)	33 (61.11)			
	Neutral	20 (37.74)	33 (62.26)			
	Somewhat not excellent	20 (37.04)	34 (62.96)			
	Not excellent	17 (34.69)	32 (65.31)			
How soon KMC initiated after delivery	Immediately	54 (62.79)	32 (37.21)	46.89 *	4	**<0.0001**
	1 Hour	26 (45.61)	31 (54.39)			
	2 hours	13 (26.00)	37 (74.00)			
	3 hours	9 (19.57)	37 (80.43)			
	> 3 hours	3 (8.33)	33 (91.67)			
Satisfaction with quality of KMC	Very satisfied	49 (69.01)	22 (30.99)	43.72 *	4	**<0.0001**
	Satisfied	24 (38.10)	39 (61.90)			
	Neutral	12 (27.27)	32 (72.73)			
	Dissatisfied	10 (23.26)	33 (76.74)			
	Very dissatisfied	10 (18.52)	44 (81.48)			
Received support from midwives	Yes	80 (45.45)	96 (54.55)	2.47	1.43 - 4.24	**0.001**
	No	25 (25.25)	74 (74.75)			
Satisfaction with level of knowledge of midwives on KMC	Very satisfied	57 (62.64)	34 (37.36)	36.84 *	4	**<0.0001**
	Satisfied	17 (33.33)	34 (66.67)			
	Neutral	10 (23.81)	32 (76.19)			
	Dissatisfied	12 (27.91)	31 (72.09)			
	Very dissatisfied	9 (18.75)	39 (81.25)			
Midwives address my concerns on KMC adequately	Yes	77 (47.24)	86 (52.76)	2.69	1.59 - 4.55	**<0.0001**
	No	28 (25)	84 (75)			
Rating readiness of midwives to help with my KMC roles	Ready	57 (62.64)	34 (37.36)	34.86 *	4	**<0.0001**
	Somewhat ready	17 (29.31)	41 (70.69)			
	Neutral	11 (23.91)	35 (76.09)			
	Somewhat not ready	10 (24.39)	31 (75.61)			
	Not ready	10 (25.64)	29 (74.36)			
Midwives provide feedback on progress of the infant	Yes	76 (52.78)	68 (47.22)	3.93	2.32 - 6.65	**<0.0001**
	No	29 (22.14)	102 (77.86)			

*Bivariate analysis by cross tabulation of midwives factors versus weight gain and other outcomes. N (%) where N= frequency, %= proportion/percentage, OR/Chi is Odds Ratio (for 2X2 aspects) or Chi-Square statistic (for those aspects not meeting 2x2 criteria), 95% CI/df for either OR or Chi-square statistic respectively. * Chi square used to make inference, ά<0.05*

4.5.2; Midwives perceptions about their role in KMC

Midwives in KMC units in the sampled hospitals were asked about their role in KMC in an in-depth interview. Their views were analyzed using thematic analysis and summarized as clinical implementation and support roles, educational and training roles, research and quality improvement roles, advocacy and policy development roles, and family and community engagement roles. These were summarized as follows;

I. **clinical implementation and support roles**, the midwives described roles involving direct patient care, support, and coordination within the KMC unit. They play crucial roles in providing direct care to mothers and infants during KMC sessions, ensuring their comfort and well-being throughout the process as expressed by one of the nurses …*"As a bedside midwife in the KMC unit, my role is to provide direct care to mothers and infants during KMC sessions."*. Midwives also take up the role of a KMC coordinator thus overseeing all aspects of KMC care, from scheduling sessions to guaranteeing the availability of essential resources, thereby facilitating the smooth operation of KMC units as echoed by one midwife. *"…As a KMC coordinator, my role is to coordinate all aspects of KMC care, from scheduling sessions to ensuring that all necessary resources are available."*

II. Educational and training roles emphasized on midwives' duties related to educating and training both staff and parents about KMC. These roles are also paramount, as highlighted by two midwives. *"In my role as a KMC educator, I conduct training sessions for both staff and parents on the principles and practices of KMC." "…I serve as a resource midwife for KMC, providing support and guidance to both staff and families on KMC best practices."* In their capacities as KMC educators and resource midwives, respectively, they conduct training sessions, equipping both staff

and parents with the knowledge and skills necessary for effective KMC implementation and adherence.

III. Research and quality improvement roles are initiatives are spearheaded by midwives where they engage in research endeavors, data collection, and clinical trials, all aimed at evaluating and enhancing the effectiveness and outcomes of KMC practices as demonstrated by two midwives *"...My role involves conducting research and quality improvement activities related to KMC…"* and "*..., I participate in clinical trials and studies to evaluate the effectiveness of KMC."*

IV. Advocacy and policy development roles are integral components of the KMC championed by midwives such as one who says that *..."In my role as a KMC advocate, I work to raise awareness of KMC among healthcare professionals, policymakers, and the general public.".* Equally, as KMC advocates and policy developers, they endeavor to raise awareness of KMC's significance among healthcare professionals and policymakers while shaping and implementing policies supportive of KMC integration within healthcare systems as reiterated by one interviewee *"I'm responsible for developing and implementing policies and procedures related to KMC within our hospital."*

V. Family and community engagement roles means that the KMC midwives are engaged in communication with families, discharge planning, and community engagement. Acting as family liaison midwives and coordinators, they facilitate communication between families and healthcare teams, coordinate discharge planning, and organize community-based KMC training programs, thus fostering a supportive environment conducive to KMC's success beyond hospital settings as demonstrated by two interviewees; *"..as a family liaison midwife in the KMC unit, my role is to facilitate*

communication between families and the healthcare team…" and *"My role involves coordinating KMC training programs for healthcare professionals both within our hospital and in the community."*

4.5.3 Midwives capacity on KMC Practice

During the in-depth interviews, the KMC midwives were asked whether they had received any on-job training, workshop, or seminar on KMC and how it affected their care provision for mothers practicing KMC.

I. Training Impact: Midwives recognized the value of formal training sessions in enhancing their understanding and practice of KMC. One midwife reflected on how training equipped her with up-to-date techniques and insights, enabling more informed and compassionate care provision. *"The training equipped me with the latest techniques and insights into the benefits of KMC... Since then, I've been able to provide more informed and compassionate care."* Similarly, others noted increased advocacy efforts post-seminar attendance, emphasizing the positive influence of such educational opportunities. *"I attended a seminar on KMC last year... Since then, I've been more proactive in advocating for KMC among our patients and colleagues…" and "It was a great refresher on the latest guidelines and best practices... I've been more confident in my ability to provide support to mothers practicing KMC."*

II. Practical Experience: Many midwives emphasized the importance of practical experience alongside formal training with an interviewee highlighting the transformative effect of learning by doing, leading to noticeable improvements in KMC practice *"Learning by doing made a huge difference... Since then, I've been practicing KMC regularly, and I've noticed significant improvements.".* Others, found practical experience in the hospital setting to be invaluable, complementing the

foundational knowledge gained from formal training "…. while it laid a good foundation, I've found that practical experience in the hospital setting has been invaluable…. since then, I've been actively involved in KMC sessions, guiding mothers through the process and addressing any concerns they may have."

III. Lack of Training: Some midwives expressed a lack of formal training opportunities and highlighted the need for continuous education. Three midwives voiced their eagerness to attend workshops or seminars in the future, recognizing the importance of ongoing learning "*Unfortunately, I haven't had the opportunity to receive any formal training on KMC... I'm eager to attend a workshop or seminar in the future…", "No, I haven't received any formal training on KMC since I started... I strive to provide emotional support and encouragement to mothers practicing KMC…." and "Unfortunately, I haven't had any formal training on KMC since I joined this unit".* Despite this, midwives remained committed to providing support to KMC mothers through self-initiated learning and on-the-job experiences as intimated by some of the "*... I'm committed to doing my best despite the lack of formal training*."

IV. Passion and Advocacy: Several midwives showcased a passion for KMC and expressed a desire to advocate for its benefits. Some described increased involvement in KMC advocacy efforts, driven by a fervent belief in the practice's efficacy and benefits. Their passion fueled advocacy efforts within their units and broader communities. *"I've become more involved in KMC advocacy within our unit... I'm passionate about spreading awareness and knowledge about its benefits." "It's motivated me to become more actively involved in promoting KMC both within our hospital and in the wider community." "While formal training is beneficial, I believe that practical experience is equally important in becoming proficient."*

V. Continuous Learning: Midwives stressed the importance of continuous learning to stay updated with the latest practices in KMC. One midwife highlighted the refreshment of knowledge through periodic updates, *"It was refreshing to refresh my knowledge and learn about any updates or advancements... I make sure to provide them with all the support and information they require…"* while another underscored the enduring impact of fundamental KMC principles. *"While it was a while ago, the fundamentals of KMC have stayed with me... I'm constantly striving to improve my skills."* Their commitment to ongoing skill refinement reflects a dedication to providing high-quality care to KMC mothers and infants.

4.5.4: Midwives roles in KMC

Midwives' roles were identified from the key informant interviews. The roles ranged from clinical, educational, research, advocacy, and community engagement as summarized under each of the themes derived from the KII.

I. **Clinical Implementation and Support Roles**: midwives described roles involving direct patient care, support, and coordination within the KMC unit. They play crucial roles in providing direct care to mothers and neonates during KMC sessions, ensuring their comfort and well-being throughout the process as expressed by one of the midwives *"…As a bedside nurse in the KMC unit, my role is to provide direct care to mothers and neonates during KMC sessions."*. Midwives also take up the role of a KMC coordinator thus overseeing all aspects of KMC care, from scheduling sessions to guaranteeing the availability of essential resources, thereby facilitating the smooth operation of KMC units as echoed by one midwife. *"…As a KMC coordinator, my role is to coordinate all aspects of KMC care, from scheduling sessions to ensuring that all necessary resources are available."*

II. **Educational and Training Roles**: midwives emphasized on roles related to educating and training both staff and mothers about KMC. These roles are also paramount, as highlighted by midwives such as two midwives. *"In my role as a KMC educator, I conduct training sessions for both staff and parents on the principles and practices of KMC." "…I serve as a resource midwife for KMC, providing support and guidance to both staff and families on KMC best practices."* In their capacities as KMC educators and resource, midwives, respectively, they conduct training sessions, equipping both staff and parents with the knowledge and skills necessary for effective KMC implementation and adherence.

III. **Research and Quality Improvement Roles**: Research and quality improvement initiatives are spearheaded by midwives. Through their roles, they engage in research endeavors, data collection, and clinical trials, all aimed at evaluating and enhancing the clinical outcomes of KMC practices as demonstrated by two midwives *"…My role involves conducting research and quality improvement activities related to KMC…"* and "*…, I participate in clinical trials and studies to evaluate the effectiveness of KMC."*

IV. **Advocacy and Policy Development Roles**: Advocacy and policy development are integral components of the KMC landscape, championed by midwives such as one who says that …"*In my role as a KMC advocate, I work to raise awareness of KMC among healthcare professionals, policymakers, and the general public.".* Equally, as KMC advocates and policy developers, they endeavor to raise awareness of KMC's significance among healthcare professionals and policymakers while shaping and implementing policies supportive of KMC integration within healthcare systems as reiterated by one interviewee *"I'm responsible for developing and implementing policies and procedures related to KMC within our hospital."*

V. Family and Community Engagement Roles: Midwives mentioned roles involving communication with families, discharge planning, and community engagement. Acting as family liaison midwives and coordinators, they facilitate communication between families and healthcare teams, coordinate discharge planning, and organize community-based KMC training programs, thus fostering a supportive environment conducive to KMC's success beyond hospital settings as demonstrated by two interviewees; *"..as a family liaison midwife in the KMC unit, my role is to facilitate communication between families and the healthcare team…"* and *"My role involves coordinating KMC training programs for healthcare professionals both within our hospital and in the community."*

4.6: Regression analysis of factors influencing weight gain for low birthweight neonates under KMC

The table 4.11 presents the results of binary logistic regression analysis of the variables that were significant factors influencing weight gain for low birthweight neonates under KMC from the bivariate analysis. The regression analysis conducted on the outcomes of Kangaroo Mother Care (KMC) for low birthweight neonates in Western Kenya identified several significant predictors, including maternal factors, neonate factors, maternal practices, facility-related factors, and midwives-related factors. Mothers' level of education played a role, with lower education levels associated with decreased odds of achieving the recommended weight gain (OR = 0.73, 95% CI = 0.55 - 0.98, p = 0.036). Postnatal complications, although not statistically significant, showed a trend towards decreased odds of successful weight gain outcomes (OR = 0.57, 95% CI = 0.33 - 1.01, p = 0.053). Conversely, mothers who rated their health status higher after childbirth had significantly higher odds of their neonates achieving the recommended weight gain (OR = 6.14, 95% CI = 2.75 - 13.71, p < 0.0001).

Similarly, lower stress levels among mothers were associated with significantly higher odds of their neonates meeting weight gain criteria (OR = 3.19, 95% CI = 1.68 - 6.05, $p < 0.0001$). Higher ratings of commitment to KMC (OR = 2.7, 95% CI = 1.45 - 5.03, $p = 0.002$), ease of integrating KMC into daily routines (OR = 1.9, 95% CI = 1.08 - 3.35, $p = 0.025$), and family support for KMC (OR = 4.96, 95% CI = 2.29 - 10.78, $p < 0.0001$) were associated with increased odds of successful weight gain outcomes. Neonatal complications significantly impacted weight gain outcomes, with neonates experiencing complications having substantially decreased odds of achieving the recommended weight gain (OR = 0.25, 95% CI = 0.15 - 0.43, $p < 0.0001$). Several maternal practices significantly influenced the outcomes of KMC in promoting weight gain among low birthweight neonates. Breastfeeding was a key factor, with mothers who breastfed their neonates having substantially higher odds of achieving the recommended weight gain (OR = 7.49, 95% CI = 1.96 - 28.61, $p = 0.003$). Additionally, specific positioning of the neonate, such as placing the neonate between the mother's breasts chest to chest ($P=0.003$), ensuring the neonate's head is turned to one side in a slightly extended position ($P=0.005$), positioning the neonate with hips flexed and extended ($P=0.002$), placing the top of the binder just under the neonate's ear ($P=0.001$), and securing baby's buttocks (0.009), were significantly associated with higher odds of successful weight gain. Similarly, maintaining warmth by having a blanket or shawl on top for additional warmth was significantly associated with higher odds of achieving the recommended weight gain (OR = 5.69, 95% CI = 1.81 - 17.82, $p = 0.003$).

Several facility-related factors significantly influenced the outcomes of Kangaroo Mother Care (KMC) in promoting weight gain among low birthweight neonates in Western Kenya. Facilities equipped with a breast pump (OR = 3.28, 95% CI = 1.57 -

6.86, p = 0.002) and a milk bank (OR = 3.58, 95% CI = 1.67 - 7.68, p = 0.001) had significantly higher odds of achieving the recommended weight gain. Additionally, the presence of a radiant heater in the facility was associated with increased odds of successful weight gain (OR = 2.21, 95% CI = 1.06 - 4.6, p = 0.035). Facilities with adequate space for KMC (OR = 2.26, 95% CI = 1.09 - 4.69, p = 0.029), provision of adequate food for the mother (OR = 5.39, 95% CI = 2.62 - 11.11, p < 0.0001), and sufficient seats for the mother (OR = 4.1, 95% CI = 1.92 - 8.76, p < 0.0001) were associated with higher odds of successful weight gain. Hygiene-promoting facilities (OR = 2.44, 95% CI = 1.18 - 5.02, p = 0.016) with informative displays about KMC (OR = 1.23, 95% CI = 0.6 - 2.52, p = 0.574) and easy-to-understand information (OR = 2.7, 95% CI = 1.31 - 5.55, p = 0.007) also had higher odds of successful weight gain outcomes. Hospitals where the management checked on KMC mothers (OR = 1.68, 95% CI = 0.81 - 3.49, p = 0.165), had outreach programs for KMC (OR = 2.09, 95% CI = 1.03 - 4.26, p = 0.042), supported family-centered KMC (OR = 2.66, 95% CI = 1.24 - 5.72, p = 0.012), and had adequate midwives to support KMC (OR = 3.43, 95% CI = 1.63 - 7.2, p = 0.001) were associated with higher odds of successful weight gain outcomes.

Midwife's factors influenced the Kangaroo Mother Care (KMC) outcomes in promoting weight gain among low birthweight neonates in Western Kenya. The timing of initiating KMC after delivery emerged as a significant predictor of success, with earlier initiation associated with higher odds of achieving the recommended weight gain (OR = 2.14, 95% CI = 1.63 - 2.81, p < 0.0001). Mothers who reported higher satisfaction with the quality of KMC had significantly higher odds of successful weight gain outcomes (OR = 1.78, 95% CI = 1.39 - 2.28, p < 0.0001). Receiving support from midwives was associated with higher odds of successful weight gain (OR = 2.36, 95%

CI = 1.11 - 5.03, p = 0.026). Mothers who reported higher satisfaction with the level of knowledge of the midwives on KMC had significantly higher odds of successful weight gain outcomes (OR = 1.61, 95% CI = 1.26 - 2.06, p < 0.0001). Mothers who perceived midwives as adequately addressing their concerns regarding KMC had higher odds of success (R = 2.88, 95% CI = 1.39 - 5.95, p = 0.004). Mothers who rated midwives as ready to help with their KMC roles had higher odds of successful weight gain (OR = 1.5, 95% CI = 1.16 - 1.93, p = 0.002). Additionally, midwives providing feedback on the progress of the neonate was associated with significantly higher odds of successful weight gain outcomes (OR = 3.99, 95% CI = 1.94 - 8.21, p < 0.0001).

Table 13.0: Regression analysis on factors influencing weight gain for low birthweight neonates under KMC

	Characteristic	OR	95% CI	P Value
Mother/ Neonate aspects	Level of education	0.73	0.55 - 0.98	**0.036**
	Postnatal complications	0.57	0.33 - 1.01	**0.053**
	Neonatal complications	0.25	0.15 - 0.43	**<0.0001**
	Number of hours of daily skin to skin care	3.46	2.16 - 5.53	**<0.0001**
	Breastfeeds	7.49	1.96 - 28.61	**0.003**
	Neonate in socks, a nappy and a cap.	1.27	0.45 - 3.61	0.655
	Neonate is between the mother's breasts chest to chest	4.98	1.7 - 14.55	**0.003**
	Head is turned to one side in a slightly extended position	4.99	1.63 - 15.3	**0.005**
	Top of the binder being just under the neonate's ear.	9.04	2.34 - 34.91	**0.001**
	Hips are flexed and extended in a "frog" position	6.25	2 - 19.51	**0.002**
	Arms are flexed	3.86	1.18 - 12.65	**0.026**
	Secure the infant on to the mother's chest	3.13	0.99 - 9.87	0.051
	Secure the head	2.47	0.84 - 7.28	0.100
	Secure the buttocks	4.94	1.49 - 16.46	**0.009**
	Neonate's abdomen not constricted & in right position	3.19	0.95 - 10.66	0.060
	Has a blanket or a shawl on top for additional warmth	5.69	1.81 - 17.82	**0.003**
	Mother has a top that is open at the front	3.13	0.83 - 11.78	0.091
	Mother keeps the infant upright when walking or sitting	1.49	0.53 - 4.18	0.451
	Effectiveness of KMC in helping the neonate gain weight	2.08	0.94 - 4.59	0.070
	Confidence in ability to understand & follow KMC instructions	1.86	0.86 - 4.06	0.117
	Rating of health status after childbirth	6.14	2.75 - 13.71	**<0.0001**
	Rating of current stress levels	3.19	1.68 - 6.05	**<0.0001**
	Rating commitment to KMC	2.7	1.45 - 5.03	**0.002**
	Rating the ease of integrating KMC in daily routines	1.9	1.08 - 3.35	**0.025**
	Rating family support for KMC	4.96	2.29 - 10.78	**<0.0001**
Facility related aspects	Breast pump	3.28	1.57 - 6.86	**0.002**
	Milk bank	3.58	1.67 - 7.68	**0.001**
	Radiant heater	2.21	1.06 - 4.6	**0.035**
	Space for KMC	2.26	1.09 - 4.69	**0.029**
	Adequate food for the mother	5.39	2.62 - 11.11	**<0.0001**
	Seats for the mother	4.1	1.92 - 8.76	**<0.0001**
	Room for breast milk expression	4.63	2.25 - 9.51	**<0.0001**
	Milk preparation equipment	1.2	0.58 - 2.49	0.632
	Promotes hygiene	2.44	1.18 - 5.02	**0.016**
	Information displayed about KMC is easy to read and understand	2.7	1.31 - 5.55	**0.007**
	Hospital has outreach program for KMC	2.09	1.03 - 4.26	**0.042**
	Hospital support family centered KMC	2.66	1.24 - 5.72	**0.012**
	Hospital has adequate midwives to support KMC	3.43	1.63 - 7.2	**0.001**
Midwives related aspects	How soon KMC initiated after delivery	2.14	1.63 - 2.81	**<0.0001**
	Satisfaction with quality of KMC	1.78	1.39 - 2.28	**<0.0001**
	Received any support from nurses	2.36	1.11 - 5.03	**0.026**
	Satisfaction with level of knowledge of midwives on KMC	1.61	1.26 - 2.06	**<0.0001**
	Midwives address my concerns on KMC adequately	2.88	1.39 - 5.95	**0.004**
	Rating readiness of midwives to help with my KMC roles	1.5	1.16 - 1.93	**0.002**
	Midwives provide feedback on progress of the neonate	3.99	1.94 - 8.21	**<0.0001**

This is binary logistic regression analysis output. All the variables that were significant from bivariate analysis were fitted into binary logistic regression model based characteristic category. OR is Odds Ratio and 95% CI is 95 % Confidence Interval. ȁ<0.05

CHAPTER FIVE

DISCUSSION

5.0: Overview

This chapter consists of summary of the findings from the study, in comparison with those from other research studies. It includes discussion on outcomes of Kangaroo mother care, maternal related factors, institutional related factors and midwife related factors, in a discussion of the literature review in relation to the research hypothesis.

5.1 Weight Gain for Neonates under Kangaroo Mother Care

The study had 100% response rate similar to a study conducted in northern Ethiopia had a response rate of 99.5% (Ebud Ayele et al., 2023). Due to the eagerness of the mothers.

Mothers who practiced KMC reported notable growth and weight increase. From the study majority of the neonates achieved the recommended daily weight gain of 15 grams per kilogram. A similar study echoed the benefits of KMC as being safe and beneficial in lowering mortality and contributed to weight increase if the practice was consistent for eight or more hours per day (Sivanandan S, 2023). This was also consistent with a study which showed that newborns receiving kangaroo mother care (KMC) experienced greater daily weight gain compared to neonates receiving conventional care (Bilal *et al.,* 2021). This was associated with proper KMC practice and adherence of the stipulated duration of 8 hours of KMC or more.

5.2 Maternal Factors Influencing Weight Gain Among Low-birth-weight Neonates under Kangaroo Mother Care

The study found that education level, significantly influenced the neonate's ability to meet the recommended daily weight gain of 15g/kg, majority of the mothers with high literacy levels had higher percentages in meeting the recommended daily weight gain, this concurs with a study done in Brazil where education level was a strong predictor of weight gain as an outcome of KMC practice (Silva et al., 2021). Literacy improves one's comprehension and understanding of information and instructions.

Majority of the young mothers aged 25- 30 years had a slightly higher proportion meeting the recommended daily weight gain criteria compared to those above 30 years though this difference was not statistically significant, this contradicts with a study at the University of California, San Francisco which found young mothers 25-34 years were adherent to KMC practice (Johnson et al., 2020). Young mothers are quick to grasp information, eager and curious to learn new practices leading them to be adherent to KMC practice.

5.3 Facility Factors Influencing Weight Gain Among Low-Birth-Weight Neonates under Kangaroo Mother Care

The study found that facilities with required infrastructure level had a substantially higher proportion of neonates meeting the recommended daily weight gain criteria. Facility with availability of required equipment such as having medications, enough food for mothers, warm water, and ensuring safety, milk banks were related with neonates attaining recommended weight gain. This concurs with a study which found that parents in Africa believed that for effective kangaroo mother care there was need for private space for mothers to perform kangaroo mother care and to remain in the hospital with the neonate, allocation of resources intended for kangaroo mother care

like wrappers to hold the neonates, furniture/beds where mothers could conduct kangaroo mother care, rooms where mothers could spend the night with the neonates, private spaces and dedicated resources. (Ochieng *et al.,* 2021). Mothers in the African settings have different cultures which prohibit some practices like exposing the neonate during breastfeeding, changing of diapers, clothing and general exposure of the neonate.

5.4 Midwives Related Factors Influencing Weight Gain Among Low Birthweight Neonates under Kangaroo Mother Care

The study revealed that the timing of KMC initiation significantly influenced meeting weight gain criteria with immediate initiation leading to a notably higher proportion meeting criterion. This was consistent with a study which found that when KMC was initiated within first week the weight gain was marked even in VLBW neonates (Gonzalez *et al.,* 2021). Midwives need to be prompt in management during labor and immediate initiation of all low-birth-weight neonates on KMC, so as to enable the neonates gain the recommended weight per day of 15g/kg.

The study found that maternal satisfaction with KMC quality strongly correlated with meeting weight gain criteria. Mothers who were very satisfied had a significantly higher proportion of neonates meeting weight gain criteria. This concurred with a study which found that 53% of midwives agreed that KMC enhanced bonding between mother and neonate (Sivanandan & Sankar, 2023). Mothers are always very confident and secure when involved directly with their neonate's care.

CHAPTER SIX

SUMMARY CONCLUSION AND RECOMMENDATION

6.0 Overview

This chapter presents the conclusion on factors affecting the outcome of kangaroo mother care in infants with low birth weight. It also includes the recommendations made basing on the specific findings from the study.

6.1 Conclusions

The study found that KMC practice was beneficial to the neonates in relation to meeting daily weight gain.

The study results highlight the crucial role mothers play in promoting weight gain for neonates under KMC.

The study highlights the impact of adequate infrastructure in the facilities in promoting KMC.

The study demonstrates that midwife's knowledge and practice play a significant role in influencing weight gain in neonates under KMC.

6.2 Recommendations

6.2.1 Recommendations for practice

The researcher recommends the following:

1. There is need for implementation of KMC in all facilities.

2. There is need for educating mothers on KMC practice and its benefits.
3. There is need for provision of KMC practice rooms and required equipment's.
4. Midwives to be trained on current KMC practices.

6.2.2 Suggestions for further study

1. The researcher suggested a further study on a quasi-experimental study on the influence of male partner involvement in the kangaroo mother care.
2. The researcher also suggested further study on acceptability and applicability of KMC practice and factors that prevent the use of KMC at home method.

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APPENDICES

Appendix I: Consent form

Title: OUTCOMES OF KANGAROO MOTHER CARE AND ASSOCIATED FACTORS INFLUENCING WEIGHT GAIN AMONG LOW BIRTHWEIGHT NEONATES IN WESTERN KENYA

My name is Selline Mukabi; I am a postgraduate student at MMUST in the faculty of Nursing. I am planning to conduct a research study, which I invite you to take part in. I am conducting a study on **"Outcomes of Kangaroo Mother Care and Associated Factors Among Mothers with Low Birthweight Neonates in Kisii, Busia and Migori County Hospitals, Kenya"** the information will be used to strengthen workable practices and effective advice for pregnant mothers

Procedures to be followed

Participation in this study will require that I ask you some questions and no procedure will be performed on you. You have the right to refuse participation in this study. You will get the same care and medical attention/services whether you agree to join the study or not and your decision will not change the care you will receive from the clinic today or that you will get from any other clinic at any other time

Please remember that participation in the study is voluntary. You may ask questions related to the study at any time.

You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from this clinic or any other organizations now or in the future.

Discomforts and risks

There are no questions you will be asked that may be embarrassing or make you uncomfortable. But, if this happens, you may refuse to answer these questions if you choose so. You may also stop the interview at any time. The interview may add approximately half an hour to the time you wait before you receive your routine services.

Benefits

If you participate in this study, you will help us to learn how to provide effective information that healthcare providers are missing out that can improve the health of newborn and reduce the risk of complications, you will also benefit from being advised more on how to care for the neonate.

Reward

Participating in this study is absolutely voluntary and therefore no reward will be given whatsoever

Confidentiality

The interviews will be conducted within the facility. Your name will not be recorded on the questionnaire. The questionnaire will be kept in a locked cabinet for safe keeping. Everything will be kept private.

Contact information

If you have any questions, you may contact Selline Mukabi (Principal Investigator) on ……or Dr. …….. (Supervisor) on 07…….. or Dr. ……(Supervisor)on 07……. or the MMUST-Ethical Review Committee Secretariat on…….

Participant's statement

The above information regarding my participants in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care I will receive from the clinic today or that I will get from any other clinic at any other time.

Code of participant…….

…… ……

Signature or thumb print Date

Investigator`s statement

I, the undersigned, have explained to the volunteer in a language she/he understands, the procedures to be followed in the study and the risks and benefits involved.

Name of interviewer……...

……. ……

Interviewer signature Date

Appendix II: Questionnaires
Title: OUTCOMES OF KANGAROO MOTHER CARE AND ASSOCIATED FACTORS INFLUENCING WEIGHT GAIN AMONG LOW BIRTHWEIGHT NEONATES IN WESTERN KENYA

Study ID: ……

Date: ……/……/……

Instructions: ***Do not write your name or any other personal data on the questionnaire.***

Please follow instructions while answering questions in each area.

The information given here will remain confidential.

SNo	**Mother**		
1	How long ago did you deliver the neonate	__ Days __ Weeks __ Months	0 1
2	What is you age?	21-30 years 31-40 years 41-50 years Above 50 years	0 1 2 3
3	What level of education did you attain?	Primary Secondary College University None	0 1 2 3 4
4	What is your marital status?	Single	0

		Married Widowed Cohabiting	1 2 3
5	How many children do you have apart from this one?	_____	1
6	How did you deliver this neonate?	SVD C/S	1 2
7	Where did you deliver?	Facility Home	1 2
8	What is your occupation?	Employed Business Farmer Housewife	0 1 2 3
9	What your main source of information on Kangaroo Mother care?	Radio/ Television Newspapers Phone/Text/Internet Healthcare worker Family and friends	1 2 3 4 5
10	How many are you in your household?	_____	
11	What is your monthly household income bracket?	Below KES5,000 KES5,000 - KES10,000 KES10,000 - KES20,000	1 2 3 4

		Above KES20,000	
12	Did the mother have complications after delivery?	Yes No	1 0
13	What complications did the mother have after delivery?	Postpartum hemorrhage Perineal tears Preeclampsia or eclampsia Postpartum infection Deep vein thrombosis Postpartum depression Uterine inversion Uterine atony Retained placenta Pelvic organ prolapses Other (Specify)	1 2 3 4 5 6 7 8 9 10
	Neonate		
1	Neonate Birth weight Neonate sex Gestation at time of delivery	____ Male [M] Female [F] ____	

2	Did the neonate have complications after delivery apart from low birth weight	Yes No	1 2
3	What complication did the infant have after birth	Respiratory distress syndrome Jaundice Infection Premature birth complications Neonatal sepsis (infection) Birth injuries Hypoglycemia (Low sugar) Congenital malformation Other (Specify)	1 2 3 4 5 6 7 8
	Kangaroo mother care		
1	On a scale of 1 to 5, how effective do you think Kangaroo mother Care is in helping the neonate gain weight (1 = not effective, 5 = very effective)	Very Effective Somewhat Effective Neutral Somewhat Ineffective Not Effective	1 2 3 4 5
2	On a scale of 1 to 5, how confident are you in your ability	Not Confident	1 2

	to understand and follow Kangaroo Mother Care instructions? (1 = not confident, 5 = very confident)	Somewhat Not Confident Neutral Somewhat Confident Very Confident	3 4 5
3	Are there any cultural beliefs or practices that influence your decisions regarding Kangaroo Mother Care?	Yes No	1 2
4	On a scale of 1 to 5, how do cultural beliefs affect your ability to utilize postnatal care?	Strongly Negative Impact Somewhat Negative Impact Neutral Somewhat Positive Impact Strongly Positive Impact	1 2 3 4 5
5	How would you rate your current health status after childbirth?	Excellent Good Fair Poor	1 2 3 4
6	How would you rate your current stress levels	No t So High	1 2 3

		Somewhat Not So High Neutral Somewhat High High	4 5
7	How would you rate your commitment to Kangaroo Mother Care?	Not Committed Somewhat Not Committed Neutral Somewhat Committed Very Committed	1 2 3 4 5
8	How would you rate the ease of integrating KMC in your daily routines	Not Easy Somewhat Not Easy Neutral Somewhat Easy Very Easy	1 2 3 4 5
9	How would you rate family support for KMC	Not High Somewhat Not High Neutral Somewhat High Very High	1 2 3 4 5
	Kangaroo mother care practice		
1	How many hours do you practice skin to skin care during the day	>6 hours 6 hours 5 hour	1 2 3

		4 hours 0-3 hours	4 5
2	Do you breast feed the neonate	Yes No	1 2
3	Is the neonate on other feeds apart from breast milk	Yes No	1 2
4	How often do you feed the neonate	On demand Very often Often	1 2 3
5	Rate midwives support in your practice of Kangaroo Mother Care	Not Excellent Somewhat Not Excellent Neutral Somewhat Excellent Very Excellent	1 2 3 4 5
6	How soon did you initiate Kangaroo Mother Care after delivery	Immediately 1 Hour 2 Hours 3 hours More than 3 hours	1 2 3 4 5
7	How satisfied are you with the quality of Kangaroo Mother Care you are giving?	Very satisfied Somewhat satisfied Neutral Somewhat dissatisfied Very dissatisfied	1 2 3 4 5

	Support from Midwives		
1.	Have you received any support from the midwives	Yes No	1 2
2.	How satisfied are you with the level of knowledge of your midwife on KMC	Very satisfied Somewhat satisfied Neutral Somewhat dissatisfied Very dissatisfied	1 2 3 4 5
3.	Do midwives address your question on KMC adequately	Yes No	1 2
4.	Rate the level of readiness of midwives to help you with your KMC roles	Not Ready Somewhat Not Ready Neutral Somewhat Ready Very Ready	1 2 3 4 5
5.	Do midwives provide you with feedback on progress on the neonate	Yes No	1 2
	Observation checklist of KMC implementation by mother		
1.	Neonate in socks, a nappy and a cap.	Yes No	1 2
2.	Neonate is between the mother's breasts chest to chest	Yes No	1 2

3.	Head is turned to one side in a slightly extended position	Yes No	1 2
4.	Top of the binder being just under the neonates' ear.	Yes No	1 2
5.	Hips are flexed and extended in a "frog" position	Yes No	1 2
6.	Arms are flexed	Yes No	1 2
7.	Secure the neonate on to the mother's chest with a clean soft cloth/carrying pouch	Yes No	1 2
8.	Secure the head	Yes No	1 2
9.	Secure the buttocks	Yes No	1 2
10.	Apply appropriate tightness	Yes No	1 2
11.	Neonate ' s abdomen not constricted and is at the level of the mother's epigastric region.	Yes No	1 2
12.	Has a blanket or a shawl on top for additional warmth	Yes No	1 2

13.	Mother has a top that is open at the front	Yes No	1 2
14.	Mother keeps the neonate upright when walking or sitting	Yes No	1 2
15.	Mother notes need for continuous skin-to-skin >20 hours	Yes No	1 2
	Healthcare system		
1.	The hospital provides		
2.	Breast pumps	Yes No	1 2
3.	Milk bank	Yes No	1 2
4.	Weighing scale	Yes No	1 2
5.	Weight chart	Yes No	1 2
6.	Radiant heater	Yes No	1 2
7.	Warm water	Yes No	1 2
8.	Space for KMC	Yes No	1 2
9.	Adequate food for the mother	Yes No	1 2

10.	Seats for the mother	Yes No	1 2
11.	Room for breast milk expression	Yes No	1 2
12.	Milk preparation equipment	Yes No	1 2
13.	Promotes hygiene	Yes No	1 2
14.	Guarantees safety	Yes No	1 2
15.	There is adequate information on KMC displayed in the KMC spaces	Yes No	1 2
16.	The information displayed about KMC is easy to read and understand	Yes No	1 2
17.	Hospital managers check on the mother practicing KMC	Yes No	1 2
18.	Hospital has outreach program for KMC	Yes No	1 2
19.	Hospital support family centered kangaroo mother care	Yes No	1 2
20.	Hospital has adequate staff to support KMC	Yes No	1 2

	Outcomes of kangaroo mother care		
1.	What are the last three temperature readings for the neonate? (If not recorded take one measurement and record)	____degrees Celsius ____ degrees Celsius ____ degrees Celsius	
2.	What was the neonate last three respiratory rates? (If not recorded take one measurement and record)	____bpm ____ bpm ____ bpm	
3.	What is the neonate's current weight?	_____ grams	
4.	How long has the neonate been under Kangaroo Mother Care?		

Thank you for your responses and the time you spent.

Appendix III: Midwives' Interview Guide

Title: OUTCOMES OF KANGAROO MOTHER CARE AND ASSOCIATED FACTORS AMONG MOTHERS WITH LOW BIRTHWEIGHT NEONATES IN WESTERN KENYA

General Introduction

Please identify a calm setting for the KII

I would like to thank you for agreeing to be a part of this discussion. My name is …… I will be leading the discussion session. I kindly request you to allow the session to be audio-taped so that we do not miss any of the ideas. The purpose of conducting this discussion is to assess outcomes of Kangaroo Mother Care. We would wish to inform you that there are no wrong or right answers in this discussion. Please be assured that your personal details or what you say as a person will not be used at any time. What you say is therefore confidential and anonymous. We will ensure confidentiality about all the information discussed. This discussion will also be anonymous – your names will not be recorded in the notes; rather we shall assign codes to the names. You are therefore encouraged to participate actively and to feel free during the discussion. The team will produce reports immediately after the discussions highlighting key observations from the session.

PART A: GENERAL INFORMATION

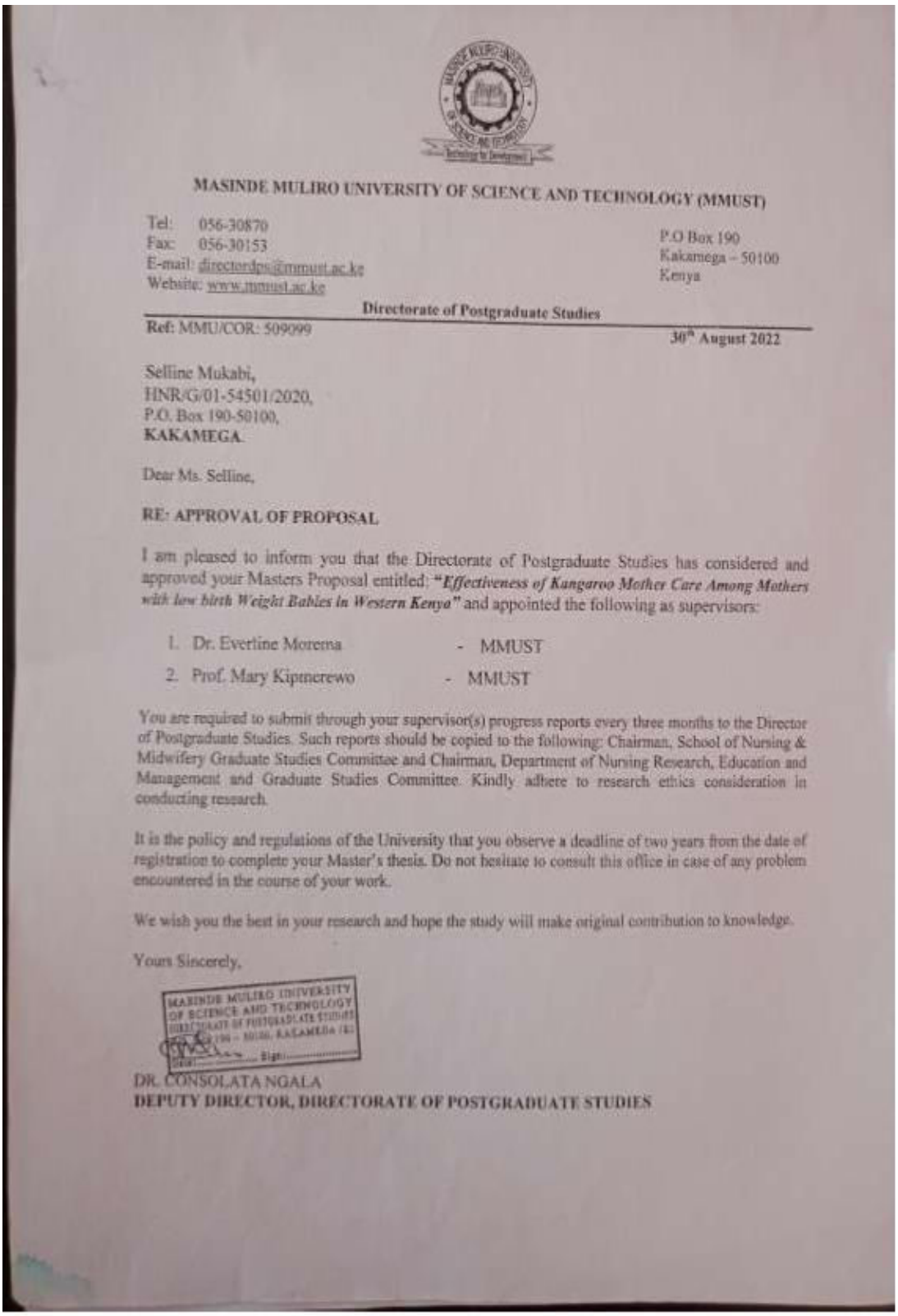
Name of the health facility:	
Position of the respondent:	
Gender:	
Start of interview Time:	
End of interview Time:	
Note Taker Name:	
Interviewer Name:	
Code of the script:	

Interview Guide Questions

Questions	**Probe (s)**
Q1. Do you provide KMC? What is your role in KMC? Have you received any on job training or workshop or seminar on KMC? How long ago did you receive the training? and how has it affected your care provision for mothers practicing KMC?	**[Probe: on job training for midwives, workshop, their role, participation, place received training, attitude towards KMC etc.]**
Q2. Characteristics of mothers provided with KMC? What aspects about the mothers practicing KMC affect the outcome of care? What is the influence of support from significant others on outcome of KMC?	[**Probe: Age, parity, knowledge, KMC policy, acceptance, birthweight, involvement of significant others, etc?**

What aspects about the low birthweight infantds affect the outcome of KMC?	
Q3. What is the role of facility in provision of KMC? What aspects about facility or health care system affect provision of KMC?	**[Probe- support system, health talks, resources, workload, supervision, etc.]**
Q4. What do you think hinders/ or facilitates KMC in your facility?	**[Probe- constraints that hinder utilizing the services, what have been done to increase the utilization]**

Appendix IV: Approval letter from DPS



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870
Fax: 056-30153
E-mail: directordps@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190
Kakamega – 50100
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099

30th August 2022

Selline Mukabi,
HNR/G/01-54501/2020,
P.O. Box 190-50100,
KAKAMEGA.

Dear Ms. Selline,

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Masters Proposal entitled: *"Effectiveness of Kangaroo Mother Care Among Mothers with low birth Weight Babies in Western Kenya"* and appointed the following as supervisors:

1. Dr. Everline Morema - MMUST
2. Prof. Mary Kipmerewo - MMUST

You are required to submit through your supervisor(s) progress reports every three months to the Director of Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Nursing & Midwifery Graduate Studies Committee and Chairman, Department of Nursing Research, Education and Management and Graduate Studies Committee. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your Master's thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

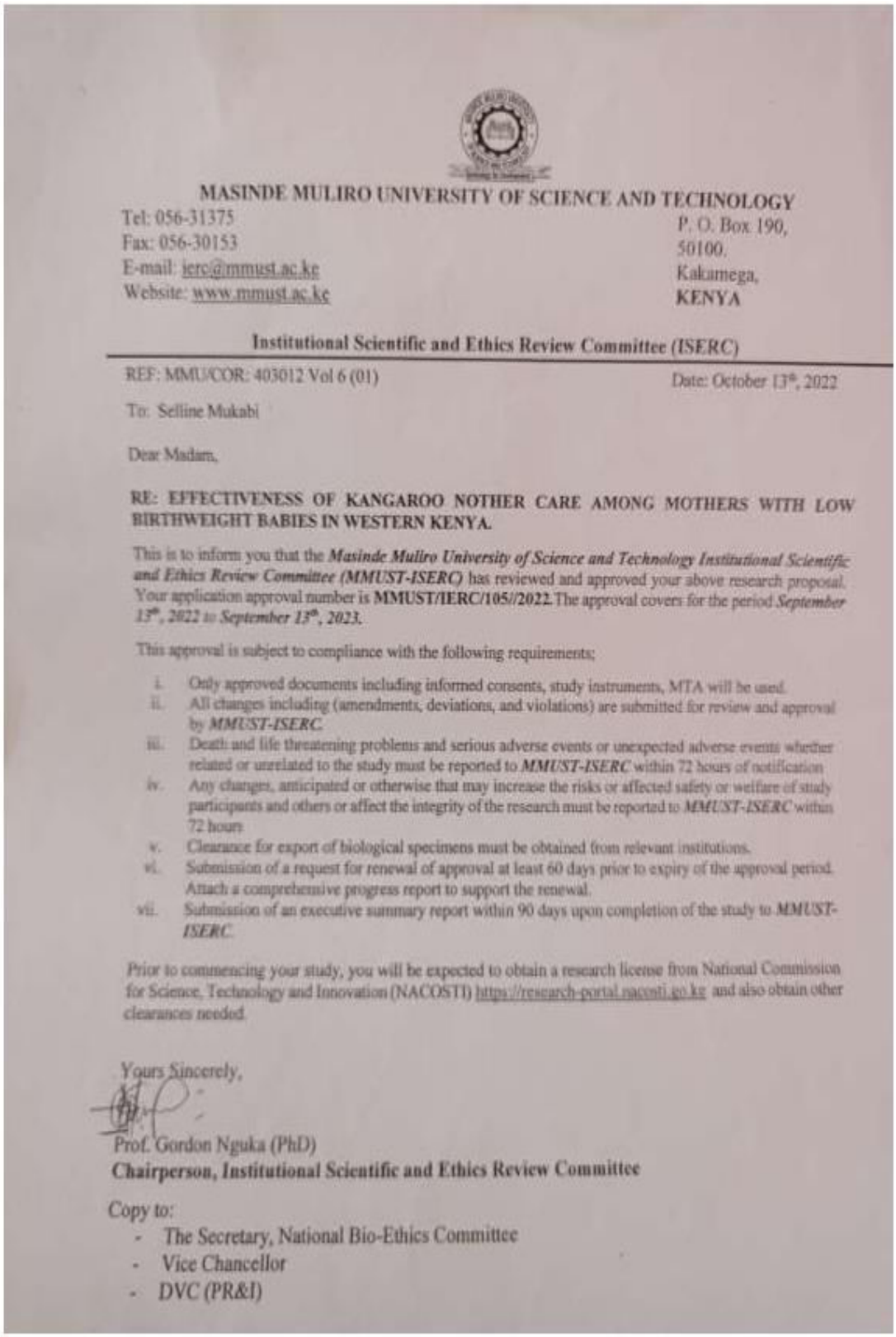
We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY DIRECTORATE OF POSTGRADUATE STUDIES P.O. BOX 190 - 50100, KAKAMEGA (K)
Date: Sign:

DR. CONSOLATA NGALA
DEPUTY DIRECTOR, DIRECTORATE OF POSTGRADUATE STUDIES

Appendix V: Approval letter from ISERC



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

Tel: 056-31375
Fax: 056-30153
E-mail: ierc@mmust.ac.ke
Website: www.mmust.ac.ke

P. O. Box 190,
50100,
Kakamega,
KENYA

Institutional Scientific and Ethics Review Committee (ISERC)

REF: MMU/COR: 403012 Vol 6 (01) Date: October 13th, 2022

To: Selline Mukabi

Dear Madam,

RE: EFFECTIVENESS OF KANGAROO NOTHER CARE AMONG MOTHERS WITH LOW BIRTHWEIGHT BABIES IN WESTERN KENYA.

This is to inform you that the ***Masinde Muliro University of Science and Technology Institutional Scientific and Ethics Review Committee (MMUST-ISERC)*** has reviewed and approved your above research proposal. Your application approval number is **MMUST/IERC/105//2022.** The approval covers for the period ***September 13th, 2022 to September 13th, 2023.***

This approval is subject to compliance with the following requirements;

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

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

Yours Sincerely,

Prof. Gordon Nguka (PhD)
Chairperson, Institutional Scientific and Ethics Review Committee

Copy to:
- The Secretary, National Bio-Ethics Committee
- Vice Chancellor
- DVC (PR&I)

Appendix VI: Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **929890**

Date of Issue: **15/November/2022**

RESEARCH LICENSE

This is to Certify that Ms.. Selline Mukabi Mukabi of Masinde Muliro University of Science and Technology, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Busia, Kisii, Migori on the topic: EFFECTIVENESS OF KANGAROO MOTHER CARE AMONG MOTHERS WITH LOW BIRTH WEIGHT BABIES IN WESTERN KENYA for the period ending : 15/November/2023.

License No: **NACOSTI/P/22/21399**

929890

Applicant Identification Number

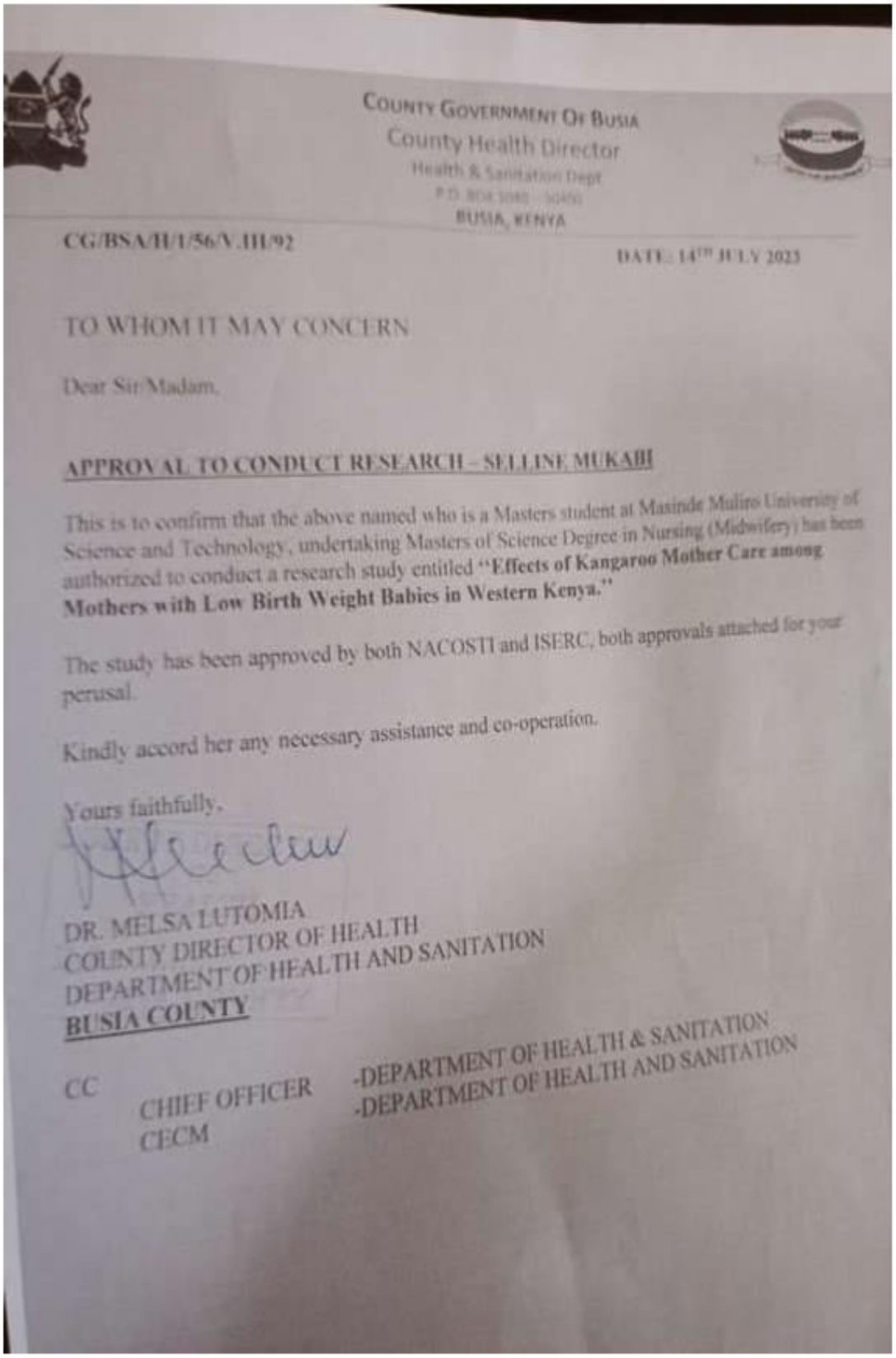
Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

See overleaf for conditions

Appendix VII: approval from Busia



COUNTY GOVERNMENT OF BUSIA
County Health Director
Health & Sanitation Dept
P.O. BOX 1080 - 50400
BUSIA, KENYA

CG/BSA/H/1/56/V.III/92

DATE: 14TH JULY 2023

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

APPROVAL TO CONDUCT RESEARCH – SELLINE MUKABI

This is to confirm that the above named who is a Masters student at Masinde Muliro University of Science and Technology, undertaking Masters of Science Degree in Nursing (Midwifery) has been authorized to conduct a research study entitled "**Effects of Kangaroo Mother Care among Mothers with Low Birth Weight Babies in Western Kenya.**"

The study has been approved by both NACOSTI and ISERC, both approvals attached for your perusal.

Kindly accord her any necessary assistance and co-operation.

Yours faithfully,

DR. MELSA LUTOMIA
COUNTY DIRECTOR OF HEALTH
DEPARTMENT OF HEALTH AND SANITATION
BUSIA COUNTY

CC CHIEF OFFICER -DEPARTMENT OF HEALTH & SANITATION
CECM -DEPARTMENT OF HEALTH AND SANITATION

Appendix VIII: approval from Migori County

REPUBLIC OF KENYA

COUNTY GOVERNMENT OF MIGORI
DEPARTMENT OF HEALTH AND SANITATION

Telegrams: "MOH", Migori
Telephone:0716 649 609
Email:**beffyvill@gmail.com**
When replying please quote;

COUNTY RESEARCH COORDINATOR,
DIVISION OF RESEARCH & LEARNING,
MIGORI COUNTY.
P O BOX 1045-40400
SUNA - MIGORI

REF: MCG/MOH/CRLC/VOL 1/8/2023 **26th July, 2023.**

To,

Seline Mukabi,

Attention: SCMOHs & SC Research and Learning Coordinators.

RE: APPROVAL TO CONDUCT A RESEARCH STUDY.

Thank you for your letter requesting authorization to conduct a research study titled "**Effectiveness of Kangaroo Mother Careamong mothers with low birth weight babiesin Western Kenya**"
After careful consideration of your research proposal, we are pleased to inform you that your request is officially granted. The study will take place in Migori County Referral Hospital, Awendo Sub County Hospital and Rongo Sub County Hospital.

We appreciate you for having met the Migori County Research and Learning Pre-requisite, shared the IRB approvals, Ethical considerations, NACOSTI permits and paid the required County research fees.

We areconfident that the study will be conducted in accordance with all the policies and procedures guiding it.

The study will take place between July 25th 2023 and 15th November 2023. You will be required to share apreliminary feedback/report to the County through the Division of Research & Learning, awaiting officialdissemination of findings to relevant officers and stakeholders.

Kindly liaise with the Sub County Research & Learning Coordinators through the SCMOH's as you undertake the research study.

Wishing you the very best.

Thank you,

MIGORI COUNTY RESEARCH & LEARNING COORDINATOR
P.O.BOX 1045-40400
SUNA-MIGORI

BEFFY VILL,
RESEARCH & LEARNING COORDINATOR,
MIGORI COUNTY.

Cc: CEC Health, Chief Officers & Directors for Health and Saniation.

Appendix IX: Approval from Kisii

KISII COUNTY GOVERNMENT
DEPARTMENT OF HEALTH

Telegramme "Medical"
Telephone: (058) 31310 Kisii
E-Mail: ktrh.erc@yahoo.com
Web: www.ktrh.go.ke

KTRH ISERC
KISII TEACHING & REFERRAL HOSPITAL
P.O Box 92 – 40200,
KISII

Date: 24TH AUGUST 2023

REF: ISERC/KTRH/058/23

Seline Mukabi
Principal Investigator,
Masinde Muliro University,
Kakamega.

Dear Seline,

RE: AUTHORIZATION TO CONDUCT A RESEARCH STUDY TITLED 'OUTCOMES OF KANGAROO MOTHER CARE AMONG MOTHERS WITH LOW BIRTH WEIGHT BABIES IN WESTERN KENYA' (ISERC/KTRH/058/23).

This is to inform you that ***KTRH ISERC*** has reviewed and approved your above research proposal. Your application approval number is ***ISERC/KTRH/058/23***. The approval period is ***24TH August 2023 - 23rd August 2024.***

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KTRH ISERC*** within 72 hours.
iii. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
iv. Submission of an executive summary report within 90 days upon completion of the study to ***KTRH ISERC***.

The study has been approved to be conducted at Kisii Teaching and Referral Hospital, Gucha Subcounty Hospital and Nyamache Subcounty Hospital.

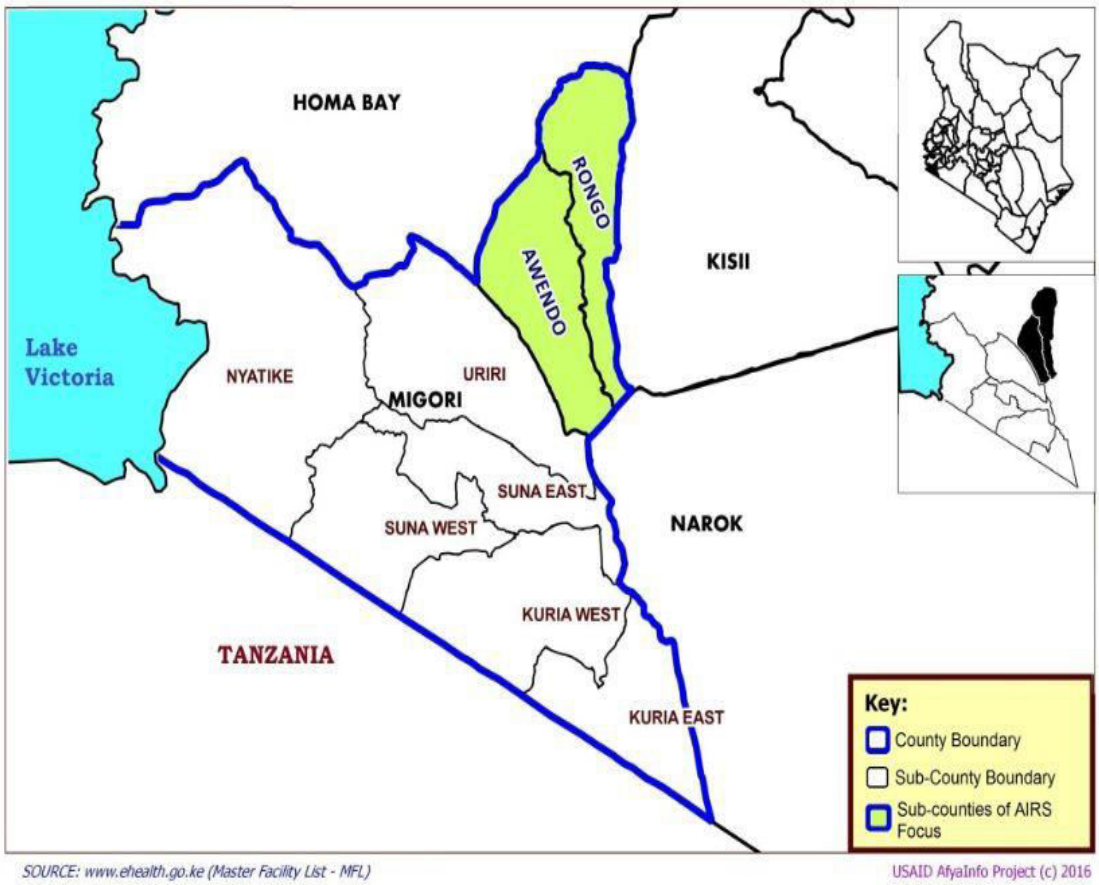
Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

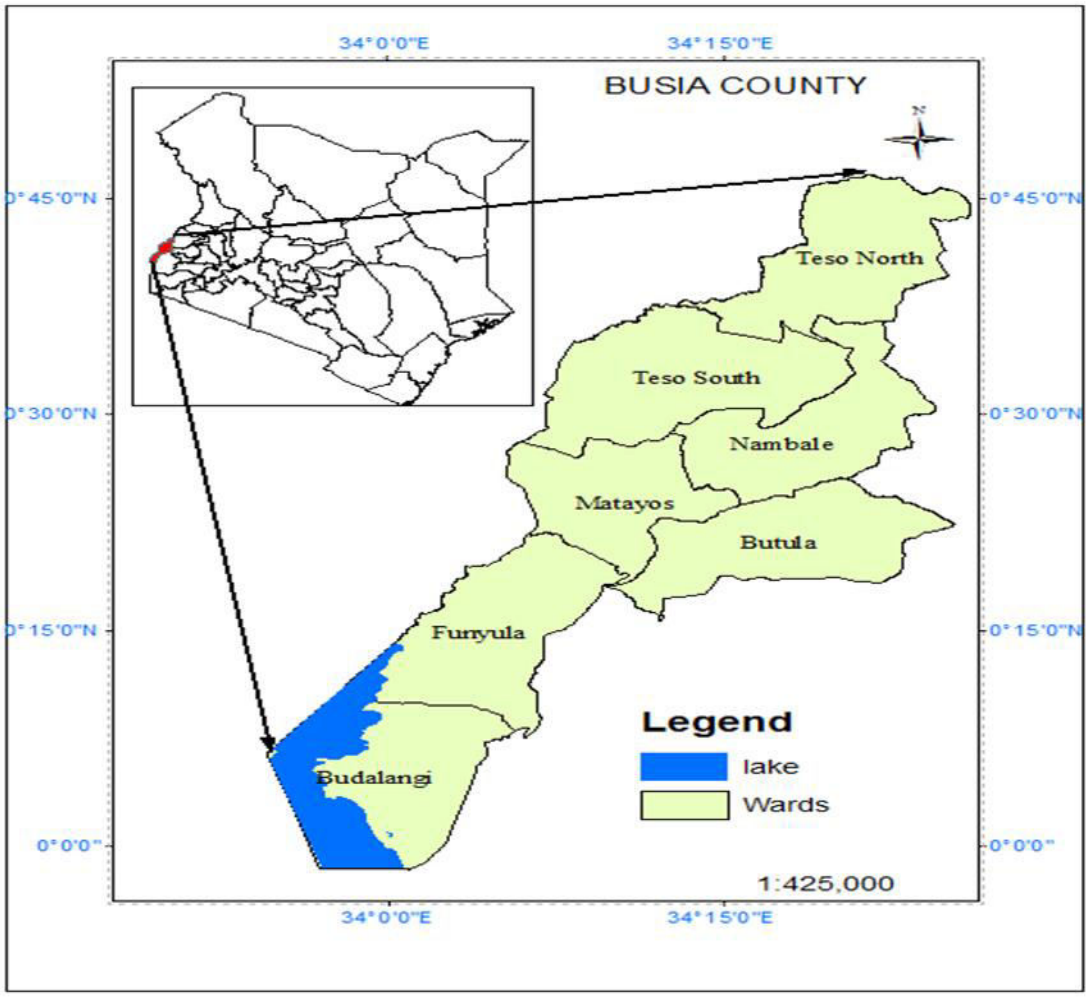
24 AUG 2023

Florence Ogero.
Chair, KTRH ISERC

Appendix X: Map Of Migori County



Appendix XI: Map Of Busia County



Appendix XII: Map of Kisii County