# OUTCOME OF KANGAROO MOTHER CARE IN REDUCING RISK OF MORBIDITY AND MORTALITY AMONG PREMATURE OR LOW BIRTHWEIGHT NEWBORNS AT TEMEKE REGIONAL REFERRAL HOSPITAL IN DAR ES SALAAM, TANZANIA.

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**SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES**

**DEPARTMENT OF DEVELOPMENTAL STUDIES**

# OUTCOME OF KANGAROO MOTHER CARE IN REDUCING RISK OF MORBIDITY AND MORTALITY AMONG PREMATURE OR LOW BIRTHWEIGHT NEWBORNS AT TEMEKE REGIONAL REFERRAL HOSPITAL IN DAR ES SALAAM, TANZANIA.

**By**

**GOODLUCK ASHERY CHENGA**

**A Dissertation Submitted in Partial Fulfilment of the Requirements for Master of Science Project Management, Monitoring and Evaluation in Health of Muhimbili University of Health and Allied Sciences**

**October, 2021**

## CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance of thesis/dissertation titled **Outcome of Kangaroo mother care in reducing risk of morbidity and mortality among premature or low birthweight newborns at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania** in fulfillment of the requirements for the Masters of Science degree **in Project Management Monitoring and Evaluation in Health of Muhimbili University of Health and Allied Sciences**.

_____

**PROF. GIDEON KWESIGABO**

(Supervisor)

_____

Date:

## DECLARATION AND COPYRIGHT

I, **Goodluck Ashery Chenga** declare that this dissertation/thesis is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature……. Date…….

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My sincere gratitude to my supervisor Prof. Gideon Kwesigabo for his great support and tireless corrections, devotion of his time and his readiness to read my work. His sharp trained eye and constructive comments enabled this work to be in the present form.

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My everlasting thanks goes to my beautiful family especially my wife, Massa Damas Vitalo and our loved children Gabriel Goodluck Chenga and Navone Goodluck Chenga who beard with me during all study time of my absence.

Lastly but not least I would like to thank my friends and colleagues with whom I shared ideas for their moral support and companionship, their contribution is real appreciated.

## DEDICATION

This work is dedicated to my parents Mr. Ashery Yoel Chenga and Mary Mremeta Mtatulu for their contribution to my life, their love, care and guidance is of a good help in my life today.

And

My beautiful family especially my wife, Massa Damas Vitalo and our loved children Gabriel Goodluck Chenga and Navone Goodluck Chenga for their remarkable support in my life fighting spirit.

## ABSTRACT

### *Background*

Kangaroo mother care (KMC) is a low cost non-conventional intervention recommended by world health organization for premature and low birthweights (LBW) newborns. Despite KMC being supported by literature, morbidity and mortality among premature and LBW newborns still high in developing countries including Tanzania.

### *Objectives*

The study assessed the outcome of KMC in reducing morbidity and mortality among premature or LBW newborns at Temeke Regional Referral Hospital (RRH) in Dar es Salaam, Tanzania.

### *Methods*

This was a retrospective study conducted between May and June 2021 at Temeke RRHs in Dar es Salaam. A total of 429 files of newborns who received KMC services at Temeke RRH between January 2019 and August 2020 were reviewed. Data were analyzed using statistical package for social sciences (SPSS) version 25. Univariate and multivariate regression analysis were performed to explore the determinants of KMC outcome. A p-value of $< 0.05$ were considered statistically significant.

### *Results*

Out of 429 neonates file reviewed, 215(50.1%) were female and the majority 273(63.6%) had bodyweight of (1501 – 2000) mg. Most 320(74.6%) of the neonates had Apgar score of > 7 and 365(85.1%) cried immediately after birth. Regarding mortality, only 4.7% of those who did not completed four weeks of KMC intervention died. Those who did not completed four weeks of KMC intervention stayed longer in the hospital (p value $< 0.01$). Admission weight and frequency of feeding appeared to be the determinants of neonatal death.

### *Conclusion*

The study found that KMC intervention is performing good to clinically stable neonates born prematurely or with LBW. The length of hospital stay following admission for KMC intervention depend on KMC admission body weight and frequency of feeding on neonatal demand.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| KMC: | Kangaroo Mother Care |
| LBW: | Low Birth Weight |
| MUHAS: | Muhimbili University of Health and Allied Sciences |
| RRH: | Regional Referral Hospital |
| SPSS: | Social Package for Social Sciences |
| SSA: | Sub-Saharan Africa |
| WHO: | World Health Organization |
| PROM: | Premature Rupture of Membranes |
| GDM: | Gestational Diabetes Mellitus |
| GA: | Gestation Age |
| SD: | Standard Deviation |
| IQR: | Inter Quartile Range |

## DEFINITION OF TERMS

**Kangaroo mother care:** Is a skin-to-skin contact between a mother and her newborn, frequent and exclusive or nearly exclusive breastfeeding, and early discharge from hospital.

**Neonatal period** Is the period that extends from birth through the first month or first four (4) weeks of life of a child.

**Premature birth:** Is a birth that takes place more than three weeks before the baby's estimated due date.

**Premature:** Is a baby born more than three weeks before estimated due date.

**Low birthweight:** Is a term used to describe babies who are born weighing less than 2000 gram.

# CHAPTER ONE

## 1.0 INTRODUCTION

Globally, about 16% of the newborns include premature have LBW[1]. Research shows that prematurity complications (18%) are the leading cause of mortality among under five year's children which surpassing pneumonia (16%) and diarrhea (9%)[2]. Among the reported complications includes respiratory distress syndrome, chronic lung disease, injury to the intestines, a compromised immune system, cardiovascular disorders, hearing and vision problems, and neurological insult[3]. Besides, the majority (16%) of the premature deaths occurs in the first 4 weeks of life, with about two-thirds occurring as early (first week of life) neonatal deaths. Moreover, about 67% of the global annual neonatal deaths occurs in South Asia and sub-Saharan Africa (SSA) [2].

A study by Lawn et al (2020) reported that a child born in developing countries is 10 times more likely to die in the first month compared to those born in a developed country[4]. According to 2019 WHO report, Tanzania is among the top 10 countries with highest newborn mortality. Preterm birth, intrapartum-related complications (birth asphyxia or lack of breathing at birth), infections and birth defects reported to be leading causes of death while malnutrition is the leading underlying contributing factor[5]. In order to reduce the risk of mortality and morbidity among premature and newborn with LBW, WHO recommends the uses of KMC in low-income countries where convectional approaches are insufficiency[1].

Kangaroo Mother Care is the non-medical intervention which comprises of skin to skin between LBW/premature newborn with the mother, exclusive and frequent breastfeeding and early discharge once the baby is clinically stable in kangaroo position[6]. KMC is recommended to all babies born with weight below 2000 grams in setting where there are no conventional methods [7]. In KMC, the mother acts as an incubator just like the kangaroo, the mother places her infant vertically in between her breasts and baby's chest in direct skin-to-skin contact for warming [8]. KMC offer both physical and emotional needs of the preterm include warmth, stimulation, parental attachment, breastfeeding and safety[9]–[11].

Studies evaluating performance of the KMC intervention reported that the approach improves premature health, enhancing the body temperature, blood glucose level and reduce the risk of infection among newborns born with LBW or premature[12]. Besides reduction in mortality, quick weight gain, improves breastfeeding and reduction in duration of hospital stay have been reported as benefit of KMC[5][13]. However, the effectiveness of this non-medical intervention could be affected by several factors related to the facility like insufficiency nurses, lack of knowledge among the nurses, related to mothers of a newborns like maternal age, gestational age, perception, awareness and the practice of a mother and related to the newborns like sex and appearance, pulse, grimace, activity and respirations (APGAR) scorers[14][15]. To reduce number of newborn death and complications, there is a need to assess the effectiveness and factors affecting the performance of KMC intervention in the local context. Therefore, this study was assessing the effectiveness of KMC in reducing risk of mortality and morbidity among premature or LBW newborns at Temeke RRH in Dar es Salaam, Tanzania.

### 1.1 Problem Statement

Since the introduction of reproductive and child care clinics under five mortalities have substantially decreased worldwide. However, studies show that most of the decline has come after the first month of life and neonatal mortality is still high[16]. Nevertheless, most of the deaths are from baby born in low-middle income countries, in which most health care services depend on herbal and non-medical intervention[17]. To reduce the risk of mortality and morbidity among neonates born with LBW or premature, WHO recommends that all baby born with bodyweight below 2000 grams to be subject to KMC[1]. Studies on effectiveness of the KMC conducted elsewhere reported that the non-medical intervention helps in reducing risk of mortality and morbidity among neonates born with LBW or premature[13]. However, Gestational age, mode of delivery, Maternal age, parity, education level, fetal sex, and initial Apgar score, knowledge, perception and practice of KMC among mothers could affect the outcome of KMC[15]. Kangaroo Mother Care is recommended in assessing the performance and factor influencing KMC outcome in our local context is of importance. Therefore, this study was assessing the outcome of Kangaroo Mother Care in reducing risk of mortality and morbidity

among premature or LBW newborns at Temeke Regional Refferal Hospital in Dar es Salaam, Tanzania.

### 1.2 Rationale of the study

The findings generate information on the outcome of Kangaroo Mother Care on reducing risks of mortality and morbidity among newborns with Low Birth Weight or premature in our local setting. In addition, findings highlight factors influencing KMC outcome in our local setting.

### 1.3 Research Questions

#### 1.3.1 Main evaluation research question

1. What is the Kangaroo Mother Care outcome in reducing risk of mortality and morbidity among premature or LBW newborns at Temeke Regional Refferal Hospital in Dar es Salaam, Tanzania.

#### 1.3.2 Specific evaluation research questions

1. What is the proportion of mortality among neonates born premature or with LBW on KMC at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania?

2. What is the length of hospital, stay among neonates born premature or with LBW on KMC at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania?

3. What are the effect of birthweight on KMC outcome among premature and LBW neonates at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania?

### 1.4 Objectives

#### 1.4.1 Broad objective

To assess Kangaroo Mother Care outcome and its determinants in reducing risk of mortality and morbidity among premature or LBW newborns at Temeke RRH in Dar es Salaam, Tanzania.

### 1.4.2 Specific objectives

1. To assess the proportion of mortality among neonates born premature or with LBW on KMC at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania.
2. To determine length of hospital, stay among neonates born premature or with LBW on KMC at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania.
3. To find the effect of birthweight on KMC outcome among premature and LBW neonates at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania.

## 1.5 Conceptual Framework

In order Kangaroo Mother Care to give good outcome when applied among newborns with LBW or premature factors like gestational age, maternal age, sex of the baby, and delivery body should be taken into consideration. Besides. Knowledge, perception and practices of the mother on KMC should be addressed with interaction between dependent and independent variables as illustrated below in figure 1.

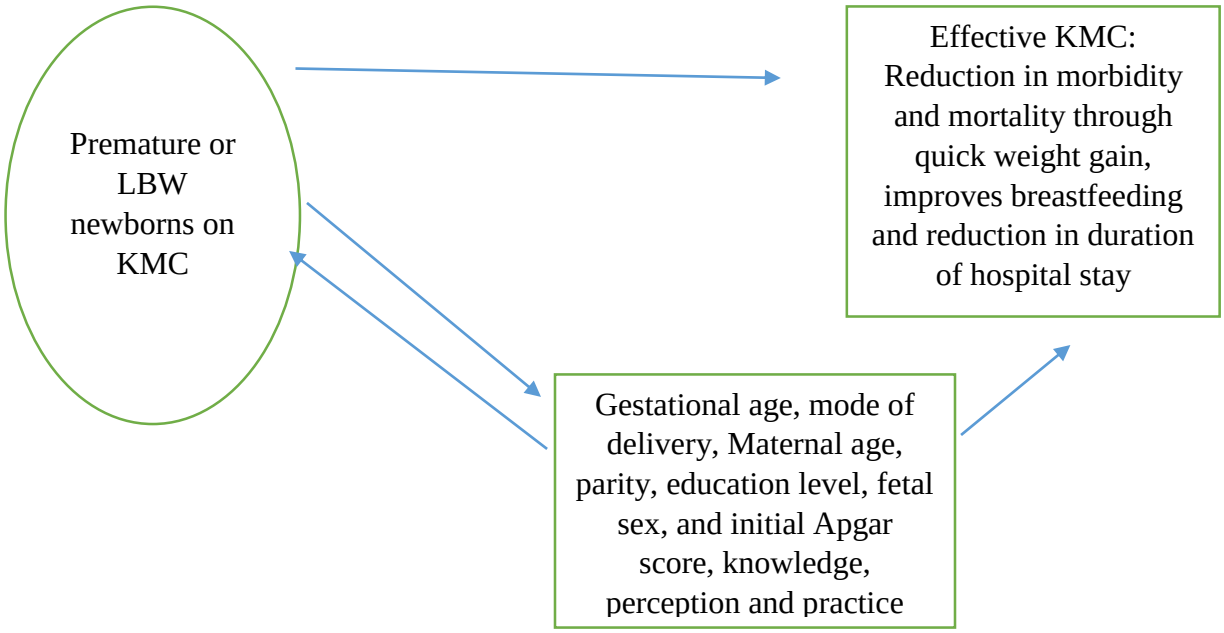



**Figure 1: Conceptual framework which indicates factors that may influence effectiveness of KMC among neonates born with LBW or premature**.

### 1.6 Program Logic Model

The intervention logic model illustrates how inputs and activities influence the outputs and eventual outcome of reduced risk of mortality among preterm infants born at Temeke RRH, Dar es Salaam. The logic model shows how the intervention is implemented, provide the intended outcomes after measuring the differences between baseline indicator and target indicator through identification of implementation gap, and help to rectify all the deviation from the track and finally identify areas for intervention improvement.

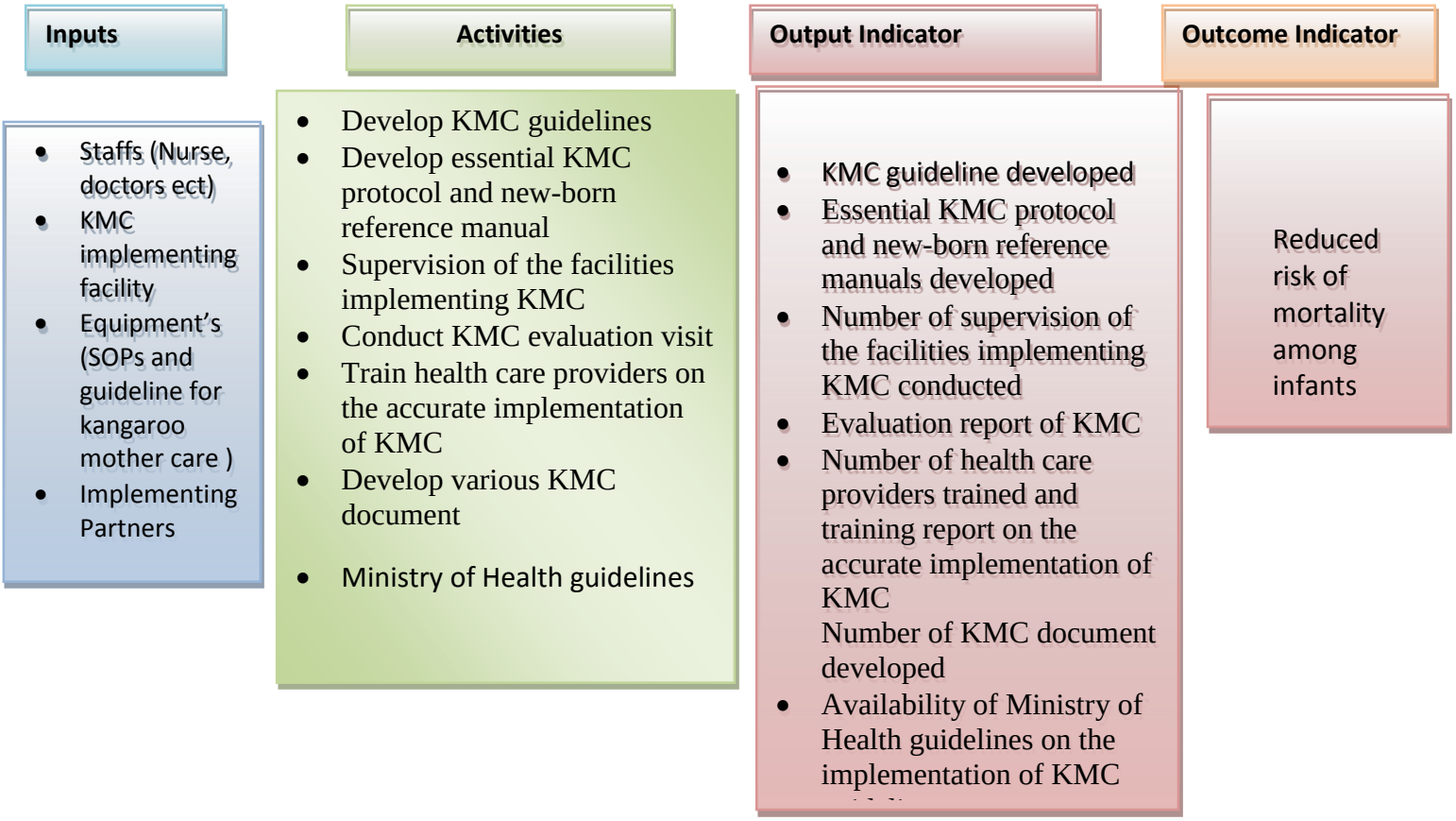



**Figure 2: Logic Framework for Effectiveness of KMC on reducing risk of mortality among infants born at Temeke Regional Referral Hospital, Dar es Salaam.**

# CHAPTER TWO

## 2.0 Literature Review

### 2.1 Effectiveness of KMC

Low Birth Weight contribute to significantly mortality and morbidity among neonates and majority of the cases are occurring in developing countries[18]. Among the reported complication of LBW include growth disorders, cognitive disorders and development of chronic diseases in elderly [19]. To help raising premature or newborns with LBW conventional and non-medical intervention has been introduced. Conventional intervention include uses of incubators, radiant warms and warm room with open cots. The techniques help to keep the baby warm which prevent them from getting hypothermia[13]. Hypothermia has been associated with life threatening sepsis, apnea and bleedings[20]. However, the techniques are not affordable in most of the developing countries. In addition, study report that conventional method reduces social contact between mother and baby[20].

To tackle the problem, KMC was introduced in 1978 by Martinez and Rey in Bogota [15]. KMC which involve skin to skin contact between a baby and a mother, frequent and exclusive breastfeeding has been reported to be effective and it maintain social contact between mother and a baby which play a significant role in growth[21]–[23]. The technique has been reported to be effective in increasing bodyweight, length and head circumference of the newborns[15]. Baby on KMC spend short time in hospital which prevent them from getting nosocomial infection/sepsis[13]. In recognizing the effectiveness of KMC, WHO recommends the uses of the technique to all baby delivered prematurely or with LBW (below 2500 mg) in all areas where the conventional techniques are not affordable[1]. Nevertheless, some studies showed that KMC is more effective than conventional methods although not conclusive[13][15]. Evidence from one of the Cochrane review included 18 trials which evaluated effectiveness of KMC found that KMC was associated with a 40% lower risk of mortality at discharge or 40–41 weeks' postmenstrual age (RR 0.60, 95% CI 0.39–0.92; 8 studies, 1736 babies) compared to conventional methods [24].

### 2.2 Factors affecting effectiveness of KMC

Kangaroo Mother Care is a non-medical intervention, therefore its effectiveness is influenced by newborn, mother or health system factors. In sufficiency number of health care providers (HCPs) particularly nurses and low knowledge of the HCPs on how the mother should conduct KMC has been reported as barriers toward effective implementation of KMC [25]. Research also shows that some HCP have poor attitude towards uses of this non-medical intervention which affect their practice. Pregnant mother knowledge and perception also have been associated with KMC outcome[26]. Cultural believe that getting a LBW baby is a spiritual punishment has been reported to affect implementation of KMC in some areas[14].

Social demographic characteristics like maternal age, multigravida, short inter pregnancy intervals, parity, maternal education, and pregnancy weight gain and fetal sex have been reported to affect KMC outcome[27]–[29]. Study by Jackson et al (2008) reported that risk of getting children with LBW increases in women with poor socioeconomic status and low education [30]. Other study reported that first pregnancy is more likely to get baby with LBW which could interfere also with KMC outcome [31]. Besides, fetal growth depends much on the adequate nutrition which is obtained from the mother. Study report that children born with mother of below 20, above 35 or short interpregnancy interval suffer lack of nutrients which affect their development[15].

# CHAPTER THREE

## 3.0 METHODOLOGY

### 3.1 Study design and study area

A descriptive retrospective study was conducted from May to June 2021 at Temeke RRH, Neonatal unit, in Dar es Salaam, Tanzania. Temeke RRH is the referral hospital found in Dar es Salaam region, with reported high prevalence of preterm infants [34]. The hospital has 304-bed capacity serving the population of Temeke District and nearby areas in Dar es Salaam [32]. The daily deliveries range from 50 to 60 babies. The hospital has a neonatal unit with two KMC rooms for males and females containing 12 beds with a proportion 30% preterm birth in a month, besides the hospital receives admission of premature neonates or LBW from lower level health facilities as it has enough pediatricians, medical doctors, nurses and other supporting staff.

### 3.2 Study population

Files of Premature or newborn with LBW at Temeke RRH were reviewed in neonatal unit between January 2019 and August 2020.

### 3.3 Inclusion criteria

Clinically stable prematures or newborns with Low Birth Weight below 2000gm on KMC services at Temeke RRH, neonatal unit.

### 3.4 Exclusion criteria

Prematures or newborns with Low Birth Weight below 2000gm with birth asphyxia, congenital malformations and other birth defects.

### 3.5 Sample size and Sampling Technique

The sample size was calculated using the Leslie formula for sample size determination $z^2p(1-p)/d^2$)[33]. Due to lack of a similar study, a proportion of premature neonates (p) of 50% was considered, at a confidence interval of 95% (z=1.96), and a precision of 5% (d). A minimum sample size of 384 premature or LBW newborns was required. Taking into account a 10% non-respondent rate a total of 429 files of premature or LBW newborns were studied.

### 3.6 Data collection

#### 3.6.1 Study variables

Independent variables: Gestational age, mode of delivery, maternal age, parity, education level, fetal sex, and initial Apgar score.
Dependent variables: length of hospital stay, change in birth weight, and mortality.

#### 3.6.2 Data collection procedure

Data were abducted from the files using a checklist (Appendix 1). The following information were extracted from the file gestational age, mode of delivery, maternal age, parity, education level, fetal sex, initial Apgar score, bodyweight, body length, head circumference, sepsis, death and duration of hospital stay within 30 days of KMC services.

#### 3.6.3 Study end points

The study end points were 30 days of using KMC services.

#### 3.6.4 Data collection tool

Data were collected using designed checklist (Appendix 1). The checklist comprised of two sections. Section A was used to document socio-demographic and clinical characteristics of the study participants include gestational age, mode of delivery, maternal age, parity, education level, fetal sex, and initial Apgar score, sepsis. Section B collected data on effectiveness of KMC include bodyweight, body length and head circumference before and 30 days post-KMC, mortality, sepsis occurrence and duration of hospital stay within 30 days.

#### 3.6.5 Data analysis

Data were analyzed using statistical package for social sciences (SPSS) version 25. Analysis plan involved frequency and percentages for categorical variables, mean and standard deviation for numerical variables, univariate and multivariate regression analysis were performed to determine factors associated with KMC outcomes in reducing risk of morbidity and mortality

among neonates therefore, descriptive analysis for demographic and clinical characteristics of study participants, comparison of proportions of mortality, Mann- Whitney U-test in comparing the duration of hospital stay, chi square analysis in comparing KMC outcomes between neonates, univariate and multivariate analysis in establishing the factors associated with KMC outcome of reducing risk of morbidity and mortality between neonates who completed KMC and those who did not complete KMC after four weeks of intervention. The results were considered statistically significant when p value $<0.05$**.**

### 3.7 Ethical consideration

The study commenced after obtaining ethical clearance from Directorate of Research and Publication, MUHAS. Permission to collect data was obtained from the management of Temeke RRH, Dar es Salaam, Tanzania. For confidentiality purposes, files were assigned identity number instead of patient name.

# CHAPTER FOUR

## 4.0 RESULTS

### 4.1 Demographic and clinical characteristics of the study participants

Records of 429 neonates from KMC register and files were reviewed. The majority (74.6%) of the studied neonates had an Apgar scores of > 7. Most (85.1%) of the neonates cried within 5 minutes after delivery and only 17% required resuscitation after delivery. About 35% of neonates were breastfed after every 2 hours. Besides, around 33% of the mother had multiple pregnancies and 59.4% of the mother had age between 21 – 30 years. About 47% of the mothers were housewife and 61.3% had multipara. Table 1.

**Table 1: Demographic and clinical characteristics of the study participants**

| Variable | Mean (±SD) | n | Percentages (%) |
|---|---|---|---|
| **Neonate demographic and clinical characteristics** | | | |
| Sex, n =428 | | | |
| Male | | 213 | 49.7 |
| Female | | 215 | 50.1 |
| Gestation Age (weeks), n=429 | | | |
| Less than 28 | | 73 | 17 |
| 28-32 | | 200 | 46.6 |
| 33-37 | | 156 | 36.4 |
| Prematurity level, n=427 | | | |
| Preterm | | 226 | 52.7 |
| Very preterm | | 81 | 18.9 |
| Late preterm | | 121 | 28.2 |
| Birth Weight (gram), n=429 | | | |
| ≤1500 | | 128 | 29.8 |
| 1501 - 2000 | | 273 | 63.6 |
| 2001 - 2499 | | 28 | 6.5 |
| Birth Weight (gram) | 1658.4 (±236.45) | | |
| Admission Birth Weight (gram), n=428 | | | |
| ≤1500 | | 171 | 39.9 |
| 1501 - 2000 | | 242 | 56.4 |
| 2001 – 2499 | | 15 | 3.5 |
| Admission Birth Weight (gram) | 1557.71 (±225.37) | | |
| Apgar score, n=428 | | | |

| | | | |
|---|---|---|---|
| < 7 | | 29 | 6.8 |
| 7 | | 79 | 18.4 |
| >7 | | 320 | 74.6 |
| Cried immediately after birth, n=428 | | | |
| Yes | | 365 | 85.1 |
| No | | 63 | 14.7 |
| Resuscitation after birth, n=429 | | | |
| Yes | | 73 | 17 |
| No | | 356 | 83 |
| Diagnosis at delivery, n=425 | | | |
| PROM | | 85 | 19.8 |
| PET/Eclampsia | | 47 | 11 |
| GDM | | 50 | 11.7 |
| Hypothyroidism | | 23 | 5.4 |
| Multiple pregnancies | | 142 | 33.1 |
| Bleeding | | 78 | 18.2 |
| **Maternal demographic and clinical characteristics** | | | |
| Maternal age (years), n=429 | | | |
| ≤ 20 | | 86 | 20 |
| 21-30 | | 255 | 59.4 |
| 31-40 | | 86 | 20 |
| >40 | | 2 | 0.5 |
| Maternal age (years) | 25.8 (±5.55) | | |
| Maternal education, n=425 | | | |
| Never gone to school | | 21 | 4.9 |
| Primary | | 155 | 36.1 |
| Secondary | | 202 | 47.1 |
| College/University | | 47 | 11 |
| Marital status, n=426 | | | |
| Single | | 127 | 29.6 |
| Married | | 217 | 50.6 |
| Cohabitation | | 82 | 19.1 |
| Occupation, n=421 | | | |
| Employed | | 34 | 7.9 |
| Business | | 100 | 23.3 |
| House wife | | 287 | 66.9 |
| Parity, n=429 | | | |
| Para 1 | | 166 | 38.7 |
| Multipara | | 263 | 61.3 |
| Mode of delivery, n=427 | | | |
| SVD | | 380 | 88.6 |

| | | |
|---|---|---|
| C/S | 47 | 11 |
| Place of delivery, n=429 | | |
| Hospital | 398 | 92.8 |
| Home | 30 | 7 |
| On transit | 1 | 0.2 |
| Frequency of feeding, n=428 | | |
| Hourly | 79 | 18.4 |
| 2 hourly | 152 | 35.4 |
| 3 hourly | 127 | 29.6 |
| On demand | 70 | 16.3 |

**4.2 Proportion of mortality among neonates born premature or with LBW on Kangaroo Mother Care intervention at Temeke RRH.**

Proportion of death among neonates who did not completed four (4) week of KMC intervention effectively was found to be 4.7%, and no death had occurred among neonates who completed such period of intervention. The difference in mortality among those completing four weeks of KMC compared to those not completing four weeks of KMC was statistically significant; p = 0.011, as shown in figure 3.

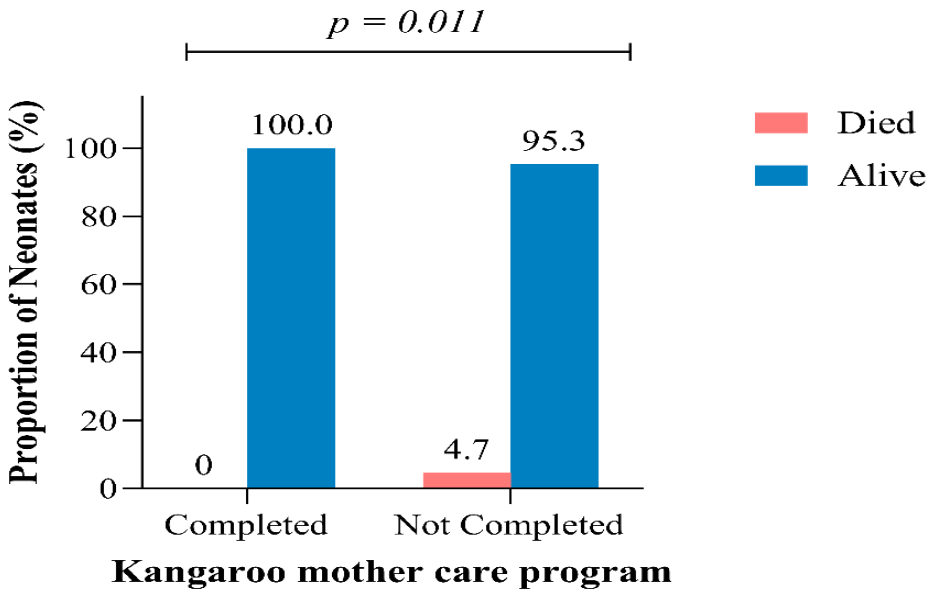
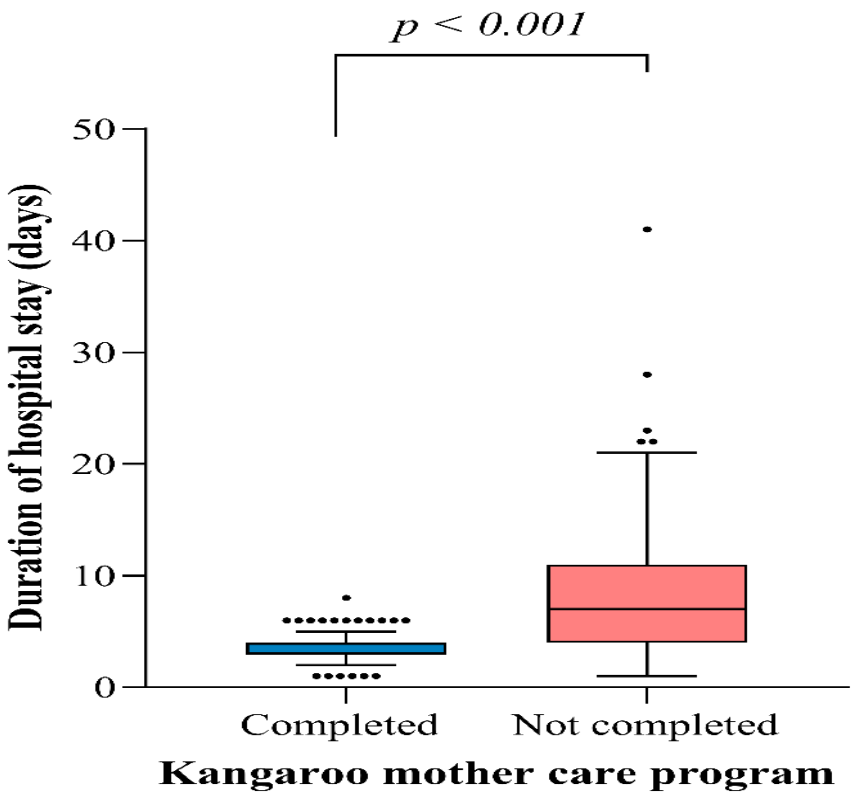



**Figure 3: Shows the proportion of mortality among neonates born premature or with LBW on Kangaroo Mother Care intervention at Temeke RRH.**

**4.3 Length of hospital, stay among neonates born premature or with LBW on KMC at Temeke RRH in Dar es Salaam, Tanzania.**

Neonates who did not complete four (4) weeks of KMC intervention were observed to stay longer in hospital (median days 7, IQR 4 – 11 days), compared to those completed KMC intervention (median days 3, IQR 3 – 4 days). Such difference in duration of hospital stay was statistically significant with p-value of < 0.001 as shown in figure 4.




;

**Figure 4: Box and whisker plots with Mann-Whitney U-test showing comparison of the distribution of duration of hospital stay (days) among neonates who had completed and those not completed KMC.**

### 4.4 Determinants of KMC outcome among neonates born premature or with LBW at Temeke RRH in Dar es Salaam, Tanzania.

Proportion of neonate with gestation age < 28 weeks were found to have not completed KMC 84.9 compared to 15.1, p=<0.001. Neonate with gestation age 28 – 32 weeks were observed not to complete KMC 72.5 compared to 27.5 who completed, while neonates born with gestation age of 33 – 37 weeks did not show difference in outcome between neonates who completed and those did not complete four weeks of KMC intervention. The association of gestation age and the completion of four weeks of KMC intervention was statistically significant with p < 0.001. The distribution of preterm neonates in those completed KMC were 31% compared to not completed KMC 69%, very preterm had 18.5% completed and 81.5% not completed, also late preterm 39.2% completed compared to 60.8% not completed while it was observed higher proportion of neonates were found to have not completed four weeks of KMC intervention compared to those who completed KMC intervention with p value of 0.008 that shows its statistically significant. Most of neonates born with birth weight <1500gm found not to complete the KMC intervention with proportion 88.3% compared to 11.7%, while those with 1501 – 2000gm had 61.5% compared to 38.5% and among all neonates with 2001 – 2500gm were 57.1% compared to 42.9% that showed the association between KMC outcome and this factor with p=<0.001. About 88.3% of neonates who were subjected to KMC intervention did not complete the four weeks of intervention compared to 11.7% who completed had admission birth weight of <1500gm, 56.6% of the neonates initiated KMC with admission birth weight of 1501 – 2000gm did not complete the four weeks of KMC intervention compared to 43.4% and those admitted with 2001 – 2500gm, 53.3% did not complete four weeks of intervention compared to 46.7 who completed with p=<0.001 that is statistically significance. Comparison observed on Apgar score between the completed and not completed group on neonates <7 score at 5 minutes was 20.7% compared to 79.3%, while at 7 were 19% compared to 81% and >7 score at 5 minutes 34.4% compared to 65.6% with statistical significance p=0.014. However on chi-square analysis the comparison between the neonates who completed the KMC four weeks of intervention had proportions of 32.9% completed and 67.1% not completed with p=0.028 which is statistically

significant to be one of the factor that was determining the KMC outcome of mortality and morbidity. Table 2.

**Table 2: Neonatal factors that determines the outcomes of KMC**

| | Kangaroo mother care program | | |
|---|---|---|---|
| **Variable** | **Completed n (%)** | **Not Completed n (%)** | **P - values** |
| Sex | | | |
| Male | 74 (34.7) | 139 (65.3) | 0.082 |
| Female | 58 (27.0) | 157 (73.0) | |
| Gestation age (weeks) | | | |
| < 28 | 11 (15.1) | 62 (84.9) | < 0.001 |
| 28 - 32 | 55 (27.5) | 145 (72.5) | |
| 33 - 37 | 66 (42.3) | 90 (57.7) | |
| Pre-maturity level | | | |
| Preterm | 70 (31.0) | 156 (69.0) | 0.008 |
| Very preterm | 15 (18.5) | 66 (81.5) | |
| Late preterm | 47 (39.2) | 73 (60.8) | |
| Birth weight (gm) | | | |
| ≤ 1500 | 15 (11.7) | 113 (88.3) | < 0.001 |
| 1501 - 2000 | 105 (38.5) | 168 (61.5) | |
| 2001 - 2500 | 12 (42.9) | 16 (57.1) | |
| Admission birth weight (gm) | | | |
| ≤ 1500 | 20 (11.7) | 151 (88.3) | < 0.001 |
| 1501 - 2000 | 105 (43.4) | 137 (56.6) | |
| 2001 - 2500 | 7 (46.7) | 8 (53.3) | |
| APGAR Score at 5 minutes | | | |
| < 7 | 6 (20.7) | 23 (79.3) | 0.014 |
| 7 | 15 (19.0) | 64 (81.0) | |
| >7 | 110 (34.4) | 210 (65.6) | |
| Cried immediately after birth | 120 (32.9) | 245 (67.1) | 0.028 |
| Causes of prematurity | | | |
| Prom | 19 (22.4) | 66 (77.6) | 0.244 |
| Preeclampsia/eclampsia | 15 (31.9) | 32 (68.1) | |
| Gestation diabetes | 21 (42.0) | 29 (58.0) | |
| Hypothyroidism | 6 (26.1) | 17 (73.9) | |
| Multiple pregnancies | 42 (29.6) | 100 (70.4) | |
| Bleeding | 27 (34.6) | 51 (65.4) | |

Maternal factors on chi-square analysis did not show the statistical significant association of KMC outcome among neonates who completed KMC intervention and those who did not complete after four weeks of intervention since the p-values comparisons made were statistically not significant as shown in table 3.

**Table 3: Maternal factors that determines the outcomes of KMC**

| | **Kangaroo mother care program** | | |
|---|---|---|---|
| **Variable** | **Completed n (%)** | **Not Completed n (%)** | **P - value** |
| Maternal age | | | |
| ≤ 20 | 24 (28.2) | 61 (71.8) | 0.066 |
| 21 - 30 | 71 (28.0) | 183 (72.0) | |
| 31 - 40 | 36 (41.9) | 50 (58.1) | |
| >40 | 1 (50.0) | 1 (50.0) | |
| Maternal Education | | | |
| No formal education | 7 (33.3) | 14 (66.7) | 0.946 |
| Primary | 47 (30.3) | 108 (69.7) | |
| Secondary | 64 (31.7) | 138 (68.3) | |
| College / University | 13 (27.7) | 34 (72.3) | |
| Marital status | | | |
| Single | 33 (26.0) | 94 (74.0) | 0.331 |
| Married | 73 (33.6) | 144 (66.4) | |
| Living with partner | 25 (30.5) | 57 (69.5) | |
| Maternal occupation | | | |
| Employed | 10 (29.4) | 24 (70.6) | 0.992 |
| Business | 30 (30.0) | 70 (70.0) | |
| Home wife | 63 (31.3) | 138 (68.7) | |
| Other | 26 (30.2) | 60 (69.8) | |
| Parity | | | |
| Para One | 50 (30.1) | 116 (69.9) | 0.111 |
| Multi parity | 74 (29.7) | 175 (70.3) | |
| Others | 8 (57.1) | 6 (42.9) | |
| Mode of delivery | | | |
| Spontaneous vaginal | 118 (31.1) | 262 (68.9) | 0.859 |
| Caesarean section | 14 (29.8) | 33 (70.2) | |
| Place of delivery | | | |
| Hospital | 125 (31.4) | 273 (68.6) | 0.113 |
| Home | 6 (20.0) | 24 (80.0) | |
| On transit delivery | 1 (100.0) | 0 (0.0) | |

Following univariate and multivariate analysis, the following factors on univariate analysis associated significantly with chances for a neonate on KMC to complete the four weeks of

intervention with gestation age of <28 weeks (16.47 (1.94 – 140.12), p=0.01), those who delivered with birth weight in kg (0.996 (0.993 – 0.999), p=0.003), while those who had admission weight of (0.994 (0.990 – 0.997), p=<0.001), Neonates born with Apgar score of <7 and 7 at 5 minutes had 5.96 (1.08 – 32.75), p=0.04 and 4.22 (1.19 – 15.01), p=0.026 respectively, those neonates whose frequency of feeding were on demand while on KMC had 7.96 (1.93 – 32.9), p=0.004. However, on multivariate analysis KMC admission weight and frequency of feeding on demand were statistically significant 0.99 (0.98 – 1.00), p=0.042 and 8.27 (1.76 – 38.88), p=0.008 respectively as shown in table 4.

**Table 4: Univariate and multivariate of the factors associated with risks of neonatal death**

| | **Univariate analysis** | | **Multivariate analysis** | |
|---|---|---|---|---|
| **Factors** | **cOR (95% CI)** | **P – value** | **aOR (95% CI)** | **P – value** |
| Gestation age (week) | | | | |
| >28 | 16.47 (1.94 – 140.12) | **0.010** | 4.34 (0.28 – 66.08) | 0.291 |
| 28 - 32 | 3.91 (0.45 – 33.85) | 0.216 | 3.39 (0.33 – 35.11) | 0.307 |
| 33 - 37 | Ref | | | |
| Birth weight (gm) | 0.996 (0.993 – 0.999) | **0.003** | 1.00 (0.99 – 1.01) | 0.572 |
| Admission weight (gm) | 0.994 (0.990 – 0.997) | **< 0.001** | 0.99 (0.98 – 1.00) | **0.042** |
| APGAR Score | | | | |
| <7 | 5.96 (1.08 – 32.75) | **0.040** | 1.72 (0.20 – 14.54) | 0.618 |
| 7 | 4.22 (1.19 – 15.01) | **0.026** | 2.78 (0.64 – 12.04) | 0.171 |
| >7 | Ref | | | |
| Frequency of feeding | | | | |
| 3horly | 1.88 (0.37 – 9.48) | 0.443 | 2.53 (0.47 – 13.74) | 0.282 |
| On demand | 7.96 (1.93 – 32.90) | **0.004** | 8.27 (1.76 – 38.88) | **0.008** |
| 1 – 2 hours | Ref | | | |

Key: cOR: Crude odds ratio, aOR: Adjusted odds ratio, CI: Confidence Interval

# CHAPTER FIVE

## 5.0 DISCUSSION

The study found that Proportion of death among neonates who did not complete four (4) weeks of KMC intervention effectively was 4.7% and no death had occurred among neonates who completed KMC intervention. The association of completing KMC intervention and neonatal mortality was statistically significant with p=0.011. Similar study conducted in Indonesia (2015) found that 24/40 (60%) of the neonates had successful reduction in risks of neonatal mortality following significant bodyweight gain after completion of KMC intervention[34]. The discrepancy observed could be due to difference in study design and sample size. Nevertheless, studies shows that physiological weight loss which occured during first week after birth, immaturity of the fetal organs and fetal ability to breastfeed affects the success of KMC intervention[34]–[36]. Furthermore, studies shows that KMC improve neonatal outcomes with significant reduction in morbidity and mortality. A study conducted in mozambique reported that the survival rates of the neonates on KMC was arouund 73% compared to 20% of those on non-KMC interventions[37]. Besides, a Cochraine review of 2016 which involved 21 studies reported that KMC significanlty increases bodyweight of the neonates and reduced length of hospital stay[24]. In India a study to determine impact of KMC intervention reported that neonates on the intervention group (KMC) gained bodyweight significanlty and spended short time in hospital compared to those in controlled group[38]. Besides, another study in Indonesia (2016) reported that the difference in first bodyweight and the last bodyweight and the velocity of gaining bodyweight was higher in KMC group comapared to the conventional approach[15]. The similarity between our findings and the previous studies emphasize the advantageous of using KMC intervention to clinically stable neonates born prematurely or with bodyweight < 2500 gm. Furthermore, studies shows that KMC intervention improve milk production, mother-infant attachment and save hospital resources.

The study also managed to demonstrate that length of hospitalization of the neonates on KMC intervention among Neonates who did not complete four (4) week of KMC intervention were observed to stay longer in hospital (median days 7, IQR 4 – 11 days), compared to those

completed KMC intervention (median days 3, IQR 3 – 4 days). Such difference in duration of hospital stay was statistically significant with p-value of < 0.001, hence the association was strongly explained by two main factors admission body weight (p=<0.001 and p=0.042) and frequency of feeding (p=0.004 and p=0.008) on univariate and multivariate analysis respectively. Besides, the univariate analysis found that gestation age (p=0.01), birth weight (p=0.003), Apgar score <7 and 7 after 5 minutes p= 0.04 and p=0.026 respectively were associated with completion of KMC after four weeks of intervention. However, age and education level of the mothers were not associated with either length of hospitalization or completion of KMC with succesful weight gain. Our findings are consistence with what reported elsewhere in which maternal factors like education level, age, economic status, parity, and gravidity were not associated with KMC intervention outcome[35].

Our finding on gestation age are similar to what reported in India (2008) in which those neonates delivered at mean (±SD) of 35.3 (±2.3) weeks had good prognosis and reduced morbidity[34]. Contrary to the Indonesia study by *Pratiwi et al*, (2015) which reported that mean gestational age in the succeseful group was not associated with good KMC outcome [34]. Another study conducted in Indonesia (2016) found that those neonates born below < 37 weeks of gestational age were more likely to have delayed growth of head circumference as the measures of KMC outcome and the findings are similar to our study [15]. The differences observed could be attributed by the differences in study design and sample size whereby the Indonesia study had only 45 neonates versus 429 in this study. However, further research are recommended to clear the observed discrepancy.

The majority of the reported neonatal deaths are associated with LBW. Several conventional methods are available to take care of the neonates who are born with weight < 2500 gm. However, due to lack of infrastructure the methods are not well instituted in low-middle income countries. To fight the problem Rey and Martinez in Bogota, Colombia came up with KMC intervention [34]. WHO recommend the uses of KMC intervention to all neonates born with weight < 2500 gm who are clinically stable[1]. Therefore, this study was designed to assess the

effectiveness of KMC among neonates born premature or with LBW on KMC intervention at Temeke RRH in Dar es Salaam, Tanzania.

## 5.1 STUDY LIMITATION

Uses of cros-sectional study may fail to show the real effect of Kangaroo Mother Care on morbidity and mortality of the neonates and newborn with low birthweight as intended. Therefore, the results should be interpreted with caution that cross-sectional study usually cannot establish causal association. Similar studies employing cohort study design is warranted.

# CHAPTER SIX

## 6.0 CONCLUSION AND RECOMMENDATION

### 6.1 CONCLUSION

The study found that KMC intervention is performing good to clinically stable neonates born prematurely or with LBW. The length of hospital stay following admission for KMC intervention depend on KMC admission body weight and frequency of feeding on neonatal demand.

### 6.2 RECOMMENDATION

The study recommends effective implementation of Kangaroo Mother Care intervention as it has found good in reducing morbidity and mortality among premature and Low Birth Weight neonates, also provision of education to healthcare providers and mothers on how to carry on KMC intervention in order to improve the neonatal outcomes by reducing risks of neonatal morbidity and mortality. Furthermore, infrastructure should be well instituted in all health care facilities which has neonatal units.

**REFFERENCES**

[1] K. M. Care, “High Impact Practice : Kangaroo Mother Care Kangaroo Mother Care is a low-cost , high-impact intervention for premature / low-birth weight newborns and should be implemented in all refugee health operations . growth through exclusive Warmth and temperature Early discharge in KMC position with outpatient,” pp. 1–7, 2015.

[2] B. J. You D, Hug L, Ejdemyr S, “Levels and trends in child mortality. Report 2015. Estimates developed by the UN inter-agency Group for Child Mortality Estimation,” *New York United Nations Child. Fund*, 2015.

[3] P. Birth *et al.*, *Mortality and Acute Complications in Preterm Infants*. 2007.

[4] J. E. Lawn *et al.*, “Every Newborn 2 Progress , priorities , and potential beyond survival,” vol. 6736, no. 14, 2015.

[5] A. Bergh *et al.*, “Implementing facility-based kangaroo mother care services : lessons from a multi-country study in Africa,” pp. 1–10, 2014.

[6] M. V Kinney, K. J. Kerber, R. E. Black, B. Cohen, F. Nkrumah, and H. Coovadia, “Sub-Saharan Africa ’ s Mothers , Newborns , and Children : Where and Why Do They Die ?,” vol. 7, no. 6, pp. 1–10, 2010.

[7] J. E. Lawn, Ã. J. Mwansa-kambafwile, B. L. Horta, F. C. Barros, and S. Cousens, “‘ Kangaroo mother care ’ to prevent neonatal deaths due to preterm birth complications,” pp. 144–154, 2010.

[8] J. Baley and C. O. N. Fetus, “Skin-to-Skin Care for Term and Preterm Infants in the Neonatal ICU,” vol. 136, no. 3, 2021.

[9] M. L. Campbell-yeo, T. C. Disher, B. L. Benoit, and C. C. Johnston, “Understanding kangaroo care and its benefits to preterm infants,” pp. 15–32, 2015.

[10] K. Akhtar, M. Haque, and S. Khatoon, “Kangaroo Mother Care : A Simple Method to Care for Low- Birth-Weight Infants in Developing Countries,” vol. 5, no. 1, pp. 49–54, 2013.

[11] L. Sarparast and R. Farhadi, “The Effect of Kangaroo Mother Care on Neonatal Outcomes in Iranian Hospitals : A Review The Effect of Kangaroo Mother Care on Neonatal Outcomes in Iranian Hospitals : A Review,” no. January, 2015.

[12] S. N. Albishry, M. E. Shouk, S. Alkhaldi, N. Almowlad, and T. Omer, “The effectiveness of Kangaroo Mother Care ( KMC ) on premature infant health progression in a neonatal care unit in Maternity and Children â€™ s Hospital , The effectiveness of Kangaroo Mother Care ( KMC ) on premature infant health progression in a neonatal care unit in Maternity and Children ’ s Hospital , Jeddah,” no. September, pp. 1–8, 2018.

[13] S. M. Ali, J. Sharma, R. Sharma, and S. Alam, “Kangaroo Mother Care as compared to conventional care for low birth weight babies Dü ş ük do ğ um a ğ ırlıklı bebekler için Kanguru anne bakımının geleneksel bakımla kar ş ıla ş tırılması,” vol. 36, no. 3, pp. 155–160, 2009.

[14] C. T. Mathias, S. Mianda, and T. G. Ginindza, “Facilitating factors and barriers to accessibility and utilization of kangaroo mother care service among parents of low birth weight infants in Mangochi District , Malawi : a qualitative study,” pp. 1–12, 2020.

[15] S. N. Lumbanraja, “Influence of maternal factors on the successful outcome of kangaroo mother care in low birth-weight infants : A randomized controlled trial,” *J. Neonatal. Perinatal. Med.*, vol. 9, pp. 385–392, 2016.

[16] WHO, “MCEE-WHO methods and data sources for child causes of death 2000-2016,” no. February, 2018.

[17] A. Bergh, J. De Graft-johnson, N. Khadka, A. O. Iniabohs, and R. Udani, “The three waves in implementation of facility-based kangaroo mother care : a multi-country case study from Asia,” *BMC Int. Health Hum. Rights*, 2016.

[18] A. Bergh, N. Charpak, and E. Van Rooyen, “Education and training in the implementation of kangaroo mother care,” no. January, 2012.

[19] R. P. Upadhyay *et al.*, “Cognitive and motor outcomes in children born low birth

weight : a systematic review and meta-analysis of studies from South Asia," pp. 1–15, 2019.

[20] WHO, "Kangaroo mother care: a practical guide. Department of Reproductive Health and Research.," *World Heal. Organ.*, 2003.

[21] K. H. Nyqvist, K. Mother, and C. Gc, "State of the art and recommendations Kangaroo mother care : application in a high-tech environment," pp. 812–819, 2010.

[22] N. Charpak *et al.*, "Kangaroo Mother Care : 25 years after," vol. 57, no. June 2004, pp. 514–522, 2005.

[23] K. H. Nyqvist *et al.*, "Towards universal Kangaroo Mother Care : recommendations and report from the First European conference and Seventh International Workshop on Kangaroo Mother Care," pp. 820–826, 2010.

[24] D.-R. J. Conde-Agudelo A, "Kangaroo mother care to reduce morbidity and mortality in low birthweight infants (Review)," *Wiley*, 2016.

[25] G. J. Chan, A. S. Labar, R. Atun, and G. J. Chan, "Systematic Systematic reviews reviews Kangaroo mother care : a systematic review of barriers and enablers Systematic reviews," no. October 2015, pp. 130–141, 2016.

[26] S. B. Nguah *et al.*, "Perception and practice of Kangaroo Mother Care after discharge from hospital in Kumasi , Ghana : A longitudinal study," 2011.

[27] R. K. Bhaskar *et al.*, "A Case Control Study on Risk Factors Associated with Low Birth Weight Babies in Eastern Nepal," vol. 2015, 2015.

[28] A. Sk and S. Jh, "MATERNAL FACTORS AFFECTING LOW BIRTH WEIGHT IN URBAN AREA OF BANGLADESH," 2005.

[29] A. Chaithra, M. A. Chiniwar, and S. B. Menasinkai, "Original Research Article A study on maternal factors affecting low birth weight in institutional deliveries," vol. 9, no. 10, pp. 4245–4249, 2020.

[30] B. County and H. D. Jackson, “Quantitative Data Analysis of Multiple Factors Associated with Low Birth Weight in Bibb County ,” vol. 1, no. 1, pp. 24–32, 2008.

[31] K. S. Negi, S. D. Kandpal, and M. Kukreti, “Epidemiological Factors Affecting Low Birth Weight,” vol. 8, no. 1, pp. 31–34, 2006.

[32] R. R. Hospitals, “Annual Assessment Report External Hospital Performance Assessment for Regional Referral Hospitals,” no. October, 2018.

[33] J. Charan and T. Biswas, “Review Article How to Calculate Sample Size for Different Study Designs in Medical Research ?,” vol. 35, no. 2, 2013.

[34] R. Pratiwi, M. S. Kosim, and N. Wijayahadi, “Prognostic factors for success in the Kangaroo Mother Care method for low birth weight babies,” *Paediatr. Indones.*, vol. 55, no. 3, pp. 142–146, 2015.

[35] P. E. Rodriguez AN, Nel M, Dippenaar H, “Good short-term outcomes of kangaroo mother care in infants with a low birth weight in a rural South African hospital,” vol. 49, no. 5.

[36] O. Penalva, U. P. Mackenzie, and U. P. Mackenzie, “Descriptive study of the clinical and nutritional profile and follow-up of premature babies in a Kangaroo Mother Care Program Descriptive study of the clinical and nutritional profile and follow-up of premature babies in a Kangaroo Mother Care Program Est,” *SA Fam Pr.*, no. July 2016, 2006.

[37] “Kangaroo Mother Care with Limited Resources,” 2000.

[38] U. T. and G. G. K. Ramanathan, V.K. Paul, A.K. Deorari, “Kangaroo Mother Care in Very Low Birth Weight Infants,” *Indian J. Pediatr.*, vol. 68, no. i, pp. 1019–1023, 2001.

# APPENDICES

## APPENDIX 1: PERMISSION TO CONDUCT RESEARCH - ENGLISH VERSION

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)**

**DIRECTORATE OF RESEARCH AND PUBLICATIONS**

ID-NO……

Greetings! My name is Goodluck Chenga. I am conducting a study on the effectiveness of Kangaroo Mother Care (KMC) on reducing risk of mortality among infants born at Temeke Regional Referral Hospital, Dar es Salaam.

Purpose of the study

This study aims at collecting information from maternal/preterm infant pair of files and registers on the effectiveness of Kangaroo Mother Care (KMC) on reducing risk of mortality among infants born at Temeke Regional Referral Hospital, Dar es Salaam to provide evidence based information regarding the currents status of the impact and implementation of the Kangaroo Mother Care (KMC) on reducing risk of mortality among infants born at Temeke Regional Referral Hospital, Dar es Salaam.

What participation involves

The researcher will review files and registers on the various aspect regarding the effectiveness of Kangaroo Mother Care on reducing risk of mortality among infants born at Temeke Regional Referral Hospital, Dar es Salaam.

Confidentiality

All the information collected from files and registers will be confidential. Only people working in this study will have access to the information. No names on the manipulation of records (Files and Registers) during extraction of the information.

Risks.

Missing of some information when reviewing the files and registers in this study.

Benefits

The information extracted will help to provide updated information on the effectiveness of Kangaroo Mother Care (KMC) on reducing risk of mortality among infants born at Temeke Regional Referral Hospital, Dar es Salaam. This information will turn into the help of the development of effective interventions focused on reducing neonatal mortality due to preterm birth and improve neonatal health outcomes.

Who to contact if you have any question about this study

In case of any questions about this study please don't hesitate to contact Principal Investigator; Goodluck Chenga. Muhimbili University of Health and Allied Sciences (MUHAS), P.O. Box 65001, Dar es Salaam (Tel. No. +255737451202). And any questions about the right to conduct this study, you may call Chairman of University Research and Publication Committee, Dr. Bruno Sunguya P.O.Box 65001, Dar es Salaam Tel, 2150302-6, and Prof Gideon Kwesigabo who is the supervisor of this study; Tel: 0713 443212

Signature of the Principal Researcher …….. Date ……

**KIAMBATANISHO NAMBARI 2: RUHUSA YA KUFANYA UTAFITI - SWAHILI VERSION**
**CHUO CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI (MUHAS)**

**KURUGENZI YA UTAFITI NA MACHAPISHO**

Namba ya utambulisho……

Salamu! Jina langu ni **Goodluck Chenga.** Ninafanya utafiti juu ya ufanisi wa Huduma ya Mama ya Kangaroo (KMC) ufanisi wa Huduma ya Mama ya Kangaroo (KMC) katika kupunguza hatari ya vifo miongoni mwa watoto wachanga waliozaliwa katika Hospitali ya Rufaa ya Mkoa wa Temeke, Dar es Salaam.

**Malengo ya utafiti**

Utafiti huu unakusudia kukusanya habari kutoka kwenye mafaili ya wamama na watoto wao wachanga waliozaliwa njiti juu ya ufanisi wa huduma ya mama ya Kangaroo (KMC) katika kupunguza hatari ya vifo miongoni mwa watoto wachanga waliozaliwa katika Hospitali ya Rufaa ya Mkoa wa Temeke, Dar es Salaam, lengo likiwa ni kutoa habari ya msingi ya ushahidi kuhusu hali ya ufanisi wa Huduma ya Mama ya Kangaroo (KMC) katika kupunguza hatari ya vifo miongoni mwa watoto wachanga waliozaliwa katika Hospitali ya Rufaa ya Mkoa wa Temeke, Dar es Salaam.

**Ushiriki**

Mtafiti atashughulika na taarifa zitakazopatikana kwenye mafaili ya watoto njiti juu ya mambo yahusuyo ufanisi wa Huduma ya Mama ya Kangaroo katika kupunguza hatari ya vifo miongoni mwa watoto wachanga waliozaliwa katika Hospitali ya Rufaa ya Mkoa wa Temeke, Dar es Salaam.

**Usiri**

Taarifa zote zitakazokusanywa kutoka kwenye mafaili ya watoto njiti zitakuwa ni siri, watu wanaofanya kazi katika utafiti huu tu ndio wanaweza kuziona taarifa hizi. Hakutakuwa na majina wakati wa kuzichakata taarifa za watoto njiti.

**Madhara**

Kukosekana kwa baadhi ya taarifa za watoto njiti na mama zao wakati wa kupitia mafaili.

**Faida**

Habari utakayotoa itasaidia kutoa habari juu ya ufanisi wa huduma ya Mama ya Kangaroo (KMC) katika kupunguza hatari ya vifo miongoni mwa watoto wachanga waliozaliwa katika Hospitali ya Rufaa ya Mkoa wa Temeke, Dar es Salaam. Habari hii itageuka kuwa msaada wa ukuzaji wa hatua nzuri zinazolenga kupunguza vifo vya watoto wachanga kwa sababu ya kuzaliwa mapema na kuboresha matokeo ya afya ya watoto wachanga.

**Mawasiliano**

Kama una maswali kuhusu utafiti huu unaweza kuwasiliana na mtafiti, **Goodluck Chenga,** Chuo Kikuu cha Tiba na Sayansi Shirikisi Muhimbili, S.L.P 65001, Dar es Salaam, (Simu number +255737451202). Na kama una maswali yoyote kuhusu haki zako kama mshiriki unaweza kupiga simu kwa Mwenyekiti wa kamati ya chuo ya utafiti na machapisho, **Dr Bruno Sunguya** Simu namba: 2150302-6, 2152489 na **Prof Gideon Kweigabo**, ambaye ni msimamizi wa utafiti huu, simu namba **0713 443212**

**Sahihi ya mtafiti..... Tarehe.....**

## APPENDIX 3: CHECKLIST

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)**
**DIRECTORATE OF RESEARCH AND PUBLICATIONS**

**SECTION A (I): DEMOGRAPHIC CHARACTERISTICS OF THE OF PREMATURE NEONATE ACCORDING TO THEIR CHARACTERISTICS**

**Put a tick (√) for each of the response of your choice**

| S/N | Variable | Variable Category | Box |
|---|---|---|---|
| 1 | Sex | 1) Male<br>2) Female | ( ) |
| 2 | Gestation age (weeks) | 1. Less than 28 weeks<br>2. 28-32 weeks<br>3. 33-37 weeks | Please write the exact GA in weeks.<br>…….. |
| 3 | Prematurity level | 1. Preterm<br>2. Very preterm<br>3. Late Preterm | ( ) |
| 4 | Admission Birth weight (In gram) | 1. ≤1500<br>2. 1501 < 2000<br>3. 2001 < 2500 | Please write the exact weight.<br>…….. |
| 5 | Apgar score (5 minutes) | 1. Less than 7<br>2. 7<br>3. Above 7 | ( ) |
| 6 | Cried immediately after birth | 1. Yes<br>2. No | ( ) |

| | | | |
|---|---|---|---|
| 7 | Resuscitation after birth | 1. Yes<br>2. No | ( ) |
| 8 | The cause of prematurity | 1. PROM<br>2. PET/ Eclampsia<br>3. GDM<br>4. Hypothyroidism<br>5. Multiple pregnancies<br>6. Bleeding | ( ) |
| 9 | Cord care | 1. Applying antiseptic<br>2. Leaving it to dry<br>3. Cleaning with warm water<br>4. Applying powder | ( ) |
| | | | |
| | **SECTION A (II): Social-Demographic characteristics of mothers of preterm babies attending at Temeke Referral Hospital.** | | |
| 10 | Maternal age (years) | 1. Less than 20<br>2. 21-30<br>3. 31-40<br>4. Above 40 | Please specify the age<br>( ) |
| 11 | Maternal education | 1. Never gone to school<br>2. Primary<br>3. Secondary<br>4. College/ University | ( ) |
| 12 | Marital status | 1. Single<br>2. Married<br>3. Not married/Living with a partner | ( ) |

| | | | |
|---|---|---|---|
| 13 | Occupation | 1. Employed<br>2. Business<br>3. Home wife<br>4. Others…..specify | ( ) |
| 14 | Parity | 1. Para 1<br>2. Multipara<br>3. Others…..specify | Please specify…<br>( ) |
| 15 | Mode of delivery | 1. Spontaneous Vaginal delivery<br>2. Caesarean section<br>3. Vacuum delivery<br>4. Others…… specify | ( ) |
| 16 | Place of delivery | 1. Hospital<br>2. Home<br>3. On transit delivery | ( ) |
| 17 | Residence ( District) | 1. Temeke<br>2. Ilala<br>3. Kinondoni<br>4. Others…..specify | ( ) |
| 18 | Socio economic status | 1. Poor<br>2. Moderate<br>3. Good | ( ) |
| 19 | Frequency of feeding during daytime in last 24 hours Hourly | 1. Hourly<br>2. Every 2 hours<br>3. Every 3 hours<br>4. On demand | ( ) |

| **SECTION C: Effectiveness of kangaroo mother care on reducing risk of mortality among infants** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **First attempt** | | **Second attempt** | | **Third attempt** | | **Fourth attempt** | |
| | | **Pre-check** | **Post check** | **Pre-check** | **Post check** | **Pre-check** | **Post check** | **Pre-check** | **Post check** |
| 20 | Respiratory rate | | | | | | | | |
| 21 | Oxygen saturation | | | | | | | | |
| 22 | Temperature | | | | | | | | |
| 23 | Heart rate | | | | | | | | |
| 24 | Weight gain | | | | | | | | |
| 25 | head circumference | | | | | | | | |
| 26 | Fetal Length | | | | | | | | |
| 27 | Length of hospital stay | | | | | | | | |
| 28 | Number of neonatal death after KMC | | | | | | | | |

## APENDISI 4: MASWALI

**CHUO KIKUU CHA AFYA NA SAYANSI MUHIMBILI (MUHAS)**
**KURUGENZI YA TAFITI NA MATOLEO**

**SEHEMU A; TAARIFA ZA KIJAMII ZA WATOTO NJITI**

**Weka alama ya tiki pale utakapochagua.**

| Namba | Eneo | Chaguo | Majibu |
|---|---|---|---|
| 1 | Jinsia | 1) Kiume<br>2) Kike | ( ) |
| 2 | Umri wa mimba kwa wiki. | 1. Chini ya wiki 28<br>2. Wiki 28 mpaka Wiki 32<br>3. Wiki 33 mpaka wiki 37 | Tafadhali andika umri wa mimba halisi katika wiki<br>…….. |
| 3 | Kiwango cha unjiti | 1. Njiti<br>2. Njiti zaidi<br>3. Njiti kidogo | ( ) |
| 4 | Uzito wa mtoto njiti (Katika gramu) | 1. Chini ya 1500<br>2. 1501 mpaka 2000<br>3. 2001 mpaka 2500 | Tafadhali andika uzito halisi wa mtoto<br>…….. |
| 5 | Hali ya mtoto baada ya kuzaliwa (Ndani ya dakika 5) | 1. Chini ya 7<br>2. 7<br>3. Zaidi ya 7 | ( ) |
| 6 | Mtoto kulia baada ya kuzaliwa | 1. Ndiyo<br>2. Hapana | ( ) |

| | | | |
|---|---|---|---|
| 7 | Kusaidiwa kupumua baada ya kuzaliwa | 1. Ndiyo<br>2. Hapana | ( ) |
| 8 | Sababu ya kuzaliwa njiti | 1. Chupa ya uzazi kupasuka kabla ya muda.<br>2. Kifafa cha mimba kabla ya kujifungua<br>3. Ugonjwa wa kisukari baada ya kupata mimba.<br>4. Goita<br>5. Mimba mapacha<br>6. Matatizo ya kutoka damu wakati wa ujauzito. | ( ) |
| 9 | Namna ya kutunza kitovu | 5. Kuweka dawa<br>6. Kuacha kikauke chenyewe<br>7. Kukisafisha na maji ya uvuguvugu<br>8. Kuweka poda | ( ) |
| | | | |
| | SECTION A (II): Taarifa za kijamii za mama mwenye mtoto njiti. | | |
| 10 | Umri wa mama (Miaka) | 1. Miaka chini ya 20<br>2. Miaka 21-30<br>3. Miaka 31-40<br>4. Miaka Zaidi ya 40 | Weka umri sahihi<br>( ) |
| 11 | Elimu ya mama | 1. Hajasoma<br>2. Elimu msingi<br>3. Elimu sekondari<br>4. Chuo/Chuo kikuu | ( ) |
| 12 | Hali ya ndoa | 1. Hajaolewa<br>2. Ameolewa<br>3. Anaishi na mwenza bila ndoa | ( ) |
| 13 | Shughuli unayofanya | 1. Mwajiriwa<br>2. Biashara<br>3. Mama wa nyumbani | ( ) |

| | | | |
|---|---|---|---|
| | | 4. Nyinginezo…..Taja | |
| 14 | Idadi ya uzazi | 1. Uzazi wa kwanza<br>2. Uzazi wa pili<br>3. Zaidi…..Taja | Taja…<br>( ) |
| 15 | Njia ya kujifungua | 5. Kawaida<br>6. Upasuaji<br>7. Kutumia vifaa vya kuvuta<br>8. Nyinginezo…… Taja | ( ) |
| 16 | Mahali ulipojifungulia | 4. Hospitali<br>5. Nyumbani<br>6. Njiani | ( ) |
| 17 | Makazi ya mama ( Wilaya) | 5. Temeke<br>6. Ilala<br>7. Kinondoni<br>8. Nyingine…..Taja | ( ) |
| 18 | Hali ya kiuchumi ya mama | 1. Mbaya<br>2. Kawaida<br>3. Nzuri | ( ) |
| 19 | Mara ngapi unamnyomyesha mtoto njiti | 1. Kila saa<br>2. Kila baada ya masaa mawili<br>3. Kila baada ya masaa matatu<br>4. Kila anapohitaji | ( ) |

| SEHEMU B: Matokeo ya Ubora wa kumbeba mtoto njiti kifuani ngozi kwa ngozi. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Jaribio la kwanza | | Jaribio la pili | | Jaribio la tatu | | Jaribio la nne | |
| | | Kabla | Baada | Kabla | Baada | Kabla | Baada | Kabla | Baada |
| 20 | Mapigo ya kifua yatokanayo na upumuaji | | | | | | | | |
| 21 | Kiwango cha oksijeni kwenye damu ya mtoto njiti | | | | | | | | |
| 22 | Jotoridi la mtoto njiti | | | | | | | | |
| 23 | Mapigo ya moyo | | | | | | | | |
| 24 | Uzito wa mtoto njiti | | | | | | | | |
| 25 | Ukubwa wa kichwa cha mtoto njiti | | | | | | | | |
| 26 | Urefu wa mtoto njiti | | | | | | | | |
| 27 | Muda wa kukaa hospitali | | | | | | | | |
| 28 | Watoto njiti waliofariki baada ya kuanza KMC | | | | | | | | |

## APPENDIX 5: INTRODUCTION LETTER

**UNITED REPUBLIC OF TANZANIA**
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
**OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES**

Ref. No. HD/MUH/T.764/2019 31st May, 2021

MEDICAL OFFICER INCHARGE,
P.O. BOX 45232,
**TEMEKE-PDAR ES SALAAM.**

**Re: INTRODUCTION LETTER**

The bearer of this letter is Goodluck Ashery Chenga (HD/MUH/T.764/2019), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MSc. Project Management Monitoring and Evaluation In Health.

As part of his studies he intends to do a study titled: **"EFFECTIVENESS OF KANGAROO MOTHER CARE (KMC) ON REDUCING RISK OF MORTALITY AMONG INFANTS BORN AT TEMEKE REGIONAL REFERRAL HOSPITAL, DAR ES SALAAM".**

The research has been approved by the Chairman of University Senate.

Kindly provide him with the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

*Ms. Victoria Mwanziva*
**For: DIRECTOR, POSTGRADUATE STUDIES**

cc: Dean, School of Public Health and Social Sciences, **MUHAS**
cc: Goodluck Ashery Chenga

9 United Nations Road, Upanga West; P.O. Box 65001, Dar Es Salaam; Tel. GULine: +255-22-2150302/6, Ext. 1015, Direct Line:+255-22 2151378;Telefax:+255-22-2150465 E-mail dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

## APPENDIX 6: PERMISSION FROM TRRH

**JAMHURI YA MUUNGANO WA TANZANIA**

WIZARA YA AFYA, MAENDELEO YA JAMII, JINSIA, WAZEE NA WATOTO
HOSPITALI YA RUFAA YA MKOA YA TEMEKE
Barua pepe: temekerh@afya.go.tz, S.L.P 45232 Dar es Salaam, Simu 0222856007

Kumb. Na. TRRH/RSC9/5/1/46 Tarehe: 03/06/2021

Ndg. Goodluck Ashery Chenga
MUHAS
S.L.P 65001
**DAR ES SALAAM.**

**YAH: OMBI LA KUFANYA UTAFITI (RESEARCH)**

Tafadhali husika na somo tajwa hapo juu.

Nimepokea ombi lako la kufanya Utafiti (Research) katika Taasisi yetu, kuhusu **'EFFECTIVENESS OF KANGAROO MOTHER CARE (KMC) ON REDUCING RISK OF MORTALITY AMONG INFANTS BORN AT TEMEKE REGIONAL REFERRAL HOSPITAL' DAR ES SALAAM.**

Ombi lako limekubaliwa, utatakiwa kulipa ada ya utafiti kiasi cha Tshs. **100,000/=** kwa kipindi chote utakachokuwa hapa hospitalini kwetu. Hivyo wasiliana na Mhasibu wa mapato wa Hospitali Ndg. Deogratias Tilya kwa namba 0765 000160 ili akupatie control Number kwa ajili ya malipo ya ada ya utafiti ili uweze kuruhusiwa kufanya utafiti.

Kny: MKURUGENZI MSAIDIZI
HOSPITALI YA RUFAA YA MKOA WA TEMEKE

Willborada Athanase
**Kny: MKURUGENZI**
**HOSPITALI YA RUFAA YA MKOA YA TEMEKE**

Nakala: Mkuu wa Idara ya Watoto – ***kwa usimamizi***

" Mhasibu wa Mapato – ***Toa "Control Number" kwa malipo***

## APPENDIX 7: ETHICAL CLEARANCE

**UNITED REPUBLIC OF TANZANIA**

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

**OFFICE OF THE DIRECTOR - RESEARCH AND PUBLICATIONS**

Ref. No.DA.282/298/01.C/ Date: 28/05/2021

**MUHAS-REC-05-2021-652**

Goodluck Ashery Chenga.
MSc – PMMEH,
School of Public Health and Social Sciences,
**MUHAS**

**RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: Effectiveness of Kangaroo Mother Care (KMC) on reducing risk of mortality among infants born at Temeke Regional Referral Hospital, Dar es Salaam.**

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 28/05/2021
EXPIRATION DATE OF APPROVAL: 27/05/2022

**STUDY DESCRIPTION:**
**Purpose:**
The purpose of this retrospective observational cross sectional study is to evaluate the effectiveness of Kangaroo Mother Care on reducing risks of mortality among preterm infants born at Temeke Regional Referral Hospital, Dar es Salaam.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%20509.pdf and in the MUHAS archives.

**The PI is required to:**

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Bruno Sunguya
**Chairman, MUHAS Research and Ethics Committee**

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research & Publications
Box 65001

Cc: Director of Postgraduate Studies

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel G/Line: +255-22-2150302/6; Ext. 1038; Direct Line:+255-22-2152489;Telefax:+255-22-2152489;E-mail:drp@muhas.ac.tz;Web:https://www.muhas.ac.tz