EVALUATION OF FACILITY BASED KANGAROO MOTHER CARE PRACTICES AT BUNGOMA COUNTY REFERRAL HOSPITAL, KENYA

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DECLARATION

I declare that this project work is my original work and that it has not been submitted for award of a degree in any other academic institution.

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Supervisors' declaration

This project work has been submitted for examination with our approval as University supervisors.

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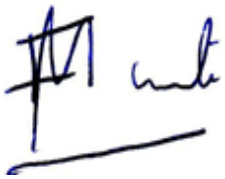
Signature:  **Date:** 7th November 2022

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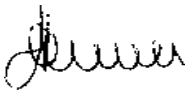
Signature:  **Date:** 7th November 2022

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ANC	Antenatal Care
CIN	Clinical Information Network
DHIS	District Health Information System
DMOH	District Medical Officer of Health
ENC	Essential Newborn Care
HMIS	Health Management Information System
IMNCI	Integrated Management of Newborn and Childhood Illnesses
KEMRI	Kenya Medical Research Institute
KAP	Knowledge Attitude and Practice
KMC	Kangaroo Mother Care
LBW	Low Birth Weight
LMIC	Low and middle income countries
NACOSTI	National commission for Science, Technology and Innovations
NBU	New born unit
NICU	Neonatal intensive care unit
PMA	Postmenstrual age
QoC	Quality of Care
SDG	Sustainable development goals
WHO	World health organization

OPERATIONAL DEFINITIONS

Preterm birth– Birth at gestation less than 37 completed weeks.

Low birth weight—Weight at birth less than 2500g regardless of the gestational age.

Birth weight less than 2kg—Weight at birth less than 2000g regardless of gestational age; babies born weighing less than 2000g are eligible for Kangaroo mother care.

KMC focal persons—Paediatrician or medical officer and nurse in-charge of NBU; trained on Kangaroo mother care who coordinate KMC implementation at the facility level.

Kangaroo mother care– Defined as early, prolonged and continuous skin-to-skin contact between a mother or her surrogate and her low birth weight infant.

Stable preterm/low birthweight infant: A newborn baby whose vital functions (breathing and circulation) do not require continuous medical support and monitoring.

Infants managed with KMC—Proportion of infants prescribed KMC among all infant discharged alive with birth weight of less than 2000g

ABSTRACT

Background: Kangaroo Mother Care (KMC) is a low-cost, easy to adopt intervention recommended by World Health Organization to improve health outcomes and survival rates of pre-term and low birthweight infants. In Kenya, even though the implementation guidelines are available and facility based KMC has been practised for over ten years, the extent to which the implementation process conforms to the required standards and the proportion of eligible infants accessing this service has not been widely evaluated. The aim of this study was to evaluate implementation of KMC practices at a level 4 facility in Kenya.

Methodology

A cross-sectional study design was used to evaluate KMC practices at Bungoma County referral hospital newborn unit. Health care worker and mother were involved in the survey to assess aspects of KMC including availability of policy documents, infrastructure, human resource, the actual skin-to-skin practice, nutrition, documentation and reporting, strengths and challenges. Available three years data was analyzed to assess the utilization of KMC.

Results

The implementation of KMC began in October 2014. The facility had a newborn unit with a room designated for KMC with 9 heath care workers who supported mothers to practise continuous KMC. All the 10 KMC beds were occupied during the survey. Mothers had good knowledge on benefits of KMC and they reported having been taught during the admission in NBU. The facility had 3 incubators and only two of them were functional, five phototherapy machines and two continuous positive airway pressure machines.

The strong stakeholder involvement at the inception of KMC, presence of nurse champions and availability of a KMC room with beds were their strengths whereas staff shortage, lack of comprehensive KMC training and poor resource allocation were the main challenges to the implementation of KMC.

A review of three years data revealed that a total of 3738 infants were admitted to the new born unit out of whom 1572 **(42%)** had low birth weight. A total of 1094 (29.3%) babies had birth

weight less than 2000g, of whom 1083 (99%) were reported to have been managed with KMC. Among infants born weighing less than 2000g 551 (44%) had a length of stay more than 21 days, 330 (28%) stayed between 7-21 days and 356 (28%) stayed less 7 days.

The crude mortality rate for infants with birth weight less than 2000g admitted to the newborn unit over the last three years was 36% (n=454) whereas the mortality for infants with birth weight more than 2000g was 16% (n=384).

Conclusion

There was a ninety nine percent utilization of facility based Kangaroo mother care at Bungoma county hospital. However, staff shortage and lack of health care worker training are the main barriers to the implementation of facility based KMC.

CHAPTER 1: INTRODUCTION

2.9 Background

Neonatal mortality is a major contributor to under five mortality rate with preterm birth complications being reported as the leading individual cause of under five mortality in a 2019 global report as shown in figure 1 (1). An estimated 2.5 million neonatal deaths occurred in 2018 globally, accounting for almost half of children dying under the age of five years (2). Preterm birth rates have been on the increase in both developed and developing countries as shown in table 1 below. It is estimated that every 1 in 10 babies is born preterm and the majority of them are in sub-Saharan Africa and South Asia where resources for advanced newborn care are limited and progress to reduce neonatal mortality is slow (3,4). In 2015, it was estimated that 20.5 million live births were low birth weight globally (5). A pooled prevalence report by Tessema et al in 35 sub Saharan countries using data from the respective countries' demographic health surveys conducted between 2010 and 2018 reported a low birth weight rate of 9.76% (6). This high magnitude of low birth weight rate implies the need for more resources to prevent neonatal morbidity and mortality among these vulnerable infants.

Even though the standard management for thermal care for premature and low birth weight infants is use of incubators, many low and middle income countries have limited access to sufficient equipment and have reported high prevalence of neonatal hypothermia as reported in a facility readiness assessment done in Uganda, Indonesia and India (7). A systemic review and meta-analysis of 12 studies done in East Africa reported a pooled prevalence of hypothermia of 57.2% with being preterm reported to have an adjusted odds ratio of 4.01; 95%CI: 3.02–5.00 (8). World health organization recommends Kangaroo mother care as one of the interventions to help improve survival of premature low birth weight infants (9).

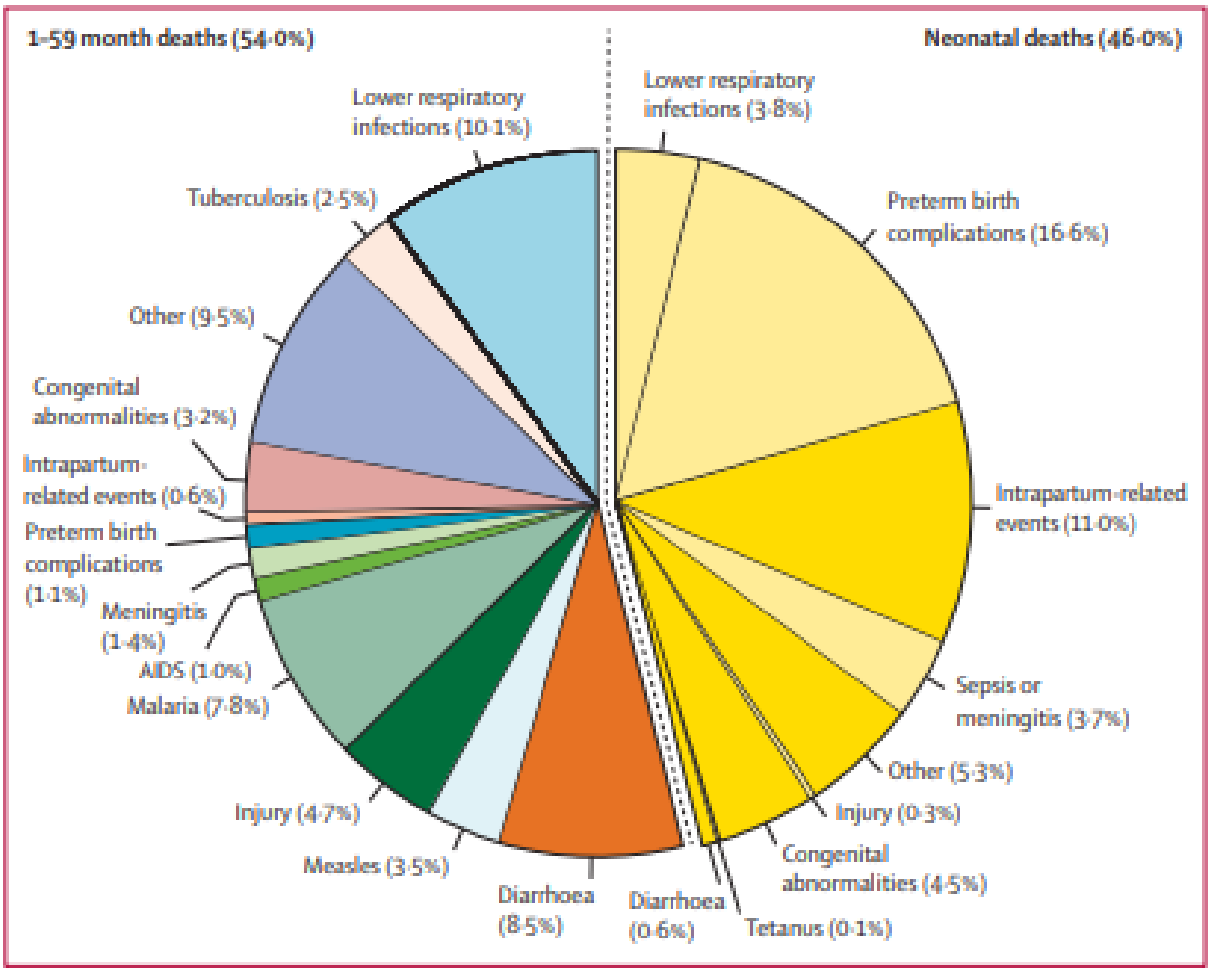

***Figure 1:* Global causes of under-5 deaths in 2019**
Deaths of neonates (aged 0–27 days) are on the right-hand side and deaths of children aged 1–59 months are on the left-hand side.

Fig. 1: Global causes of under-5 mortality in 2000-2019 (1).

Table 1: Estimated preterm birth rates and preterm births for 2010 by Millennium Development Goal region (3).

	No. of live births	Preterm birth rate (%)	No. of preterm births
Developed regions	1,430,0000	8.6	1,233,200
East Asia	1,740,0000	7.2	1,262,000
Latin America	10,200,000	8.4	852,800
North Africa	3,543,100	7.3	259,200
Oceania	263,200	7.4	19,500
Southeastern Asia	11,000,000	13.6	1,497,500
Southern Asia	38,700,00	13.3	5,159,300
Sub-Saharan Africa	**32,100,00**	**12.3**	**3,936,800**
Western Asia	4,855,300	10.1	488,200
Caribbean	682,800	11.2	76,500
Caucasus and Central Asia	164,300	9.2	151,300
TOTAL	**135,000,000**	**11.1**	**14,936,700**

In Kenya, according to a WHO and UNICEF report, 12% of live births in 2010 were preterm and in 2015, complications associated with prematurity contributed to 24.6% of neonatal deaths (10, 11). A recent retrospective cohort analysis of data from 16 hospitals in the Clinical information network (CIN), reported a high burden of neonatal causes of illness and mortality among

children aged 0-13 years. Neonatal admissions accounted for 46% of all admissions among this age cohort, yet they accounted for 66% of the deaths among children aged 0-13years (12). The analysis of 41,657 in born neonates aged 0-28 days admitted to those facilities showed that 30% of them were preterm and similarly, 30% of new born unit admissions had low birth weight (12). This is a manifestation of the high burden of prematurity and low birth weight in Kenya and its impact on child mortality.

Kangaroo mother care, is an intervention that has been shown to reduce neonatal morbidity and mortality related to preterm births and low birth weight. World health organization (WHO) in its 2003 KMC practical guide recommended the use of KMC for management of stable newborn infants born with birth weight less than 2000g to improve their survival (8). Emerging evidence from recent studies on initiating early KMC before stabilization have reported benefits when compared to conventional care (13, 14).

Kangaroo mother care practice can either be continuous or intermittent. First practiced in Bogota, Colombia in 1978, Kangaroo mother care has been shown to be safe and effective in the management of low birth weight infants with a systematic Cochrane review done in 2016 recommending KMC as an alternative to conventional neonatal care, mainly in resource limited settings (15). The effect of KMC on the various outcomes as reported in the systematic review were summarized as shown in table 2 below:

Table 2: Summary of benefits –Kangaroo mother care versus conventional care in reducing morbidity and mortality in low birth weight infants (14).

	Outcome	Risk effect (95%CI)	No. of participants	Quality of evidence
1.	Mortality at latest follow up	0.67 (0.48-0.95)	2293	Moderate
2.	Severe infection/sepsis at latest follow up	0.5 (0.36-0.69)	1463	Moderate
3.	Hypothermia at discharge or 40-41 weeks PMA	0.28 (0.16-0.49)	989	Moderate
4.	Weight gain at latest follow up (grams/day)	4.0g/d higher (2.3-5.86)	1198	Moderate
5.	Any breastfeeding at discharge or 40-41 weeks PMA	1.2 (1.0-1.34)	1696	Moderate
6	Any breastfeeding at 1 to 3 months follow up	1.17 (1.05-1.31)	1394	Low

In Kenya, the practice of Kangaroo mother care began prior to the official launch of guidelines. A survey conducted by the Ministry of health to assess neonatal care in clinical training facilities in the year 2014 reported that KMC was available in 14 out of 22 facilities that were assessed (16). The Kenya Kangaroo mother care clinical implementation guidelines were launched in 2016 and it was recommended that KMC practice should be early and prolonged continuous KMC for a minimum of 20 hours per day (17). Early KMC in the Kenyan guideline meant that babies weighing between 1200g and 1799g were to be stabilized then started on KMC as soon as possible after stabilization. Whereas according to WHO, early KMC means starting KMC immediately after birth before stabilization.

The Ministry of Health collaborated with development partners (Save the Children and UNICEF) to introduce, promote and support the scale up of facility based KMC in counties in the initial stages of introduction of KMC in Kenya. Kangaroo mother care is currently recommended to be practiced at all levels of care, including community level, provided prerequisite conditions are met (17).

However, the extent to which KMC practice conforms to the guideline requirements, and the proportion of eligible low birth weight infants accessing the service in Kenya has not been widely studied.

This study was conducted to evaluate KMC implementation process at one of the county hospitals in Kenya that was part of the early adopters of KMC practice since October 2014.

Even though randomized control trials in KMC have provided the size of effect (risk effect as shown in table 2 above), they do not provide information on how the intervention may be replicated in contexts with varied infrastructure. Carrying out implementation process evaluation for KMC, as a complex intervention, which by definition refers to interventions that comprise multiple interacting components, was aimed at enabling us to understand the status of KMC implementation in Bungoma County referral hospital (18).

CHAPTER 2: LITERATURE REVIEW

2.1 Definition and KMC Pillars

Kangaroo mother care is defined as early, prolonged and continuous skin-to-skin contact between a mother or her surrogate and her low birth weight infant. It may be practiced intermittently or continuously and either in the hospital or community (at home) (17).

There are three main components of Kangaroo mother care:

i. Kangaroo Position
ii. Kangaroo Nutrition
iii. Kangaroo discharge, support and follow up

i. Kangaroo Position

During Kangaroo mother care practice, the infant is placed skin to skin on the mother's chest or a surrogate, between the breasts and in an upright position dressed in a hat, diaper and socks only and is then secured using a wrap. The top of the wrap should be at the level of the baby's ear. The head is turned to the side, with the neck in a slightly extended position to keep the airway open and allow eye contact between the mother and the baby. Wraps can be made using locally available material/fabrics such as *leso/kanga* or they can be specially customized. In a randomized control trial done in Malawi by Kondwani et al comparing use traditional and a customized wrap to keep babies in KMC position, he reported that a higher proportion of mothers [44%] who used the customized wrap were able to practise KMC for 20 hours or more per day compared to those who used the local *Chitenje* fabric [33%] (19).

A baby in Rwanda tied in the kangaroo position on the mother's chest. KMC provides warmth and promotes infant growth Photo credit: Anne-Marie Bergh.

Figure 2: Kangaroo mother care position

ii. Kangaroo Nutrition

Exclusive breastfeeding is the recommended mode of feeding for infants on Kangaroo mother care. However, premature and very low birth weight infants may not be able to latch and suck due to lack of a strong suck reflex and inability to coordinate breathing, sucking and swallowing. In this case, milk is expressed and fed using a nasogastric tube or cup (17).

iii. Kangaroo discharge, support and follow up

Once the infant is feeding well, maintaining body temperature and is gaining weight towards the recommended discharge weight, the mother is prepared and taught how to continue practicing KMC at home. After discharge, the infant should be followed up for monitoring satisfactory

weight gain, growth and development and surveillance for any anticipated morbidity related to prematurity such as anemia of prematurity, metabolic bone disease of prematurity and retinopathy of prematurity. During follow up, the infants also receive the recommended supplements i.e. iron, multi-vitamins, folic acid and vitamin D and receive routine vaccinations (17).

During Kangaroo mother care, health care providers empower and support mothers on how to take care of their infants. Mothers require emotional support and encouragement to continue practising KMC during their stay in hospital and after discharge. Family members are also involved and taught how to support the mother in taking care of the infant and practicing KMC at home (17).

2.2 Benefits of Kangaroo mother care

2.2.1Benefits to the baby

The benefits of KMC to the infant have been widely studied. Premature and low birthweight infants are susceptible to hypothermia due to the physiologic immaturity of thermoregulation, which in turn is dependent on the available amount of brown and white adipose tissue and on the large body surface area. Hypothermia is a common complication in both inborn and referred premature infants at admission to the newborn unit. In a study done in Kenyatta National Hospital, Simiyu E. reported that 27% of low birth weight infants had hypothermia (20). Keeping premature infants in KMC position prevents hypothermia during transport to hospital and during hospitalization in the new born unit.

When compared with standard of care, studies have reported benefits of Kangaroo mother care in the care of stable preterm and low birth weight infants. A systematic Cochrane review of 21 studies by Conde-Agudelo and Diaz-Rosello reported that the use of KMC in the management of low birth weight infants was associated with low mortality, less nosocomial infection/sepsis and lower rates of hypothermia (15). During short term follow up visits, it was still reported that KMC was associated with decreased risk of mortality, lower risk of severe infections and better growth and development in terms of weight gain, length gain and head circumference (15). The use of Kangaroo mother care has been associated with better neurodevelopmental outcomes too.

Infants managed with KMC have also been reported to have longer time in quiet sleep. They have a lower and more regular heart rate, they suffered less from apnoea and bradycardia, had better temperature control and better oxygen saturations. (21).

Skin to skin care practiced during painful medical procedures has been reported to result in lower combined infant pain scoring systems (22)

Musoke et al, in an un-blinded randomized control trial done in Kenyatta national hospital on the use of partial kangaroo mother reported better growth and early discharge in the intervention group (23).

Benefits of Kangaroo mother care have also reported to be preserved over time in long term follow up studies. A 20 year follow up of a cohort of infants who had been managed using KMC reported persistence of benefits of KMC in terms of social and behavioral effects compared to the control group. Neuroimaging studies done on infants who had been managed with KMC showed larger volume of the left caudate nucleus (24).

2.2.2 Benefits to the mother

Mothers who practise KMC have been reported to exhibit less maternal stress and fewer symptoms of depression. They have a better sense of the parenting role and more confidence in meeting their babies' needs than those whose infants did not receive KMC (23). They reported more positive feelings towards their babies, perceived the infants as being less sick and had improved parental sensitivity to the infant's cues (25). Parents who had practiced KMC were found more protective and nurturing during long term follow up (24).

2.2.3 Benefits to the hospital

The utilization of Kangaroo mother care during hospitalization can result in significant cost saving in addition to the better survival outcomes of premature and low birth weight infants since there is less dependency on incubators which require electricity, servicing and human resource to operate. The reduced length of hospital stay also results in reduced cost of care. The involvement of mothers in the care of their infants reduces the burden on the human resource resulting in improved morale and motivated health care providers and better survival outcomes (17).

2.3 Recommendations on use of Kangaroo mother care—WHO and Kenya

Low birth weight which results from either prematurity or impaired intrauterine growth, is one of the major determinants of infant morbidity and mortality (26). WHO recommends several interventions to improve outcomes of preterm and low birth weight infants, Kangaroo mother care being one of them (9). The WHO Kangaroo mother care practical guide outlines KMC practice as a method for care of stable preterm/low birth weight infants (27).

Kenya adopted the WHO guidelines and unveiled local KMC implementation policy guideline in the year 2016; and further developed a facilitator training clinical guide for health care provider capacity building in order to enhance their knowledge and skills (17). In Kenya, kangaroo mother care has been integrated in the essential newborn care services and it is currently included in the integrated management of neonatal and childhood illnesses (IMNCI) training guidelines.

2.4 Implementation of Kangaroo mother care

2.4.1 Operational requirements

The key requirements needed to introduce and sustain Kangaroo mother care in hospitals are outlined in a WHO-Western Pacific report and the Kenya KMC clinical implementation guide of 2016 (17, 28). The steps that should be undertaken during introduction of KMC include:

i. Carrying out a facility needs assessment to establish the capacity of the health facility to provide quality Kangaroo mother care services. The assessment aims to identify any gaps that need to be addressed prior to introduction of the service and enables stakeholders to mobilize resources to support KMC.
ii. Development of a KMC action implementation framework—guided by the policy guidelines at national and county level to ensure adherence to the set standards and integration of KMC in the existing essential new born care services.
iii. Setting the supportive environment—the setting within which KMC can be practised in Kenya includes all levels of health facilities from primary to tertiary hospitals.
iv. Staffing—implementation of KMC does not require additional health care workers but the existing staff should be adequately capacity built using the KMC health care provider

training manual in order for them to acquire the knowledge and skills in all aspects of KMC implementation.

v. Capacity building—after the initial comprehensive KMC training, there should be a program for mentorship, continuous professional development and induction/orientation of new staff joining the team in order to maintain the quality standards.

vi. Equipment and supplies—health facilities intending to implement KMC should have sufficient space (beds set aside for KMC) and other essential facilities for use by mothers such as bathrooms, toilets, laundry area, and sink area with running water and soap.

vii. Monitoring and evaluation—documentation of KMC services provided in the ministry of health KMC register and new born unit registers from which monthly summaries are computed and regular progress evaluation should be emphasized.

A study by Kondwani et al on hospital readiness to provide KMC and documentation of KMC service delivery outlined the requirements for establishing KMC. These included the need for a national policy and clinical guidelines, development of clinical training materials, training of healthcare providers, availability of data collection tools and integrating KMC indicators into the routine health management information system (29)

A systematic review of 30 studies in sub-Saharan Africa by Kinshella et al reported inadequate facilities and supplies as the most frequently described barrier to implementation of Kangaroo mother care (30).

2.4.2 Evaluation of KMC implementation

Long after research has shown evidence that certain interventions are beneficial, there is a gap between knowledge and adoption of those interventions by countries (31). Even though Kangaroo mother care has been shown to be an effective low cost intervention in reducing morbidity and mortality in low birth weight infants, it has not been implemented to full scale in sub-Saharan Africa (30). Therefore, evaluation of implementation of facility based KMC is vital in determining why scale up has been a challenge in low and middle income countries. At facility level, evaluation of KMC implementation of KMC practices is essential for determining the quality of care, strengths and challenges.

2.5 Kangaroo mother care implementation in low and middle income countries

2.5.1 KMC uptake and service coverage

Available evidence has shown that Kangaroo mother care is safe and effective in the care of preterm infants in both developed and developing countries (15). However, studies done to evaluate utilization and implementation progress and scale up of facility based KMC in hospitals in low and middle income countries have reported varied results. A multi-country case study from Asia by Bergh et al involving India, Indonesia and Philippines using cross sectional country studies reported a gap between implementation of KMC by the first hospital(s) to implement KMC and the further scale up of KMC services to other health facilities in all the three countries. In most cases there had been no significant expansion of KMC services without systematic donor input (32).

A multi-country facility based assessment of KMC implementation in sub-Saharan Africa done in Malawi, Mali, Rwanda and Uganda by Bergh et al reported variation in the quality of KMC implementation between facilities and implementation stages across the four countries (33).

A study done by Kondwani et al in Malawi to assess readiness of 87 hospitals to provide Kangaroo mother care revealed that even though 79% of the facilities reported providing some form of facility based KMC services, there was a large difference between the reported availability of KMC services, readiness to provide KMC and documentation of KMC services in the facilities' health information systems (29)

In Kenya, the implementation of KMC began in 2014 through the partnership of the Ministry of Health and development partners after trainers of trainers (TOTs) were trained in Malawi. Prior to the guidelines launch, facilities were implementing KMC on a low scale and without guidelines in place. Local trainers trained health care providers and since then, there has been an increment in the number of facilities implementing KMC and addition of KMC as an indicator in the district health information system (DHIS) reporting system but the extent to which KMC is utilized by individual health facilities has not been widely studied. Facilities in the Clinical information network document the number of infants receiving KMC per month.

2.5.2 Barriers and enablers of KMC

Even though KMC has been shown to have many benefits in the care of preterm and low birth weight infants, its implementation in low and middle income countries has been limited.

A systematic review of possible barriers and enablers of KMC in sub-Saharan Africa reported that buy in by the local leadership was essential to overcome barriers of inadequate space, limited budget for supplies, inadequate staffing, lack of guidelines and policies and insufficient facility supportive supervision. Workload burdens, knowledge gaps and staff attitudes were highlighted as challenges at health workers' level. It was reported that health worker related challenges could be alleviated by mentorship programs and by establishing a forum for sharing of best practices and success stories (30). Support for mothers and their families was also identified by Kondwani et al as a gap (29). Early studies done in Sub-Saharan Africa have reported poor documentation of KMC services as an additional gap (33).

Kangaroo mother care has been widely practised in sub-Saharan Africa with Malawi being one of the early implementers. A study done in Malawi reported that use of a customized KMC wrap was highly acceptable to women and improved skin-to-skin practices in facility-based KMC. Almost half of the mothers who were using customized wraps were reported to have practised continuous KMC for 20 or more hours per day, compared to a third of mothers using the traditional wraps. Women using the customized wrap reported being comfortable in keeping the baby in skin-to-skin position more often than women using the traditional wrap, and they were able to tie on the wrap themselves, making it more acceptable (19).

In a study done among health workers of different cadres in Kenya by Murila et al, it was reported that even though most of the health professionals were aware of KMC, lack of requirements needed to implement KMC and inadequate skills hampered the practice of KMC (34).

The decision to carry out this study at Bungoma county referral hospital, an early adopters of KMC in Kenya, was informed by the paucity of data on evaluation of KMC implementation, adherence to the standards outlined in the Kenya KMC implementation guide and the facility's enablers and barriers during the implementation process.

2.6 Kangaroo mother care before Stabilization

The initial WHO recommendation on use of kangaroo mother care was in the management of stable low birth weight infants. But since the majority of neonatal deaths in preterm and low birth infants occur in the first seven days of life, before stabilization; current KMC research has been focusing on evidence regarding benefits of KMC before stabilization. A multisite randomized control trial on immediate KMC among infants with a birthweight of between 1000g to 1799g reported lower neonatal deaths at 72 hours and at 28 days in the interventional group compared to the conventional care. Early onset KMC was also reported to be associated with reduced length of hospital stay (35).

2.7 Rationale/Study justification and utility

Preterm birth complications are the leading cause of neonatal morbidity and mortality with the highest burden being in the low and middle income countries where there are limited resources for intensive neonatal care and thermal care for the preterm infants such as incubators. A Cochrane review has shown that KMC, a cost effective intervention for improving outcomes of care and survival of low birth weight infants, improves growth, reduces mortality and morbidity particularly from hypothermia, hypoglycemia and nosocomial sepsis in stable preterm infants with birth weight less than 2000g (15).

Even though WHO in its 2015 guidelines recommended KMC as an intervention to improve survival of preterm and low birth weight infants, its implementation in LMIC has been slow and the level of adherence to the standards outlined in the policy documents has not been widely studied. The access to KMC and utilization in terms of proportion of low birth weight infants being managed with KMC at facility level has also not been widely assessed.

Bungoma County referral hospital being one of the early adopters of KMC in Kenya and having been used as a training centre by other counties, was therefore a suitable facility to be evaluated to establish whether the KMC practices conform to the standards outlined in the WHO and Kenyan KMC implementation guidelines.

Bungoma hospital is part of 21 hospitals in Kenya involved in the Clinical Information Network (Newborn care) since November 2018. This is a network of hospitals working in conjunction

with the Kenya Medical research institute (KEMRI) to collect quality in-patient data in the paediatrics wards and newborn units. More than a third of infants admitted to the newborn unit are premature and the facility has in the past been used by other hospitals to bench mark prior to establishment of KMC services in their respective hospitals. It has also been used as a training centre for the practical aspects of KMC training package.

The CIN network has a rich pool of data which we utilized to determine utilization of facility based KMC in the management of eligible low birth weight infants born weighing less than 2000g in the last three years and to also describe clinical characteristics of the infants.

Findings from this study will be useful in informing the quality of facility based KMC being implemented at Bungoma County referral hospital; strengths and weaknesses and utilization of the service by eligible low birth weight infants. The findings can also be used to design quality improvement projects in the facility and other CIN or County referral hospitals.

2.8 Research question

What is the implementation status of Kangaroo mother care practices at Bungoma County referral hospital, Kenya?

2.9 Research Objectives

2.9.1 Overall objective

To evaluate the implementation status of Kangaroo mother care practices at Bungoma County referral hospital, Kenya.

2.9.2 Specific Objectives

Primary Objective

To describe KMC practices at Bungoma County referral hospital, Kenya in the domains of history of KMC implementation, available KMC resources, evidence of KMC practice, staff training and rotation, mothers' education, strengths and weakness.

Secondary objectives

The secondary objectives were:

1. To determine the proportion of low birth weight infants born weighing <2000g documented to have had KMC following admission to Bungoma county referral hospital new born unit over the last 3 years.
2. To describe the clinical characteristics, length of stay and mortality amongst low birth weight infants weighing <2000g admitted to the Bungoma county referral hospital new born unit over the last 3 years.

CHAPTER 3: METHODOLOGY

3.1 Study design

A cross-sectional study design was used to evaluate the implementation of facility based Kangaroo mother care at Bungoma county referral hospital, in the Western part of Kenya. The process evaluation survey was done through a facility KMC audit and health care provider and mother interviews using a structured, pretested KMC progress monitoring checklist adopted from the South Africa Medical Research Council (Appendix 8).

The utilization of Kangaroo mother care at Bungoma county referral hospital by eligible infants weighing less than 2000g at birth admitted to the new born unit was assessed by analysing retrospective data collected over the last three years.

Additionally, a new born unit services review and supervision quality of care supplement tool (Appendix 10) was used to ascertain the status of essential new born care services. This was done to provide current information on the context within which kangaroo mother care is being practised in the facility.

3.2 Study site

This study was conducted at the Bungoma County referral hospital new born unit, a level 4 hospital located in the Western part of Kenya, currently being assessed for gazettement as a level 5 hospital. The catchment population of the facility is the entire county population of 1.67 million since it's the referral facility for the entire County and some neighbouring counties. The hospital is located in a malaria endemic zone in Kenya and has a significant prevalence of low birth weight infant with routine CIN reports indicating that 45% of infants admitted to the new born unit are of low birth weight.

The hospital has a maternity ward where an average of 600 deliveries are conducted per month. The facility has a basic new born unit staffed by one paediatrician, one medical officer, ten nurses, a medical officer intern and two clinical officer intern at any given time.

The dream of implementing KMC in Bungoma County was born during the first commemoration of World prematurity day in Kenya on 17th November 2014 when the County health management team volunteered to be the first county to implement KMC practice at scale. The implementation of KMC began in October 2014, using two beds in the postnatal ward through the support of a partner Save the Children. The facility underwent a needs assessment and KMC practice began by setting aside two beds in the postnatal ward as KMC space. Subsequently a room was set aside for the implementation of KMC next to the postnatal ward. The county equipped the room with 8 reclining beds and a sink with running water and soap provided. The room also had a television set put up for use in educating mothers on KMC and entertainment purposes. The room was expanded and 2 more beds added to make the current total of 10 KMC beds.

Facility health care providers were trained on all aspects of KMC, registers for documentation were provided and the actual practice started. The facility had no single functioning incubator at the time of KMC inception.

Since then, the facility and several other hospitals within Bungoma County have been implementing KMC but the adherence to standards and proportion of low birthweight accessing the care have not been studied.

3.3 Study Population

3.3.1 Study population for KMC practices evaluation

A cross-sectional survey on KMC practice evaluation was conducted using a standardized Kangaroo mother care progress monitoring structured questionnaire that was administered to the key role players in KMC implementation. These included the hospital managers (medical superintendent and nursing officer in-charge of the hospital), KMC focal persons in the newborn unit who are the paediatrician, the medical officer, nursing officer in-charge of the new born unit, all the nurses working in the new born unit since they are the same ones who cover the KMC ward and the nutritionist allocated in the newborn unit. The section on questions for mothers was administered to all mothers who were in the KMC ward at the time of the survey. Health care providers and mothers who were and able to give informed written consent were included in the process evaluation survey. Health workers and mothers who did not consent were excluded.

Likewise health care workers who were on leave or away from the work station were excluded from the study.

3.3.2 Study population for evaluation of utilization of KMC

The study population included all infants admitted to the newborn unit in Bungoma county referral hospital during the study period out of whom those eligible for KMC (born with a birth weight less than 2000g) were identified as the target population eligible to receive KMC. Infants with weight less than 2000g referred out or those with major life threatening congenital malformation making it impossible for them to be managed using Kangaroo mother care, those who were referred out for specialized care and those who absconded from the ward were excluded from the study.

3.4 Study Period

This study was conducted in two parts. The cross-sectional survey to evaluate KMC practices was conducted in July 2022. Thereafter, retrospective data analysis to determine the proportion of low birth weight infants born weighing <2000g documented to have had KMC following admission to the new born unit at the Bungoma County referral hospital over the last three years (1st November 2018 to 30th October 2021); using the clinical information network data abstracted from the REDCap (Research Electronic Data Capture, a secure web-based application designed for research studies).

3.5 Sample size determination and sampling method

For the primary objective, this study utilized the census method of sample size determination and therefore all the KMC focal persons and healthcare workers working in the newborn unit who are involved in the KMC service delivery were included in the evaluation. All mothers who were admitted in the KMC ward practising KMC at the time of the survey were involved in the evaluation.

For the secondary objectives, all infants admitted to Bungoma county referral hospital new born unit during the period of interest— 1st of November 2018 to 30th November 2021 who met the

inclusion criteria and whose data was captured in the Clinical Information Network redcap software were included in the study.

3.6 Study tools

For the primary objective, a structured standardized KMC monitoring tool (Appendix 8) that has been previously used to conduct similar evaluation was used to collect data on implementation of KMC and qualitative information obtained through interviewing of key informants. The specific sections that were covered in the evaluation tool and observations included: the history of how KMC implementation began, involvement of role-players and stakeholders at inception, staffing, staff rotation policies, staff training and on-the-job orientation of new staff, the actual KMC practice, record keeping, KMC admission criteria, feeding and weight monitoring, discharge criteria, follow-up, general strengths and challenges, general impression of the assessor and recommendations for consideration.

For secondary objectives, a separate data collection tool (Appendix 9) was used to extract data from the CIN red cap software for determination of the proportion of low birth weight infants born weighing <2000g documented to have had KMC over the last 3 years and description of their clinical characteristics. The clinical characteristics contained in the tool include: gender, birthweight, causes of morbidity, length of stay and outcomes of care.

Additionally, a ministry of health clinical services review and supervision: quality of care supplement: neonatal structure tool was used to collect on the first quarter of this year (1st January to 31st March 2022) to provide information on the on the context within which the facility was operating at that time.

3.7 Study Procedure

For the primary objective, the principal investigator trained the research assistant on how to carry out KMC process evaluation using a structured KMC implementation progress monitoring tool. The tool was pre-tested at Webuye hospital in Bungoma County. We then visited Bungoma county hospital newborn unit, obtained written informed from key informants and providers on duty as they continued with their daily working routine. We then conducted the cross-sectional survey and involved all the health care providers who worked in the newborn unit and were

present at the time of the survey. Then KMC mothers who were admitted in the KMC unit at the time of the survey gave informed written consent and took part in the survey. Two nurses, one was on annual leave and another who was out of the County were excluded since they could be reached.

For first secondary objectives, data was abstracted from the CIN redcap using the codes of the variables of interest using the CIN code book. They were filtered out and entered into an excel sheet.

For the health facility clinical service review and supervision: QoC supplement, a neonatal structure tool (Appendix 10) was used to collect data from the facility daily registers and monthly summary reports.

3.8 Data collection procedure

3.8.1 Primary Objective

Kangaroo mother care implementation evaluation was conducted using a standardized KMC progress evaluation tool adapted from South Africa that has been used in KMC evaluation in other Sub-Saharan countries. The questionnaire has 18 sections that cover different aspects of the evaluation. We subdivided the questionnaire into 4 parts. The research assistant completed the questionnaire during the survey.

The first section was completed by obtaining information from the senior hospital management staff (Medical superintendent and the nursing officer in-charge of the hospital). The second part covering information on KMC resources, continuous and intermittent KMC, feeding and weight monitoring, KMC education, documentation, referral, discharge and follow up, staff training and rotation, strengths and weaknesses was obtained from the KMC focal persons and the new born unit health care workers (paediatrician, medical officer, nurses and nutritionist). The 3rd part covering questions to ask mothers was completed by talking to the mothers who were in the KMC ward at the time of the survey and the last part on general observations and impressions was completed by the research assistant and the principal investigator. The informants gave their responses to the questions while the research assistant filled the questionnaire. Certain sections required observations and taking copies of the records e.g. written program on when intermittent KMC should be practised.

3.8.2 Secondary Objectives

Clinical information network member facilities collect in-patient data obtained from patient files for neonates admitted to the newborn unit using clerical officers stationed in the hospitals. One data clerk in each hospital to abstract biodata, admission and discharge diagnoses, and outcome (alive or dead) from the paper hospital records each day for all patients after discharge. The information is entered directly into a non-proprietary Research Electronic Data Capture (RED Cap) tool with inbuilt range and validity checks. Data entry is guided by a standard operating procedure manual and error-checking systems that form the basis of the data clerks' training. To ensure no record is missed, the research team benchmarks the admission numbers entered in the CIN-Neonatal database with the aggregate statistics submitted to MoH for entry in the district health information system (DHIS). In order for us to determine the proportion of low birth weight infants born weighing less than 2000g admitted to the newborn unit for the last 3 years who were documented to have had KMC, retrospective data was extracted from the redcap using a data tool (Appendix 9) designed for the survey to abstract data from REDCap (Research Electronic Data Capture, a secure web-based application designed for research studies) used by Kemri Wellcome trust, based on indicators collected by neonatal CIN hospitals monthly. The facility data management team assisted by the CIN data management team helped in the data retrieval. The data extracted included statistics and infants clinical characteristics of babies admitted to the newborn unit during the three year study period—admissions, sex, birth weight, causes of morbidity and outcome of care (discharge alive or died). Those with birth weight of less than 2000g are eligible for KMC. The data was entered into an excel sheet for checked for completeness prior to analysis.

3.8.3 New born services audit

The new born unit clinical service review was done using the MoH Clinical services review and Supervision: QoC supplement tool was used to conduct a facility audit. Data was collected from the daily activity registers and monthly summaries and structured responses from the nurse in-charge of the new born unit. Data collected included information on neonatal ward statistics for the months of January to March 2022, the layout of the neonatal ward, NBU admission policy,

available equipment and their functionality, available essential drug and non-pharmaceuticals, policy documents and job aids.

3.9 Quality assurance procedures

Facility KMC evaluation data

The completed facility KMC implementation progress monitoring tools that were used to conduct the KMC evaluation and facility audit that were paper based were kept in a lockable cabinet only accessible by the principle investigator and the research assistant.

Retrospective patient data

The patient data that was used to determine the proportion of infants reported to have been put on KMC was de-identified, had no patient specific information and the laptop password was only accessible by the principal investigator.

3.10 Ethical considerations

3.10.1 Authorization to conduct the study

Ethics and Research committee approval

Ethical approval was obtained from KNH-UoN Ethics and Research Committee on 20th May 2022. The approval we obtained was then used to obtain a research license from the National Commission for Science, Technology and Innovations (NACOSTI). All participants provided informed written consent before participating in the study. Mother-infant dyads were observed during the survey to ensure that the both were stable and safe.

The Clinical Information Network data collection ethics approval was provided by the KEMRI Scientific and Ethical Review Unit KEMRI—**SERU ID 3459**. The Clinical Information Network uses de-identified routine patient data shared with the permission of all partner hospitals.

County and Hospital permission

Permission to conduct the study was obtained from the Bungoma County health management team (CHMT) and the medical superintendent Bungoma county referral hospital.

3.10.2: Waiver of consent

Request for waiver of consent was form was filled and approved by KNH-UoN ethics and research committee for use of the retrospective data collected by the hospital under the clinical information network by KEMRI WELLCOME TRUST.

3.11 Data management and analysis

3.11.1 KMC implementation evaluation data

The data collected during KMC process evaluation was organized as per KMC progress monitoring tool questions which covered various components of the KMC implementation reported under the following descriptive categories:

- History of KMC implementation
- Available KMC resources
- Evidence of KMC Practice
- Staff training and rotation
- Mothers' KMC education
- Strengths and weaknesses

3.11.2 KMC utilization and outcomes of care and clinical characteristics

Descriptive analysis was done for continuous variables while tabulation was done for categorical variables. Birth weight was categorized into <1000g, 1000-1499g, 1500-1999g and ≥2000g. The proportion of infants with birth weight less than 2000g receiving KMC was calculated and expressed as percentage.

3.12 Dissemination of study findings

The findings from this study will be shared with Bungoma county referral hospital management team (HMT) and Bungoma county health management team (CHT). The report will also be shared with the other CIN network hospitals and the Ministry of Health.

3.13 Study limitations

Internal validity

Census method was used to reduce the risk of selection bias. Given that all the nurses working in NBU who participated in the survey were not part of the part of the health care workers who were trained at the inception of KMC, there is a possibility of response bias.

Having used retrospective data abstraction may have a possibility of missing data. This was mitigated by using checking for completeness prior to analysis and utilization of a three years data set from CIN network data.

External validity

Even though it's a single centre study, the facility being a public hospital that met the recommended 10 bed capacity for a level 4 facility and given that we reviewed utilization data collected over a long period of three years, we are confident that these findings are generalizable to other public facilities of similar level of care.

CHAPTER 4: STUDY RESULTS

Bungoma County referral hospital had successfully implemented facility based kangaroo mother care from October 2014 up to the time of the survey. The facility began KMC implementation with 2 beds in the postnatal ward, then progressed to 8 beds and later added 2 more to the current total of 10. The facility had a separate space for KMC where stable infants weighing less than 2000g were being managed.

4.1 KMC Practice Evaluation

For the first objective- to evaluate the implementation status of facility based KMC practices at Bungoma County referral hospital, the cross-sectional survey findings were as follows:

4.1.1 History of KMC implementation

Bungoma County referral hospital established facility based Kangaroo mother care in October 2014 through the support of a donor, Save the Children, initially using two beds in the postnatal ward. The informants were not present in the facility when KMC was first initiated. The decision to start implementing KMC was necessitated by the lack functional incubators for care of low birth weight infants. Save the Children is the donor partner that supported the County in the initial phase of KMC implementation but they have since left in 2018 and handed over the implementation of KMC to the Hospital Health Management Team (HMT).

4.1.2 Available KMC resources

Health facility level of care

Bungoma county referral hospital is a level 4 hospital with a 20 bed capacity basic new born unit. The facility was undergoing assessment for gazettement as a level 5 hospital at the time of the survey.

Infrastructure for KMC

The newborn unit had two rooms for patient care; one for acutely sick babies and another for stable babies, a nursing station and a store. The facility had a 10 bed KMC ward which was hived off from the postnatal ward and equipped by the County through the support of a partner, Save the Children. Key role players were involved in the initial phase. Sanitary amenities such as bathrooms and toilets were being shared with the rest of maternity mothers and they were located

outside the KMC ward. There were 32 babies admitted to the newborn unit on the day of the survey.

Human resource

The health care workers taking care of infants in the NBU and KMC unit consisted of a paediatrician, a medical officer, 9 nurses, a medical officer intern, 4 clinical officer interns, occupation therapist and a nutritionist.

Nursing students who were rotating in NBU at the time of the survey were also reported to work in KMC ward. They reported that the qualified nurses took them through an orientation package that included KMC care when they report to the new born unit.

Table 3: Distribution of health care providers involved in the survey

Cadre	**Frequency % (n=22)**
Management—medical superintendent and nursing officer in-charge	2 (9%)
Clinicians—paediatrician and MO	2 (9%)
Nurses	7 (32%)
Nutritionist	1 (5%)
Mothers	10 (45)
Total	22 (100%)

Equipment and support structures

The facility had 3 incubators only, out of which two are functional and in use. Due to insufficient numbers, those babies being managed in the incubator share—two to three per incubator which nurses reported made it challenging to observe strict infection prevention and control. There was

alternative source of heat, one space heater available in the new born unit acute room which does not have incubators, and in which babies are not stable for continuous KMC.

Other available support systems and equipment for the management of premature/low birth weight infants that were available include a 24 hour laboratory. The facility had five phototherapy machines and four continuous positive airway pressure (CPAP) machines but only two were functional.

Table 4: Summary of available equipment

Equipment	**Number available**	**Number functional**
Reclining KMC beds	10	10
Incubators	3	2
CPAP Machines	4	2
Phototherapy machines	5	5
Electronic weighing scale	1	1

4.1.3 Evidence of KMC practice

New born care services

Newborn services were organized such that infants born within the hospital requiring newborn services are admitted to the newborn unit while out-born babies aged less than two weeks are also admitted to the newborn unit. Babies older than two weeks old were admitted to the newborn unit. There was however no written admission policy.

On the day of the survey, there were 32 babies (22 in the new born unit and 10 in the KMC room) cared for in two rooms. There were 13 clean cots; with 2 functional incubators. The hospital provided linen for sick babies and the linen was clean.

Skin to skin practices

The nurses reported that both intermittent and continuous KMC were being practised in the facility. Intermittent KMC was mainly practiced by the mothers whose babies were unstable in the new born unit while still on management of acute illnesses. However, they complained of the space for intermittent KMC being inadequate since the two NBU rooms were small. The babies were being transferred to the KMC ward once they were on full enteral feeds and weaned off oxygen since there was no provision of oxygen in the KMC ward. Notably, there was no schedule of what time intermittent KMC was practised and there was no documentation of duration of intermittent KMC in the patients' files. The decision to start a baby on continuous KMC was reported to be made by both the clinicians and nurses.

Mothers were observed to be practicing KMC with babies correctly positioned, though half of them had no hats. They were secured using mothers' own material since the hospital did not provide customized wraps, wrapping linen or hats for the babies. Mothers were not allowed to leave the ward with babies in KMC position as part of infection prevention and control.

Feeding and weight monitoring

Mothers with sick newborns were being accommodated in the postnatal wards in order to allow them to be available to feed their babies as prescribed, both day and night. The feeds were prescribed based on the comprehensive new born care protocols and the basic paediatric protocol recommendations. The two protocols were available in the facility. Babies were fed every three hours mainly on expressed breast milk via nasogastric tube or cup based on the clinicians' prescription. No personalized supervision was done during feeding and there was no documentation of the amount of expressed milk fed per feed in the comprehensive monitoring charts or the KMC daily score sheets.

Within the KMC room, there was good support for exclusive breastfeeding from the nutritionist during the day and job aids on feeding such as how to express breastmilk shown below:

Figure 3: Chart on how to express breast milk by hand

Babies on Kangaroo mother care are weighed daily except over the weekend using digital electronic weighing scale. The weight is recorded in the baby's file. There was one electronic weighing scale used to weigh both the newborn unit and KMC babies by the nutritionist. The birth weight, weight at admission and discharge weight was indicated in the exit (discharge) form.

Records in use for KMC information

The NBU in-patient medical records seen included a hardcopy files containing a standard newborn admission record, comprehensive monitoring charts, treatment sheet, continuation papers and exit forms. The admission process was also done electronically to generate the patient admission number. The laboratory and pharmacy ordering systems were computerized but the discharge or exit forms were paper based. Bungoma county referral hospital NBU had the official Ministry of Health KMC register that was being used for recording KMC information.

KMC daily ward round notes were written in the patients' files even though the ward round were not consistently done every day. The discharge scoring sheet was not completed and put in the patients' file. Additionally, the duration of hours that the baby had been in KMC position per day was not recorded and could not be ascertained from any of the available records.

It was reported that the exit form or discharge summary would be written by the clinician upon discharge and a copy retained in the patients' file. Information regarding the management on KMC was also recorded in the mother and baby booklet. After babies are discharged home, their records were entered in the CIN Redcap software and monthly summaries would then be shared with the facility thereafter. The clinical information network system also captures the number of low birth weight infants managed with KMC monthly.

The facility monthly summaries were prepared by the nurse in-charge of the NBU and recorded in the MoH KMC register. The data was then handed over to the hospital health records and information officer for entry into the district health information system (DHIS).

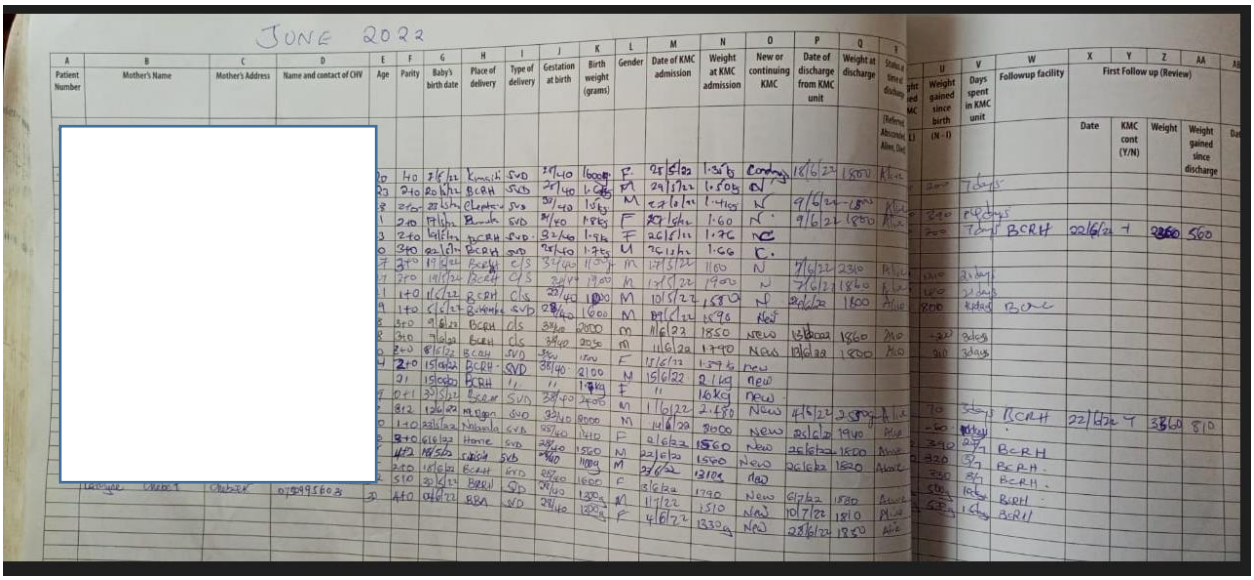

Figure 4 The MoH KMC register

KMC education

The nurse in-charge of the NBU reported that mothers were educated about Kangaroo mother care upon admission to the new born unit. There was no individual patient checklist for all

procedures that mothers needed to be taken through when a mother and baby are admitted to the KMC ward. Within the newborn unit, there were posters on the benefits of KMC provided by implementing partners. There was television in the KMC ward that was intended to deliver educational sessions to mothers practicing KMC and for recreational purposes too.

Policy documents

The hospital had a vision and mission visibly displayed in the medical superintendent's office but no special vision and mission statements for the new born unit under which kangaroo mother care was being practised. The facility had the Kenya Kangaroo mother care clinical implementation guide that was launched in 2016.

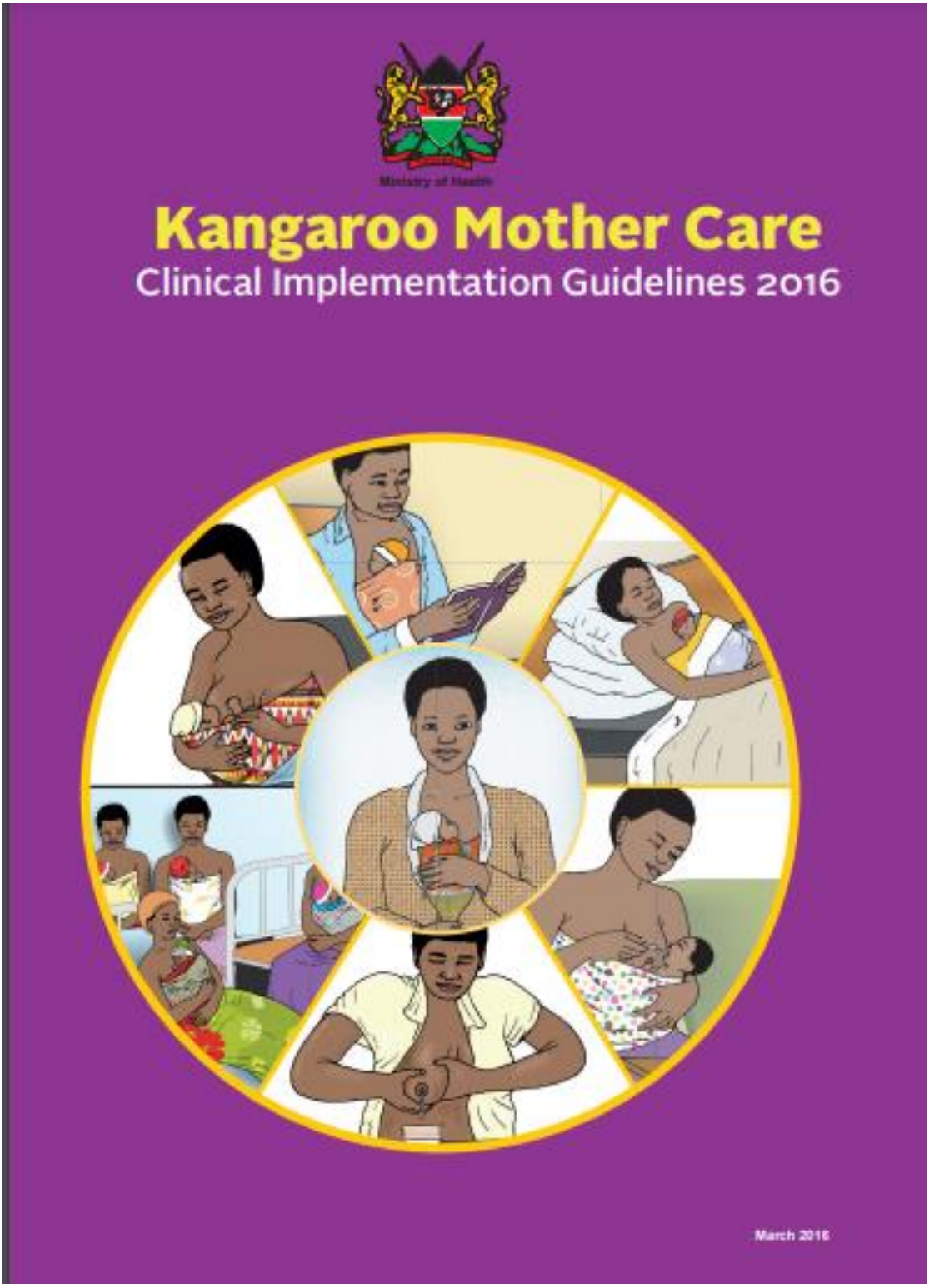

Figure 5: Kenya KMC Clinical implementation guide 2016

Referral, Discharge and follow up

The decision to discharge babies home was reported to be done by both clinicians and nurses. Babies were discharged when they attained a weight of 2000g; with the least weight at which a baby could be discharged documented in the register being 1800g. Initial follow up after discharge was reported to be scheduled after one week, second visit after two weeks and thereafter monthly unless the infant had clinical reasons warranting more frequent review.

The infants were reported to be on follow up in the neonatal outpatient clinic for a period of one year during which health education, immunization, growth monitoring, nutrient supplementation and other multidisciplinary services are received. There was evidence of follow up in the KMC register where weights taken on subsequent follow visits were recorded. The follow up was scheduled such that the first visit was done a week after discharge from the hospital, the second visit two weeks later and subsequently monthly unless there was a clinical reason or concern for a more frequent review.

There were no home visits for those who failed to return to clinic at the time of the survey as it used to happen during donor support. There was no active and functional community linkage structure. Estimated adherence to follow up (first clinic after discharge) was 80%.

Psychosocial support groups that used to be held monthly during donor support have also since stopped. The KMC champion (an ex KMC mother) who was being supported by the donor left.

4.1.4 Staff training and rotation

All the nurses who were previously trained in KMC outside the facility (offsite training) at the inception of KMC had since left through transfer or retirement. All those who were allocated to the newborn unit at the time of the survey had not undergone the comprehensive KMC training as per the KMC training manual. They all reported having been sensitized by fellow providers on job.

The nursing officer reported that there were staff change overs for nurses every six months except for the nursing officer in-charge of the NBU, the deputy nursing officer in-charge and nurses who have done specialty training in Neonatal Nursing.

4.1.5 Mothers' education

We interviewed a total of 10 mothers who were admitted in the KMC ward at the time of the survey, three of whom had been referred from the Sub-county hospitals, while 7 delivered at Bungoma county referral hospital. The three mothers who had delivered before arrival reported having used skin to skin to transport their babies to Bungoma county referral hospital.

The source of their KMC education varied with the majority of them (60%) having been taught by the nurses at or during admission while two reported to have been taught by a doctor and a student respectively. However, one mother reported that she was not taught by anyone but instead read the chart in the KMC room. One mother reported having been taught by a fellow mother. All mothers in the KMC ward at the time of the survey reported that they received support from fellow mothers in tying and securing babies in the KMC position.

All mothers reported that some of the benefits of KMC that they were taught included bonding between the baby and the mother, keeping the baby warm, better weight gain and reduction in infant infections

All the 10 mothers expressed need for supplements to be availed in the hospital even though it was not part of the evaluation questions. They reported that at the time of the survey, they only got folic acid and have to buy multi-vitamins, iron syrup, vitamin D and calcium when needed which most of them could not afford.

4.1.6 Strengths and Weaknesses identified

<u>Strengths</u>

The hospital management team and the health care workers were committed to ensuring that the facility offers KMC services. Having a 10 bed KMC room, the KMC policy documents and registers, the past position of the facility as a KMC center of excellence in the country were the facilities major strengths. The new born unit team reported that they were working well with maternity to identify infants who are eligible for KMC.

The mothers who were present at the time of the survey were all very knowledgeable on the benefits of KMC and they reported to have been taught by the nurses during their stay in the unit.

Weaknesses

The paediatrician, medical officer, nurses and nutritionists who were working in NBU and taking care of infants being managed on KMC had not undergone a formal KMC training as per the KMC health care worker training manual. Most of them had learnt on job and through mentorship by fellow health care workers.

Table 5: Summary of strengths and Challenges

Strengths	Challenges
The hospital has a 10 bed KMC ward within the maternity-NBU complex	Staff shortage
Health workers committed to implementation of KMC despite no formal KMC training	No comprehensive KMC training
KMC register is available and being used during and after discharge from KMC.	Limited space within NBU for practicing intermittent KMC
Availability of visual IEC materials (posters) on KMC	
The KMC facility having been used as a centre of excellence and training site by other counties.	Poor Support for follow up activities and community linkage
Education of mothers on KMC and supporting them to practise KMC	Unavailability of supplements for preterm infants in the hospital

4.2 Kangaroo mother care service utilization

For the first secondary objective—to determine the proportion of low birth weight infants weighing less than 2000g documented to have had KMC for the last three years, total of 3738 infants were admitted out of whom 1094 (29%) had a birth weight less than 2000g and therefore were eligible for kangaroo mother care. Ninety nine percent of eligible infants were documented to have received KMC.

Table 6: Infants admitted to the newborn unit for the last three years

Indicator	**N**	**%**
Total admissions	3738	
Birth weight <1000g	102	3
Birth weight 1000-1499g	402	11
Birth weight 1500-2499g	1065	29
Birth weight >2500g	2065	57
Missing birth weight	99	3
Eligible for KMC (<2000g)	1094	29
Received KMC	**1083**	**99**

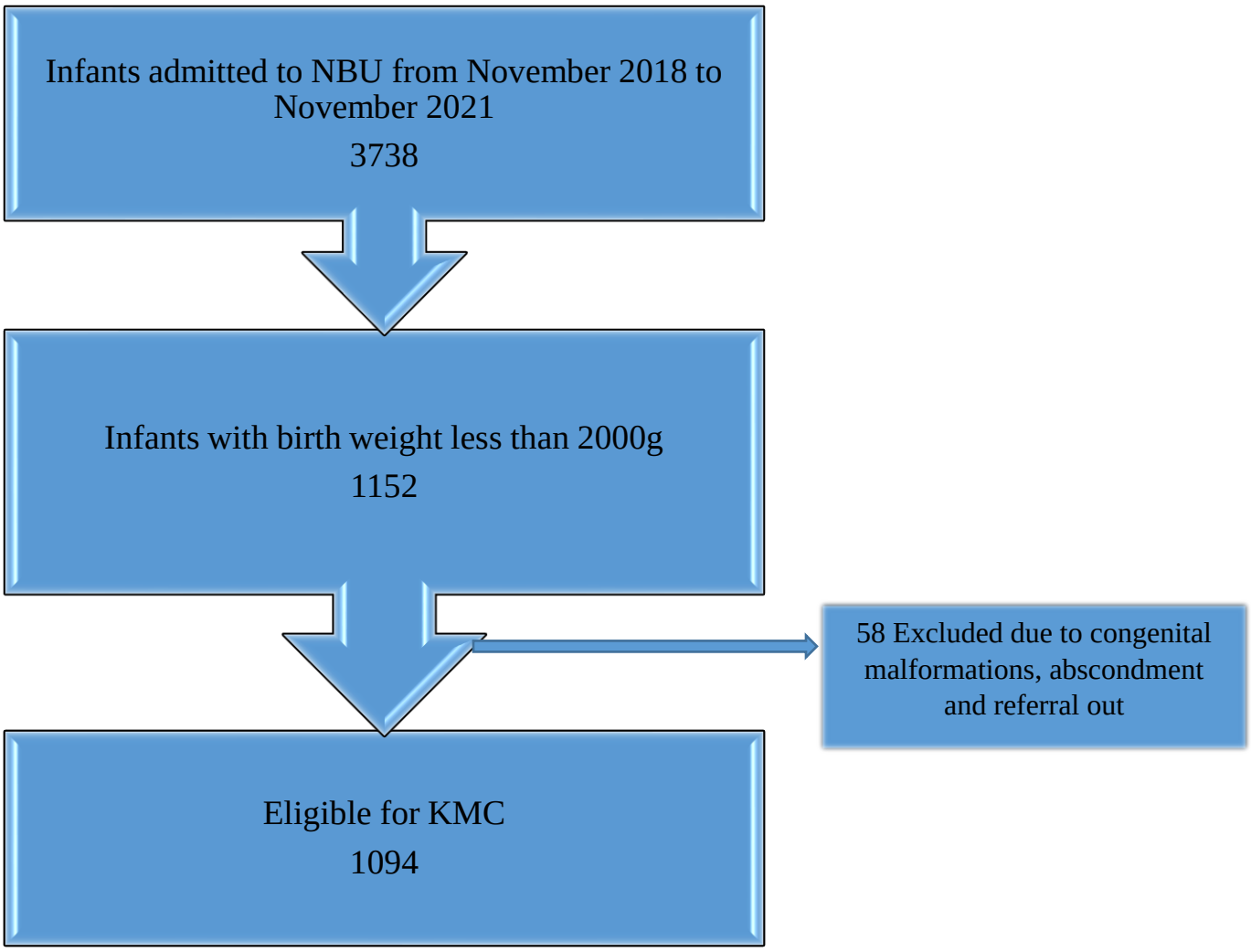

Figure 6: Study Consort diagram for KMC utilization

For the second secondary objective, to describe the clinical characteristics, length of stay and mortality amongst low birth weight infants weighing less than 2000g admitted to Bungoma county referral hospital newborn unit over the last 3 years, the male infants were 636 (52%) while the female were 585 (48%). Most mothers were aged between 20-30 years (55%). The three leading diagnoses made was low birth weight (83%), followed by prematurity (81%) and respiratory distress syndrome (45%).

The length of stay was stratified into three categories namely, less than 7days, 7-21 days and more than 21 days. Infants with birth weight less than 2000g had a longer length of stay than those with birth weight more than 2000g. Almost half of the infants with birth weight less than

2000g, 551 (44%), stayed for more than 21 days compared to only 99 (4.2%) of those with birth weight more than 2000g.

The crude mortality rate for infants with birth weight less than 2000g admitted to the newborn unit over the last three years was 36% (n=454) whereas the mortality for infants with birth weight more than 2000g was 16% (n=384).

A sub-analysis of the duration within which the infants died revealed that 68.2% died after less than 7 days, 25.0% between 7-21 days and 6.8% died after 21 days.

Table 7: Clinical characteristics and outcome of care

Indicator	**(n)**	**(%)**
Male	636	50
Female	585	47
Missing Sex	36	3
Maternal age <20 years	219	22
20-30 years	537	55
>30 years	221	23
Morbidity by diagnosis: LBW	1041	83
Prematurity	1015	81
RDS	565	45

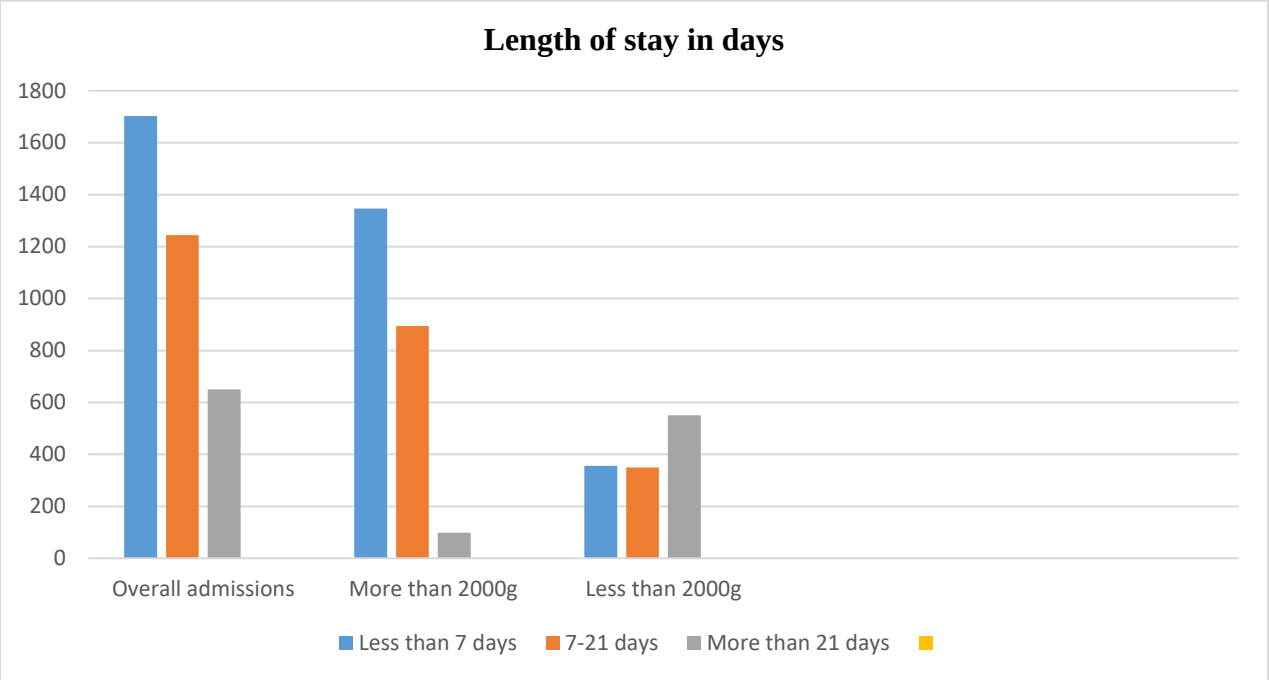

Figure 7: Length of stay for various weight categories

CHAPTER 5: DISCUSION

History of KMC implementation

This study highlights a systematic evaluation of facility based Kangaroo mother care practices in a county hospital in Kenya. From our evaluation, the initiation of KMC at Bungoma county referral hospital in October of 2014 and has been well sustained to date. The inception was informed by an unmet need for keeping preterm and low birth weight babies warm. There was healthcare provider and stakeholder involvement by leadership of the County health management team prior to initiation of KMC. Two systematic reviews by Chan et al and Kinshella et al both highlighted the value of user engagement and stakeholder involvement in the successful implementation of KMC. (36, 37). This might explain why KMC implementation has been consistent for the last 8 years. The implementation of KMC began later than early adopters of KMC in sub-Saharan Africa such as Malawi which began KMC implementation in 1999. The implementation of facility based kangaroo mother care was initially supported by a donor partner, Save the Children. This is similar to implementation of KMC in other sub-Saharan African countries such as Malawi that was similarly supported by save the children (30, 36).

Resources for KMC

There was space set aside for KMC with reclining beds and furniture meeting prerequisite for quality KMC practice as stipulated in the Kenya KMC implementation guide (17). However, the physical infrastructure is inadequate and the 10 beds in Bungoma County hospital KMC ward had 100% occupancy on the week of the survey, indicating unmet need for KMC space. A systematic review of 30 studies in sun-Saharan Africa reported insufficient space and supplies as the leading barrier to implementation of Kangaroo mother care (30).

The space was renovated through the support of Save the Children and there has been no further expansion of the space since their exit 4 years ago. This raises question about the commitment of the ministry of health, in this case the county management to support, scale up and sustain implementation of facility based Kangaroo mother care after the exit of donors who supported initial implementation. Similar resource constraints have been reported by other African countries after donors exit and hand over KMC programs to the government (33, 36).

Human resource available for implementation of KMC was noted to be a challenge where the 9 nurses running the NBU, who had not undergone the comprehensive KMC training, were the

same ones supervising KMC. Adequate healthcare worker training was reported in the systematic review by Kinshella as an essential facilitator of KMC implementation (30). This finding is also similar to findings by Seidmal et al in a systematic review of barriers and enablers of KMC in low and middle income countries where nurse shortage and fatigue was listed as a major barrier to KMC implementation (37).

Skin to skin practices

There was evidence of all the three components of KMC being practised with mothers observed having babies in KMC position, exclusive breastfeeding and presence of KMC register where follow up of infants discharged home was documented. This is in keeping with national KMC implementation guide where facilities are required to document low birth weight infants receiving KMC service (17). The finding of well-maintained KMC registers and over 90% completion was reported by Salim et al in a multi-country validation study involving facilities from Bangladesh, Nepal Tanzania with nurses taking the lead role in register filling similar to our study (38).

Even though the facility reported practicing both continuous and intermittent KMC, there was no evidence of documentation of intermittent KMC. This finding is similar to other KMC evaluations which have reported poor other sub-Saharan country studies where documentation of intermittent KMC was poor (30). A study by Samra demonstrated that intermittent KMC is safe and effective in promoting weight gain and can be useful in promoting early initiation of breastfeeding in low birth weight infants (39).

Feeding of infants during KMC was not being supervised at individual level by nurses. Similar findings were reported from Mozambique in Kinshella's systematic review where lack of individualized supervision of feeding was reported as a barrier to KMC implementation (30).

Follow up after discharge

Even though follow up after discharged was happening, health care providers working in the new born unit reported that certain practices that were previously supported by the donor partner such us providing transport cost for mothers returning for follow up, support for monthly mothers' support group meeting and tracing mothers who have become lost to follow up were currently

not happening. This is similar to the findings by Bergh et al in their multi-country study in Africa (Malawi, Mali, Rwanda and Uganda), where it was reported that Malawi struggled to maintain routine practices due to resource constraints after donor funding ceased (33). A multi-country study by Laura et al involving Ethiopia, Malawi, Nigeria and Rwanda in Africa, and Bangladesh and India in Asia, reported that all the six countries had challenges with follow up (40).

Documentation of follow up of babies after discharge from the KMC ward was reported to be happening and it was evident in the KMC register. This finding differs from a study done in four African countries also reported gaps in documentation (33). The follow up documentation in the same longitudinal register is in keeping with the requirements by the national implementation guide (17).

KMC utilization and outcomes of care

Ninety nine percent of low birth weight infants eligible for KMC were reported to have received KMC. The findings of this study demonstrate a very good utilization of KMC. This is different from a KMC implementation multi-country study done in Ethiopia, Malawi, Nigeria and Rwanda in Africa, and Bangladesh and India by Laura et al which reported low proportion of small babies being started on KMC (40). The high proportion of eligible infants receiving KMC could be explained by the availability of a functional KMC unit and the unavailability of incubators. Similar utilization was reported in the multi-country validation study by Salim (38).

Low birth weight infants had higher mortality and longer duration of stay compared to the other infants. This was as expected since duration of hospital stay has been demonstrated to have a positive but non-linear relationship with birthweight and gestational age (26, 41).

Two thirds of infants with birth weight less than 2000g died within the first 7 days. This could be attributed to challenges in the management of acute complications of prematurity such as respiratory distress syndrome as the survey noted that the facility only had two functional CPAP machines which are the main stay in the management of RDS.

Strengths and Limitations

This study utilized a standardized KMC progress evaluation tool and a rich body of data from the clinical information network to evaluate the status of implementation and utilization of facility based KMC. The findings can help policy makers within the hospital, county and ministry of health to understand the challenges being faced in implementation of KMC after donor exit.

Because this was a single centre study of an early adopter of facility based KMC, the findings may not be replicated to other settings especially facilities such as late adopters of KMC and those without donor support. Missing data from retrospective data analysis and selection bias mitigated by use of census for the study period, including all infants admitted during the three years study period.

CHAPTER 6: CONCLUSION

The implementation of facility based KMC practices in BCRH was being done in accordance to the Kenya KMC implementation guide.

All the components of Kangaroo mother care were being well implemented except for documentation of intermittent KMC.

There was a ninety nine percent utilization of KMC services by low infant birth weight infants born weighing less than 2000g.

Staff training and community follow up of infants discharged from KMC ward was still a challenge.

CHAPTER 7: RECOMMENDATIONS

We recommend that more investment in facility based KMC in terms of human resource deployment and health care worker training as per KMC training guide

Strengthen follow up by providing supplements, psychosocial support and community linkage.

REFERENCES

1. Perin J, Mulick A, Yeung D, Villavicencio F, Lopez G, Strong KL, Prieto-Merino D, Cousens S, Black RE, Liu L. Global, regional, and national causes of under-5 mortality in 2000-19: an updated systematic analysis with implications for the Sustainable Development Goals. Lancet Child Adolesc Health. 2022 Feb;6(2):106-115. Doi: 10.1016/S2352-4642(21)00311-4. Epub 2021 Nov 17. Erratum in: Lancet Child Adolesc Health. 2022 Jan;6(1):e4. PMID: 34800370; PMCID: PMC8786667.
2. UN Inter-Agency Group for Child Mortality Estimation. Levels & trends in child mortality: report 2019. New York: UNICEF; 2019. https://www.unicef. org/media/60561/file/UN-IGME-child-mortality-report-2019.pdf. Accessed 14 Oct 2019
3. Blencowe et al National, regional and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications Lancet 2012; 379: 2162–72
4. World Health Organization. Althabe F, Bhutta Z, Blencowe H, Chandra-Mouli V, Chou D, et al. Born Too Soon: The Global Action Report on Preterm Birth. May 2012.
5. https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30565-5. National, regional and worldwide estimates of low birth weight in 2015, with trends from 2000: a systematic analysis.
6. Tessema ZT, Tamirat KS, Teshale AB, Tesema GA (2021) Prevalence of low birth weight and its associated factor at birth in Sub-Saharan Africa: A generalized linear mixed model. PloS ONE 16(3): e0248417. https://doi.org/10.1371/journal.pone.0248417
7. Narayanan, I., Nsungwa-Sabiti, J., Lusyati, S. et al. Facility readiness in low and middle-income countries to address care of high risk/ small and sick newborns. Matern health, 48ractice and 48ractice48 **5**, 10 (2019). https://doi.org/10.1186/s40748-019-0105-9
8. Beletew, B., Mengesha, A., Wudu, M. *et al.* Prevalence of neonatal hypothermia and its associated factors in East Africa: a systematic review and meta-analysis. BMC Pediatr **20**, 148 (2020). https://doi.org/10.1186/s12887-020-02024-w
9. WHO. WHO recommendations on interventions to improve preterm birth outcomes. Geneva: WHO; 2015.

10. WHO. 2010. Countdown to 2015 decade report (2000–2010): Taking stock of maternal, newborn and child survival. WHO and UNICEF, New York
11. State of the World Children data, 2017.United Nations Children's Fund, New York
12. Irimu G, et al. Neonatal mortality in Kenyan hospitals: a multisite, retrospective, cohort study. BMJ Global Health 2021;6: e004475. Doi:10.1136/bmjgh-2020-004475
13. WHO Immediate KMC Study Group, Arya, S., et al. Immediate "Kangaroo Mother Care" and Survival of Infants with Low Birth Weight. *The New England journal of medicine*, *384*(21), 2028–2038. https://doi.org/10.1056/NEJMoa2026486
14. Impact of early Kangaroo mother care versus standard on survival of mid-moderately unstable neonates <2000g: a randomized control trial https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(21)00330-8
15. Conde-Agudelo A, Diaz-Rosello J. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. Cochrane Database Syst Rev. 2016;23
16. Aluvaala J, Nyamai R, Were F, Wasunna A, Kosgei R, Karumbi J, Gathara D, English M; SIRCLE/Ministry of Health Hospital Survey Group. Assessment of neonatal care in clinical training facilities in Kenya. Arch Dis Child. 2015 Jan;100(1):42-7. Doi: 10.1136/archdischild-2014-306423. Epub 2014 Aug 19. PMID: 25138104; PMCID: PMC4283661.
17. GoK, 2016 Kangaroo Mother Care Clinical Implementation Kenya Guideline
18. https://www.bmj.com/content/350/bmj.h1258t
19. Kondwani et al. Improving Skin-to-Skin Practice for babies in Kangaroo Mother Care in Malawi through the use of a customized baby wrap: A randomized control trial. PLOS ONE. 15. E0229720. 10.1371/journal.pone.0229720.
20. Simiyu DE. Morbidity and Mortality of low birth weight infants in the new born unit of Kenyatta National Hospital, Kenya EAMJ Vol 81 No. 7; 367-74
21. Head LM. The effect of kangaroo care on neurodevelopmental outcomes in preterm infants. J Perinat Neonatal Nurs. 2014 Oct-Dec;28(4):290-9
22. Boundy EO, Dastjerdi R, Spiegelman D, et al. Kangaroo Mother Care and Neonatal Outcomes: A Meta-analysis. Pediatrics. 2016;137(1):e20152238

23. Musoke RN, Mwendwa AC, Wamalwa DC. Impact of partial Kangaroo Mother Care on growth rates and duration of hospital stay of low birth weight infants at the Kenyatta National hospital, Nairobi. EAMJ Vol 89 (2) Feb 2012
24. Nathalie et al.Twenty-year Follow-up of Kangaroo Mother Care Versus Traditional Care Pediatrics Jan 2017, 139 (1) e20162063; DOI: 10.1542/peds.2016-2063
25. Shrivastava SR, Shrivastava PS and Ramasamy J. Utility of kangaroo mother care in preterm and low birthweight infants, South African Family Practice, 55:4, 340-344, DOI: 10.1080/20786204.2013.10874373
26. Duman N, Kumral A, Gülcan H, Ozkan H. Outcome of very-low-birth-weight infants in a developing country: a prospective study from the western region of Turkey. J Matern Fetal Neonatal Med. 2003 Jan;13(1):54-8. Doi: 10.1080/jmf.13.1.54.58. PMID: 12710858.
27. WHO Kangaroo Mother care A practical Guide
28. https://apps.who.int/iris/handle/10665/273625 Introducing and sustaining EENC in hospitals : kangaroo mother care for pre-term and low-birthweight infants
29. Kondwani et al. Readiness of hospitals to provide Kangaroo Mother Care (KMC) and documentation of KMC service delivery: Analysis of Malawi 2014 Emergency Obstetric and Newborn Care (EmONC) survey data. Journal of Global health Dec 2017 Vol 7(2) Kinshella, ML.W, Hiwa, T., Pickerill, K. *et al.* Barriers and facilitators of facility-based kangaroo mother care in sub-Saharan Africa: a systematic review. *BMC Pregnancy Childbirth* **21,** 176 (2021). https://doi.org/10.1186/s12884-021-03646-3
30. Haines A, Jones R. Implementing findings of research. BMJ 1994; 308: 1488-921
31. Bergh et al. The three waves in implementation of facility-based kangaroo mother care: A multi-country case study from Asia. BMC International Health and Human Rights. 16. 10.1186/s12914-016-0080-4
32. Bergh et al.: Implementing facility-based kangaroo mother care services: lessons from a multi-country study in Africa. BMC Health Services Research 2014 14:293.
33. Murila et al. Motivation and barriers to Kangaroo mother care amongst health service providers in Kenya. JOGECA 2016; 28(2): 2-5
34. Immediate Kangaroo mother care and survival of low birth weight N Engl J Med 2021;384:2028-38. DOI: 10.1056/NEJMoa2026486

35. Chan GJ, Labar AS, Wall S, Atun R. Kangaroo mother care: a systematic review of barriers and enablers. Bull World Health Organ. 2016 Feb 1;94(2):130-141J. doi: 10.2471/BLT.15.157818. Epub 2015 Dec 3. PMID: 26908962

36. Seidman G, Unnikrishnan S, Kenny E, Myslinski S, Cairns-Smith S, Mulligan B, et al. (2015) Barriers and Enablers of Kangaroo Mother Care Practice: A Systematic Review. PloS ONE 10(5): e0125643. Doi:10.1371/journal.pone.0125643

37. Salim, N., Shabani, J., Peven, K. et al. Kangaroo mother care: EN-BIRTH multi-country validation study. BMC Pregnancy Childbirth 21 (Suppl 1), 231 (2021). https://doi.org/10.1186/s12884-020-03423-8

38. Samra, N. M., Taweel, A. E., & Cadwell, K. (2013). Effect of intermittent kangaroo mother care on weight gain of low birth weight neonates with delayed weight gain. The Journal of perinatal education, 22(4), 194–200. https://doi.org/10.1891/1058-1243.22.4.194

39. Torres LM, Mazia G, Guenther T, Valsangkar B, Wall S. Monitoring the implementation and scale-up of a life-saving intervention for preterm and small babies: Facility-based Kangaroo Mother Care. J Glob Health. 2021 Jul 24;11:14001. Doi: 10.7189/jogh.11.14001. PMID: 34386217

40. Rawlings JS, Smith FR, Garcia J. Expected duration of hospital stay of low birth weight infants: graphic depiction in relation to birth weight and gestational age. J Pediatr. 1993 Aug;123(2):307-9. Doi: 10.1016/s0022-3476(05)81708-1. PMID: 8345432.

APPEDNDICES

Appendix 1: Time frame

Months 1-6	Proposal development
Month 7-8	Ethical and hospital regulatory approvals
Month 9-12	Data collection
Month 12-14	Data analysis
Month 14-15	Book write up and examination of dissertation
Month 16	Oral dissertation defense
Month 16	Feedback to Bungoma County referral hospital

Appendix 2: Study Budget

Category	**Remarks**	**Units**	**Unit Cost**	**Total (Ksh.)**
	Printing drafts	8	1000	8000

Proposal development	Proposal copies	12	1000	12000
	ERC Application	1	2000	2000
Data collection	Stationary pack	150	50	7500
	Training research assistant	2	2500	5000
	Research Assistant	12 weeks	2000	48,000
	Voice recorder	1	10,000	10,000
Data entry	Data Clerk	1	7000	7000
Data analysis	Statistician	1	30000	30000
Thesis Write up	Printing drafts	6	1000	6000
	Printing thesis	10 copies	1500	15000
Dissemination	Printing posters	3	750	2250
Contingency Fund				14,075
Total				**166,825**

Appendix 3: Plagiarism Check report

EVALUATION OF FACILITY BASED KANGAROO MOTHER CARE PRACTICES AT BUNGOMA COUNTY REFERRAL HOSPITAL, KENYA

ORIGINALITY REPORT

11%	9%	8%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	researchonline.lshtm.ac.uk Internet Source	1%
2	gh.bmj.com Internet Source	1%
3	journals.plos.org Internet Source	1%
4	Bergh, Anne-Marie, Kate Kerber, Stella Abwao, Joseph de-Graft Johnson, Patrick Aliganyira, Karen Davy, Nathalie Gamache, Modibo Kante, Reuben Ligowe, Richard Luhanga, Béata Mukarugwiro, Fidèle Ngabo, Barbara Rawlins, Felix Sayinzoga, Naamala Sengendo, Mariam Sylla, Rachel Taylor, Elise van Rooyen, and Jeremie Zoungrana. "Implementing facility-based kangaroo mother care services: lessons from a multi-country study in Africa", BMC Health Services Research, 2014. Publication	1%

bmcpregnancychildbirth.biomedcentral.com

Appendix 4: KNH-UoN ERC Ethical approval

UNIVERSITY OF NAIROBI
FACULTY OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/191

20th May, 2022

Dr. Felicitas Makokha Okwako
Reg. No. H120/39179/2021
Fellow in Neonatal Perinatal Medicine
Dept. of Paediatrics & Child Health
Faculty of Health Sciences
University of Nairobi

Dear Dr. Okwako,

RESEARCH PROPOSAL: EVALUATION OF FACILITY BASED KANGAROO MOTHER CARE PRACTICES AT BUNGOMA COUNTY REFERRAL HOSPITAL, KENYA (P16/01/2022)

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P16/01/2022.** The approval period is 20th May 2022– 19th May 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 KNH-UoN ERC.
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 KNH-UoN ERC 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 KNH-UoN ERC 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 KNH-UoN ERC.

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,

DR. BEATRICE K.M. AMUGUNE
SECRETARY, KNH-UoN ERC

c.c. The Dean, Faculty of Health Sciences, UoN
The Senior Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Chair Dept. of Paediatrics & Child Health, UoN
Supervisors: Dr. Florence Murila, Dept. of Paediatrics & Child Health, UoN
Dr. Brian Maugo, Dept. of Paediatrics & Child Health, UoN
Dr. Martin Jalemba Aluvaala, Dept. of Paediatrics & Child Health, UoN

Appendix 5: NACOSTI Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 563494

Date of Issue: 13/July/2022

RESEARCH LICENSE

This is to Certify that Dr., FELICITAS MAKOKHA OKWAKO of University of Nairobi, has been licensed to conduct research in Bungoma on the topic: EVALUATION OF FACILITY BASED KANGAROO MOTHER CARE PRACTICES AT BUNGOMA COUNTY REFERRAL HOSPITAL, KENYA. for the period ending : 13/July/2023.

License No: NACOSTI/P/22/18738

563494

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

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THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014

CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies
5. The License does not give authority to transfer research materials
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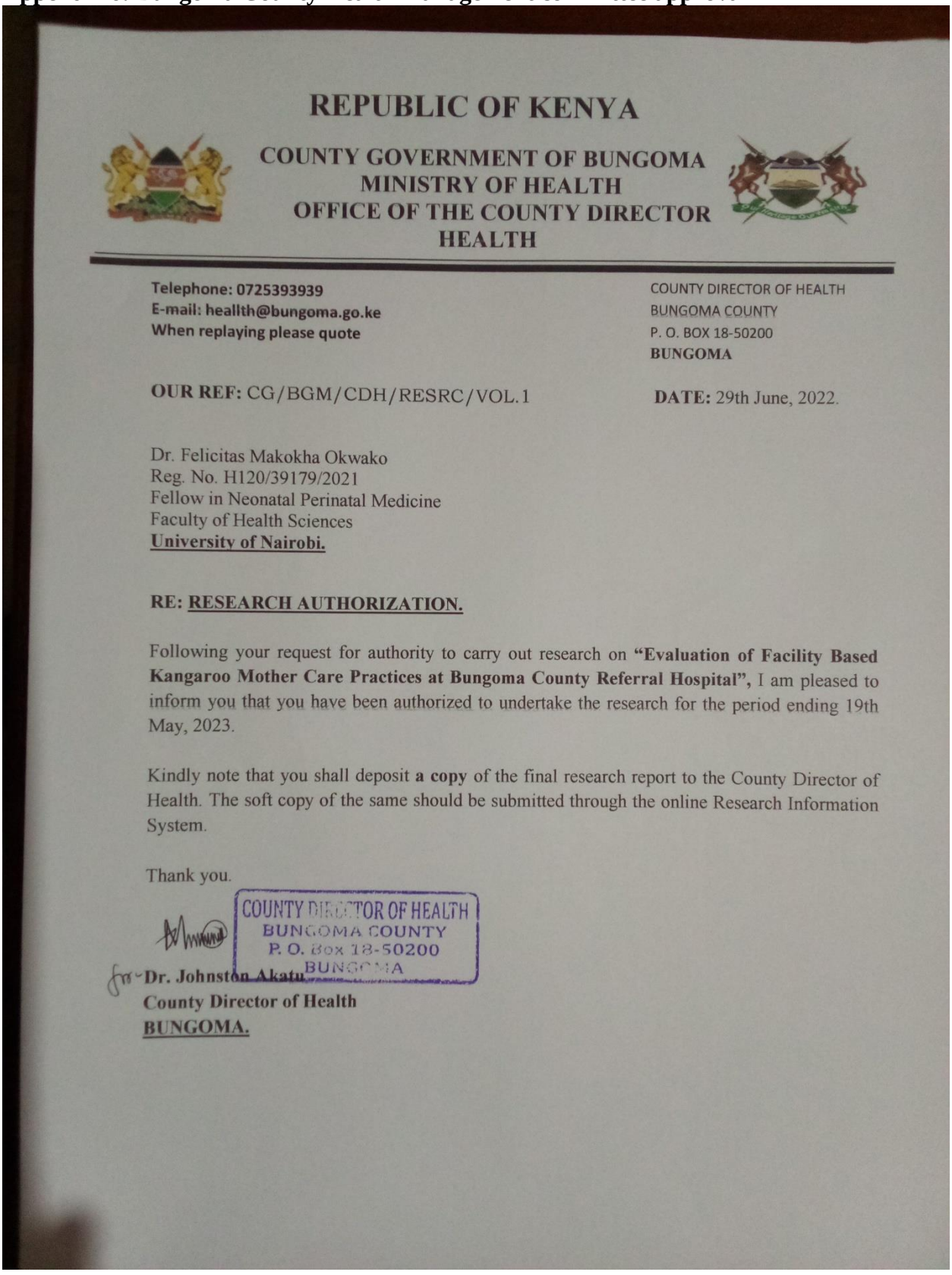
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix 6: Bungoma County Health management committee approval



REPUBLIC OF KENYA

COUNTY GOVERNMENT OF BUNGOMA
MINISTRY OF HEALTH
OFFICE OF THE COUNTY DIRECTOR
HEALTH

Telephone: 0725393939
E-mail: heallth@bungoma.go.ke
When replaying please quote

COUNTY DIRECTOR OF HEALTH
BUNGOMA COUNTY
P. O. BOX 18-50200
BUNGOMA

OUR REF: CG/BGM/CDH/RESRC/VOL.1

DATE: 29th June, 2022.

Dr. Felicitas Makokha Okwako
Reg. No. H120/39179/2021
Fellow in Neonatal Perinatal Medicine
Faculty of Health Sciences
University of Nairobi.

RE: RESEARCH AUTHORIZATION.

Following your request for authority to carry out research on **"Evaluation of Facility Based Kangaroo Mother Care Practices at Bungoma County Referral Hospital",** I am pleased to inform you that you have been authorized to undertake the research for the period ending 19th May, 2023.

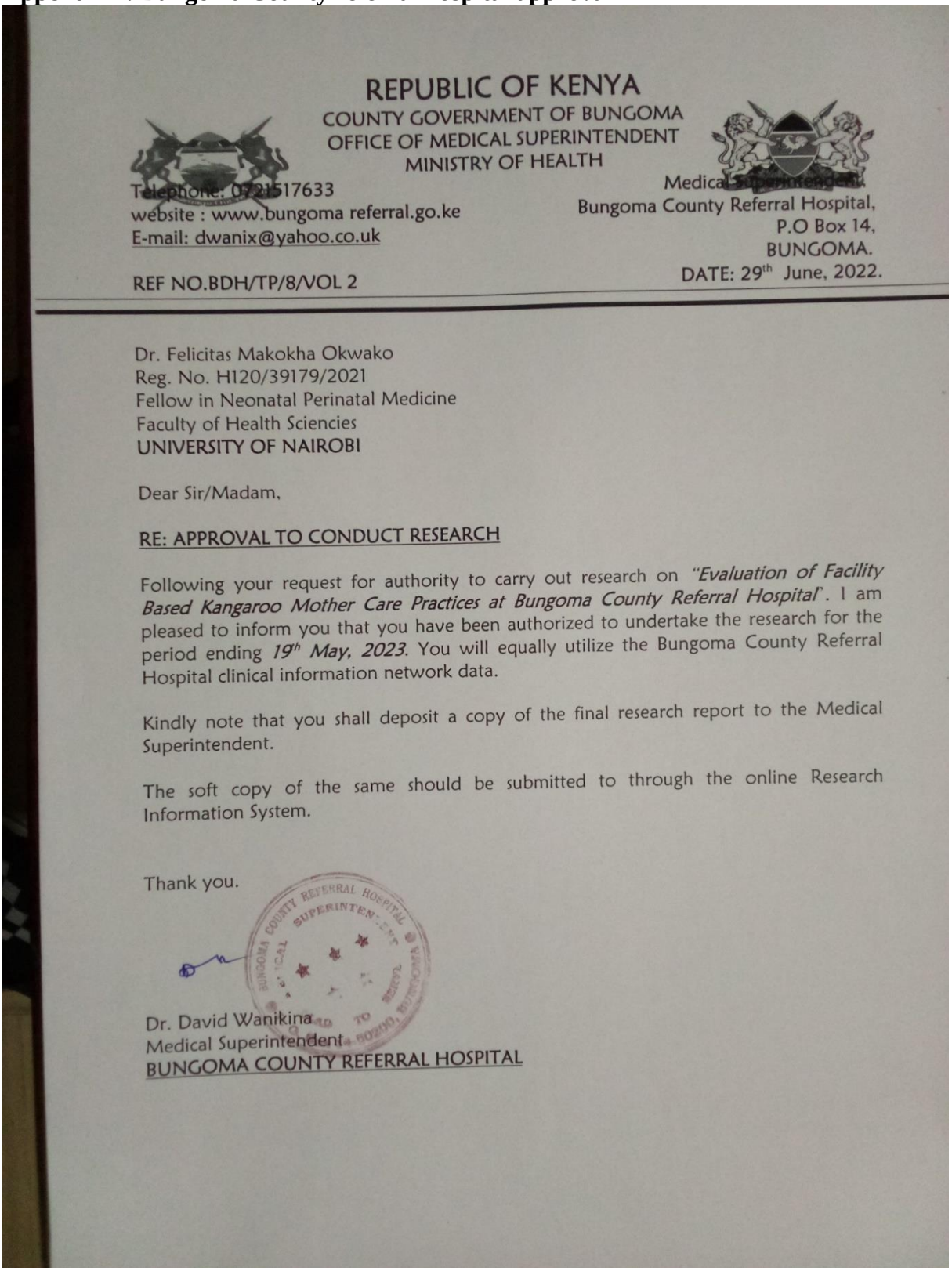
Kindly note that you shall deposit **a copy** of the final research report to the County Director of Health. The soft copy of the same should be submitted through the online Research Information System.

Thank you.

COUNTY DIRECTOR OF HEALTH
BUNGOMA COUNTY
P. O. Box 18-50200
BUNGOMA

for **Dr. Johnston Akatu**
County Director of Health
BUNGOMA.

Appendix 7: Bungoma County referral hospital approval



REPUBLIC OF KENYA
COUNTY GOVERNMENT OF BUNGOMA
OFFICE OF MEDICAL SUPERINTENDENT
MINISTRY OF HEALTH

Telephone: 0721517633
website : www.bungoma referral.go.ke
E-mail: dwanix@yahoo.co.uk

Medical Superintendent
Bungoma County Referral Hospital,
P.O Box 14,
BUNGOMA.

REF NO.BDH/TP/8/VOL 2

DATE: 29th June, 2022.

Dr. Felicitas Makokha Okwako
Reg. No. H120/39179/2021
Fellow in Neonatal Perinatal Medicine
Faculty of Health Sciencies
UNIVERSITY OF NAIROBI

Dear Sir/Madam,

RE: APPROVAL TO CONDUCT RESEARCH

Following your request for authority to carry out research on *"Evaluation of Facility Based Kangaroo Mother Care Practices at Bungoma County Referral Hospital"*. I am pleased to inform you that you have been authorized to undertake the research for the period ending *19th May, 2023*. You will equally utilize the Bungoma County Referral Hospital clinical information network data.

Kindly note that you shall deposit a copy of the final research report to the Medical Superintendent.

The soft copy of the same should be submitted to through the online Research Information System.

Thank you.

Dr. David Wanikina
Medical Superintendent
BUNGOMA COUNTY REFERRAL HOSPITAL

Appendix 8: KMC Progress Monitoring tool

HEALTH CARE FACILITY

1.1 County……Sub-County……
1.2 Name of Hospital……...
1.3 Level of Facility……
1.4 Name of KMC Focal Person……
Designation……...
1.5 Other informant/s

Name	**Designation**
……..	……..
……..	……..
……..	……..
…….....	……..
……..	……

2.1 Types of Neonatal care available (*Mark as applicable*)
Intensive care…….
Incubators (Used and Unused)……..
Warm cribs……....
Ordinary cribs in a heated room……
Ordinary cribs in a non-heated room……
Others (Specify)……
2.2 If there are incubators in the neonatal unit
2.2.1 How many are there (used and unused)? .....
2.2.2 How many are in use? .....
2.2.3 If none or only a few are in use, what are the reasons?
…….
…….

SKIN TO SKIN PRACTICES

3.1 How is a baby cared for in the first hour after birth in this facility? Could you explain the steps and procedures of what happens to the baby? (*Let the informant talk freely first and make notes)*……

……..

……

3.3.1 Skin to skin contact between mother and baby mentioned spontaneously?

Yes……No……**If Yes, go to question 3.2**

3.3.1.1 If No, are there any babies placed skin to skin-to-skin contact with the mothers during the first hour after birth?
Yes…….No……Unsure…….

(a) If Yes, which babies are placed in a skin-to-skin position?

……

3.2 Types of Kangaroo mother care practiced:

Mark as many as applicable:

No KMC practiced……

Intermittent KMC…….

Continuous KMC…….

Sporadic KMC…….

Other (specify)……

4. HISTORY OF KMC IMPLEMENTATION

4.1 When was KMC started?.....

4.2 Tell us more about the process that was followed.

(*Take notes and probe for the points below, if not mentioned*)

4.2.1 Was there a specific occasion or meeting where the decision to implement KMC was taken?

Yes…….No……..Unsure……

4.2.2 Approximate date…….

4.2.3 What was the occasion……

……

4.2.4 Are there written minutes or a report of the decision?

Yes……No…….Unsure…….

4.2.4.1 Copy of written document seen? Yes……..No……..

4.2.5 Who was involved in decision making?.....

…….

4.3 Monitor's/Assessor's impression of recall of history of implementation.

Good recall……Some recall……No recall…….

4.4 Did the facility do a baseline survey on the neonatal mortality and/or morbidity rates before starting with KMC?

Yes…….No……Unsure……..

4.4.1 If Yes, did the monitor/assessor receive a copy of baseline data?

Yes…….No…….Unsure…….

4.5 Did the Medical Superitendent of the hospital/the District Medical officer of health (DMOH) sign a commitment or undertaking or agreement that he/she would ensure that KMC is implemented in the hospital?

Yes……..No…….Unsure……

If Yes, specify further (if necessary)……

…….

5 INVOLVEMENT OF ROLE PLAYERS

5.1 Who are the people who were initially involved in starting KMC?

(Let informant/s first talk freely; take notes and probe for the persons below, if they are not mentioned specifically)

……

……

…….

5.2 What kind of support did you get from the following people?:

District Medical Officer of Health…….

……

Medical superintendent……

……

Nursing officer in-charge of the hospital…….

……

New born unit in-charge……

……

Medical officer/Paediatrician…….

……

5.3 Are there other people in the hospital from whom you got support?

Yes……..No……..Unsure……

If yes, who and what kind of support?.....

……

6 RESOURCES

6.1 Did you get any allocation from the hospital or district budget to establish your facility KMC?

Yes……No……Unsure…….....

6.1.1 If Yes, what was the nature of the allocation/what was the money used for?

……..

……

6.2 Did you have other sponsors? Yes…….No……Unsure……..

(Also probe for donations in the form of materials, wraps, caps, furniture, paint, labour [e.g. for making the space pretty] etc. from churches, or other community, volunteer or religious groupings, or individuals in the community)

6.2.1 If yes:

Name of sponsor Nature of contribution

……

…….

……

7 KANGAROO MOTHER CARE SPACE: CONTINUOUS KMC

7.1 Is there a ward or special area in another ward allocated for KMC?

Yes……No…… If No, go to question 8

7.7.1 If Yes, what nature of the space is available?

Separate ward unit……..

Space/Corner inn another ward……

Other (Specify)…….

7.2 Number of KMC beds……

7.3 Number of mother-baby pairs enrolled for KMC at the moment (i.e. how many KMC beds occupied?)…….

7.4 Number of mothers having babies in KMC position at time of walk-through……..

(*Must have been observed in person*)

7.5 *If there is no mother or baby in KMC, ask for records of the last baby that went through KMC*

Records could be provided—Yes…….No……..

7.5.1 If Yes, is there any evidence of KMC 65ractice65 in records?
Yes…….No……..

7.5.1.1 If Yes,
what?.....

……

7.6 Are there any cribs removed in the KMC space/ward? Yes……No……..

7.7 How are babies tied in KMC position? (Mark as many as applicable)

Local cloth (e.g. Kanga/Leso)……..

Special triangle and blouse……..

Draw sheets……

Towels……

Other (specify)……

7.8 Which of the following equipment or facilities are available in the KMC space?

Low beds…….

Head rests or pillows for mothers to lean against……

Chairs (comfortable)…….

Other (specify)…….

7.9 For how many hours per day are the babies in the KMC position?.....hours

7.9.1 When are babies not in the KMC position?.....

……....

……

7.10 Who decides when a baby is ready to go to (intermittent or continuous) KMC?

(Let informant talk first before ticking or probing) (Mark as applicable)

Routine for mother-baby dyads……

Clinicians (clinical or medical officers)……

Nurses……

Patient attendants……..

Mother's request……..

Other (specify)……..

7.11 Which mothers or babies are excluded from going to KMC before discharge?

Mark as many as applicable; specify further as needed) (Let informant/s first talk freely)

None……

HIV+ mothers…….

Mothers with another infectious disease…….

Babies born outside the facility/before arrival…….

Babies below a certain weight (specify)……..

Babies above a certain weight (specify)……..

Other (specify)……

7.12 What is the policy on the movement of mothers *with their babies in KMC position*? (E.g. Do they walk around? Are they allowed to leave the ward? Where are they allowed to go under what conditions? When do they leave their babies behind and when not?)

……..

……..

……..

……..

8 NEONATAL UNIT OR NURSERY: INTERMITTENT KMC

If there is no nursery or no KMC 67ractice67 in the facility, go to Question 9

8.1 Is intermittent KMC 67ractice67 in the new born unit?

Yes……No…….Sometimes……..If No, go to question 9

8.2 If Yes, or Sometimes, describe when (i.e. criteria for eligibility)……..

……

……

8.3 If Yes

8.3.1 Are there fixed times of the day that mothers 67ractice intermittent KMC?

Yes…….No……Sometime…….Unsure……
…

8.3.1.1 If Yes or sometime, please describe……

……

……..

8..3.2 Is there a written programme available for the times when KMC is supposed to be 68ractice68?

Yes……No…….Unsure……
……

(If Yes, get a copy)

8.3.3Are the times/occasions when it is recorded somewhere when a baby gets intermittent KMC?
Yes…….No…….Unsure……..

8.3.3.1 If Yes,
describe:……..

…….

…….

8.4 Number of babies currently in the new born unit……..

8.5 Number of babies doing intermittent KMC……...

Observed……Number……..

Verified from records……Number……

Verified from mothers……..Specify……

8.6 If there is no baby in KMC, request the records of the last baby that received KMC

Records could be provided Yes…….No……

8.6.1 If Yes, is there any evidence of KMC 68ractice68 in records?
Yes…….No……..

8.6.1.1 If Yes,
what?.....

……..

8.7 When is a baby eligible to start with intermittent KMC? (What criteria do you use to decide if a baby can start intermittent KMC?)……..

……..

……..

8.8 Who decides when a baby is ready to start with intermittent KMC? *(Let informant/s talk first and make notes before ticking or probing) (Mark as many as applicable)*

Clinicians (clinical or medical officers)……

Nurses……

Others (specify)…….

8.9 Where do mothers sit while practicing KMC…….....

……

……

9 FEEDING AND WEIGHT MONITORING

9.1 Is there a place near or at the hospital where the mothers where mothers can stay/lodge while their babies are in the new born unit (before they start with KMC)?

Yes…….……..No……..Unsure……Not applicable……..

If No or Unsure, go to Question 9.1.2

If Not applicable, go to Question 9.2

9.1.1 If Yes

9.1.1.1 Describe where the mothers stay……...

……

……

9.1.1.2 How far is the place from the new born unit/nursery?.....

……

9.1.1.3 Is it possible for mothers to come for *all* feeding sessions at night?

Yes……..No…….Unsure……..

9.1.2 What happens if a mother cannot come for all the feeds?.....

……
……

9.2 Is there a *written* feeding policy or protocol for babies in the neonatal ward/nursery and in the KMC space? (*Get a copy to take along or take a picture*)

Yes…….No……..Unsure…….

9.2.1 If Yes, could a copy be provided?
Yes……No……

9.3 Are there job aids for feeding in the new born unit/nursery and in the KMC space? (Get a copy or take a picture)

Yes……..No……Unsure……..

9.3.1 If Yes, where is/are this/these aid/s kept? (*Mark as many as applicable; comment further as needed)*

In a cupboard…….

In a file at the nurses' station……

Displayed on the wall……..

Other (specify)…….....

9.4 Feeding records: *(Request to see the records for babies)*

9.4.1 Are there regular recordings of each feed for each baby?

Yes……..No…….Unsure……..

9.4.2 If Yes, what is recorded for each feed? *(Mark as many as applicable)*

Time of the Feed……..

Volume of the feed (if expressed breast milk and/or formula is used)…….

Nurse's notes…….

Clinician's notes (medical or clinical officers)……..

Other (specify)…….

…….

9.5 Records of weight

9.5.1 Are all babies weighed regularly? Yes……No……..Unsure…….

If No, or unsure, go to Question 9.6

9.5.2 If Yes:

9.5.2.1 How often are they weighed?

More than once every day…….

Once every day…….

Every two days……

Twice per week……..

Once per week…….

Other specify…….

9.5.2.2 How and where is weight recorded? (Observe and let informant/s first talk freely before probing below)

Special weight book……..

Ward register…….

Other specify……

9.6 Scale

9.6.1 Type of scale:

Manual……..Brand name……

Electronic……Brand name……

Other……..Specify……

9.6.2 Increments:

5grams……..50grams……

10grams……..100grams……

20grams……...Other (specify)…….

10 RECORDS IN USE FOR KMC INFORMATION

10.1 What kinds of general records are being used for recording KMC information?

(*Mark as many as applicable)(If it is not standardized record, attach copies or pictures of forms or a few pages of a register/book, with names crossed out*)

Official register provided by the Ministry/Health Directorate……..

Special KMC register or collective record kept for all babies who receive(d) KMC…….

Discharge scoring sheet…….

KMC daily notes……..

Other special form for every single KMC baby e.g. as part of file)……

Discharge letter *with information on KMC*……

Road to health chart/booklet *with information on KMC*……..

Other (specify)……..

10.2 Can figures be provided on how many babies received *intermittent* KMC in a particular period?

Yes……..No……Unsure……..Not applicable……..

If No or Unsure or Not applicable, go to Question 10.3

10.2.1.If Yes:

10.2.1.1 Can it be calculated, how many hours per day a baby received intermittent KMC?
Yes……No…….Unsure……
…

10.2.1.2 Can it be calculated, for how many days a baby received intermittent KMC?

Yes……No…….Unsure……

10.2.1.3 Can a baby's daily weight gain while receiving intermittent KMC be calculated?

Yes……No……..Unsure……
…

10.2.2 *Note for monitors: Look very carefully at any statistics and see if you can find any anomalies (e.g. no or fewer babies in KMC some months, evidence of poor record keeping, etc). Discuss your observations with the informant/s and try to find reasons for any anomalies*

……..

……
…..
.....

10.3 Can figure be provided on how many babies received *continuous* KMC in a particular period?

Yes……No…….Unsure…….Not applicable…….

If No or Unsure or Not applicable, go to Question 10.4

10.3.1 If Yes:

10.3.1.1 Can it be calculated, for how days a baby received continuous KMC ?

Yes……..No……Unsure……..

10.3.1.2 Can a baby's daily weight gain while receiving continuous KMC be calculated?

Yes…….….No…….Unsure……

10.3.2 Note for monitors: Look very carefully at any statistics and see if you can find any anomalies (e.g. no or fewer babies in KMC some months, evidence of poor record keeping, etc). Discuss your observations with the informant/s and try to find the reasons for any anomalies.

10.4 Can audit figures or statistics for at least one year be provided containing evidence of sustained KMC practice? *(E.g. how many babies went through KMC, how many babies in each LBW category, average/mean birth weight, average/mean discharge weight, average/mean number of days babies spent in hospital, survival rate [number and percentage])*

10.4.1 For intermittent KMC Yes…….No…….N/A…….

10.4.2 For continuous KMC Yes……..No……..N/A……..

10.4.3 Only KMC in general Yes…….No……...N/A……...

10.5 Are there any statistics on KMC displayed somewhere (e.g. on the wall)?

Yes……..No…….Unsure……..

10.6 Are there official channels through which KMC is reported to different levels of management on regular basis?

Yes……No……Unsure……..

10.6.1 If Yes, elaborate

……
……
……..

11 KMC EDUCATION

11.1 Is there a written checklist for all the procedures to go through when a mother and her baby are admitted to the KMC space? Yes……..…..No……Unsure……..

11.1.1 Elaborate

……
……
……

11.2 What written and audiovisual information on KMC is available for mothers?

(*Get copies or pictures of each if it is not standard material provided by the government or the implement ion project*)

Posters……Which posters…….

Brochures/information sheets…….Describe…….....

Video/DVD…….Describe…….

Other……Specify……

11.3 Is verbal education related to intermittent and/or continuous KMC provided to mothers? *(Let informant/s first talk freely, before probing the points below*)

Yes…….No…….Unsure……

11.3.1 If Yes, at what point/when? (*Mark as many as applicable; describe further*)

Antenatal care……..

During transport to hospital…….

Immediately after birth……

While baby is in nursery…….

When mothers and baby are transferred to/start KMC…….

Other (specify)…….

11.4 Is there a daily or weekly educational or recreational programe for mothers in KMC?
Yes……..No……Unsure……

11.4.1 If Yes, describe: (Include a copy if available)……

……

12. DOCUMENTS

12.1 What general documents like a vision and mission are visibly displayed in the hospital?

……

12.2 Are there special vision and mission statements for the neonatal unit/nursery/maternity (under which KMC is 75ractice75)?

Yes……..No……Unsure……..**If No or unsure, go to Question 12.3**

12.2.1 If Yes, do any of those statements mention KMC?

Yes……..No……..Unsure…….

12.2.1.1 If Yes, describe (or include a document or picture as evidence):

…….

……

12.3 Are there any written policies, guidelines or protocols regarding the practice of KMC?

Yes……No….....Unsure……..*If No or Unsure, go to question 13*

12.3.1 If Yes:

12.3.1.1 For what type of KMC are the policies, guidelines or protocols meant?

(Mark as applicable) (Get copies or pictures)

Intermittent KMC……

Continuous KMC…….

Other (specify)…….

12.3.1.2 For which target groups? *(Mark as many as applicable; describe further as needed) (Get copies or pictures)*

General instructions for the ward……

For Nurses…….

For clinicians……

For patient attendants……..

Other (specify)……..

12.3.1.3 Where do these guidelines, policies or protocols come from?

Taken over as is from examples provided during training…….

Taken over as is from other institutions' documents……

Adapted from examples provided during training……

Adapted from other institutions' documents……..

Original policy/protocol/guideline developed locally……..

Other (specify)……

…….

12.3.1.4 Who drafted or adapted the policy, protocol or guidelines? *(Let informant/s talk first before ticking or probing)*

……..

……

One person……

Group of persons……Specify…….

……..

12.3.1.5 Was the draft policy, protocol or guidelines distributed further for comments?

Yes……..No…….Unsure…….

(a) If Yes, to whom?

13. REFERRALS, DISCHARGE AND FOLLOW UP

13.1 Who decides when a baby is ready for discharge?

Clinicians (clinical or medical officers)……

Nurses…….

Patient attendants……

Mother's request……

Other (specify)……

13.2 What criteria are used to decide if a baby is ready to be discharged?

(*Let informant/s first talk freely before probing the points below*)

……
……

Baby has reached certain weight…….Specify……..

Baby gains weight consistently……Specify…….

Mother is willing to continue KMC……..Specify……

Other……Specify…….

……...

13.3 Is a special discharge scoring sheet used to help with discharge decision?

Yes…….No…….Unsure……

13.4 Where are the majority of preterm/LBW/KMC babies followed-up after discharge from hospital?

At the hospital where baby has been born……..Go to Question 12.5

At the hospital nearest to mother's home……Go to Question 12.6

At the nearest community centre/clinic……..Go to Question 12.6

Other……Specify……

Go to Question 12.6

13.5 If babies are followed up at the hospital where they have been born:

13.5.1 Where are they followed up?

In the KMC space/ward……

At the nursery/new born unit…….

At the outpatients department……

Other (specify)……

13.5.2 Are records kept of follow-up visits? (*Take a blank copy or take a picture*)

Yes……..No…….Unsure……

13.5.2.1 If Yes, specify/describe……

……..

13.5.3 Until what weight are they followed up at the hospital? .....

…….

13.5.4 What is the follow-up rate of babies? (What percentage of babies are brought back to the hospital for review?)

…….Not known…….

13.5.5 What measures are in place to ensure that babies are brought back to the hospital for review? .....

……None……

13.6 What measures of communication are in place to inform a health centre of a baby's discharge from hospital? (Specify further if necessary)

None…….

Phone call, fax or email to health centre…….

Phone call, fax or e-mail to district office……..

Referral letter given to the mother or guardian…….

Other (specify)……

13.7 Are home visits done? Yes…….No……Unsure…….....

12.7.1 If Yes, Are all babies visited or only some? All……..Only some……

(a) If Only some, which babies are visited?.....

……

13.7.1.2. Who does home visits? (Describe further where needed)

Community health workers (CHWs)…….

Community-based surveillance volunteers (CBSVs)/ Health surveillance assistance (HSAs)…….

Nurses (Community health, public health)……

Community health officers (CHOs)…….

Other (specify)…….

13.8 Are babies transported to your hospital in the skin-to-skin (KMC) position?

Always…….Sometimes……Seldom……Never……...

13.9 Are babies transported from your facility to another in the skin-to-skin (KMC) position?

Always……Sometimes……Seldom…….Never……

14 STAFF ORIENTATION AND TRAINING

14.1 How many staff were originally trained in KMC *outside* your facility? Don't know...

Total……	Number
Managers (e.g. DMOH, Matron)	……..

Clinicians (clinical or medical officers) …….

Nurses/Midwives ……

Patient attendants ……..

Other (specify e.g. cleaners, volunteers) ……..

14.2 What kind of awareness and educational activities did you have in your facility to introduce KMC to staff members? None……..

……

……

14.3 How many staff members have up to now been fully trained in KMC *inside* your facility? None……..

Total……. **Number**

Managers ……..

Clinicians (clinical or medical officers) ……..

Nurses/Midwives ..……..

Patient attendants …….

Other (specify)……..

……

14.4 Number of staff members trained in KMC who still work with KMC……

14.5 How often do you get new staff in the maternity of neonatal unit?.....

……..

……..

14.6 Is there a special orientation programme for new staff who will work with KMC?

Yes……..No……..Unsure……

14.6.1 If Yes:

14.6.1.1 What is the nature of this orientation? (Describe further as needed)

Oral presentation……..

Written documents to study……

Audiovisuals (e.g. video, CD, DVD)…….

Other (specify)……

14.6.1.2 What evidence is there of this program? (Mark as many as applicable)

Programme outline available in writing……

Notes used in programme available……..

Health workers confirmed training……

Verbally signed in-service or training records……...

Other (specify)…….……

14.7 Is there a long term plan in the hospital or district to get all health workers trained and updated in KMC? Yes……No……..Unsure……..

14.7.1 If Yes, is this plan *written*? Yes……..….No……Unsure……

14.8 Are there plans to link KMC with other initiatives such as Essential Newborn Care or the Baby-friendly Hospital Initiative? Yes……..No……Unsure……..

14.8.1 If Yes, which initiatives?

Initiative	**Link**
…….	……
…….	…….
……	…….

14.9 Do students do practical work in maternity or neonatal unit?

Yes……Some……..……..No…….Unsure……

14.9.1 If Yes or Some:

14.9.1.1 Which students?

Nursing……

Medical……

Nutrition..……..

Other (Specify)…….

14.9.1.2 Are any of them trained in KMC?

Yes…….Sometimes…….No……..Unsure……..

(a) If Yes or Sometimes, how systematic is the training? Is there a specific programme or are they only trained on the job?
Systematic (specify)……
Apprenticeship/On the job……..
Other (specify)……
(*Ask to see a written copy of a programme if it exists. Take a copy or a picture*)

15 STAFF ROTATIONS

15.1 Which nurses rotate between day and night shifts in the maternity or neonatal unit?

All……..Some……..None…….

15.1.1 If Some, who does not do day/night shift?.....

15.2 Are staff members rotated between different wards in the hospital? (e.g. between maternity, surgery, male ward, female ward etc)?

Yes…….No……Unsure…….

15.2.1 If Yes,

14.2.1.1 Are all or only some of the staff members rotated?
All……..Some……

15.2.1.2 Which of the following cadres are rotated

Manager (nursing etc)…….

Clinicians (clinical or medical officers)……..

Nurses……

Patient attendants……..

Other (specify)…….

15.2.1.3 Is there a core of staff in the neonatal unit or maternity ward where KMC is practiced that is not rotated to other wards?

Yes…….No…….Unsure……

(a) If Yes, describe…….....
……
14.2.1.4 How often do rotations take place?
Every month……
Every 3 month…….
Every 6 months……
Every year……
Other (specify)…….

16 STRENGTHS AND WEAKNESS

16.1 What do you think are the strengths in your facility that facilitated implementation (made implementation easier)?

……
……
……..

16.2 What are/were the barriers/obstacles to the implementation of KMC?

……
……
……
……

17 QUESTIONS TO ASK MOTHERS

17.1 *(Verbal education related to intermittent and/or continuous KMC*) Did you get any education on KMC at any time?

Yes……No……..Unsure……

17.1.1 If Yes

17.1.1.1 Who gave you the education? (*Let mothers talk freely, before probing the points below)*……
……..

Nurse……..

Doctor…….

Patient attendant……..

Nutritionist……

Other (specify)……...

17.1.1.2 When did you get the KMC education? (*Let mothers first talk freely, before probing the points*
below)……

……

(*Mark as many as applicable: describe further as needed)*

Antenatal care……..

During transport to hospital……..

Immediately after birth…….

While baby was in nursery……

When mother and baby were transferred to/started KMC ……

Other (specify)……

17.1.1.3 What did the nurse/patient attendant/nutritionist/clinician tell you about KMC?

……

……..

……..

17.2 Was your baby born inside or outside the hospital? Inside……...Outside……..

16.2.1 If the baby was born outside the hospital: How did you or the guardian hold your baby when the baby was being transported to hospital? (*Let mothers first talk freely and demonstrate, before probing the point below)*……..

……

Put in a special incubator……..

Swaddled and held in horizontal position……

Skin-to-skin-to-skin the KMC (upright) position……

Other (specify)……

18 GENERAL OBSERVATIONS AND IMPRESSIONS

18.1 Impressions regarding the intensity of involvement of senior management (Medical superintendent, DMOH, Nursing officer in-charge/Matron) in establishing KMC (past and future)

A lot of involvement and/or support (moral, material etc.)……..

Some involvement and/or support (moral, material etc.)……..

Neutrality/Little support/Resistance……

18.1.1 Comments:
…….

…….

…….

18.2 Impressions of mothers' compliance with KMC? (I.e. do they always 85ractice it or not?)

Mothers are diligent in carrying their babies in the KMC position……..

Mothers carry their babies in KMC position some of the time…….

Very little of KMC actually practiced by the mothers…….

18.2.1 Comments:
……..

……..

……

18.3 Impressions on the quality of data captured in records

Excellent…….

Average (only minimum requirements)……

Poor……

18.3.1 Comments:

…….

……

……

18.4 Impressions regarding the quality of follow up system

Well developed (written proof could be supplied)……

Partly developed (no written proof but strong evidence of a well-organized system)……

Non-existent……..

18.4.1 Comments:

……

…….

…….

18.5 Other comments and observations (e.g. observe well-being of mothers during KMC, fixing baby, homeliness of space/ward etc.)……

……

……

18.6 Comments for hospital *(Use this as basis for giving immediate feedback to hospital either verbally or on separate sheet*)

18.6.1 GENERAL IMPRESSION OF MONITOR/ASSESOR

(*Organize your comments around the following headings: General KMC practice [including feeding]; Documentation and Protocols; Involvement of management [different levels*])

……

……

……..

……..

…….

……

……

……

18.6.2 RECOMMENDATIONS FOR CONSIDERATION

(*Organise your comments around the following headings: General KMC 87ractice [including feeding]; Documentation and Protocols; Involvement of management [different levels])*

……..

……

……

……..

……

……

……

……..

18.7 Ideas for Policy makers and health authorities

……

……

……
……
……
……

……. …….

NAME OF THE MONITOR/ASSESOR Signature

……

Date

Appendix 9: Data collection Tool

Serial Number……

Characteristic	**Entry**
Gender : Male	
Female	
Birth weight	
<1000g	
100-1499g	
1500-1999g	
>2000g	
Morbidity- Tick	
Respiratory distress syndrome	
Neonatal sepsis	
Anemia	
Neonatal jaundice	
Apnoea	
Other- specify	
NEC	
Outcomes of care	

Alive

Received KMC (Yes or No)

Duration of stay

Less than 7 days

7-21 days

>21 days

Appendix 10: Clinical Services Review and Supervision: QoC Supplement: Neonatal Structure Tool

Date

Name of Hospital

Hospital code

Level

Name of Hospital Medical Superintendent

- **Mobile**
- **Email**

Name of Nursing Officer I/C

QoC Evaluator

County

SECTIONS

2. Neonatal information and statistics
2. Layout and admission policy
2. Neonatal ward facilities
2. Essential drugs and equipment

2. NEONATAL INFORMATION AND STATISTICS

2.3 NEONATAL WARD STATISTICS

Admission by weight	
a) Is there a summary of admissions by weight category? If yes proceed to b	Y ☐ N ☐
b) Weight categories	Admissions (Jan 2022- March 2022)
• <1000gms	
• 1000- <1500	
• 1500-<2500	
• >2500	
Total, all weight groups	

1. NEONATAL INFORMATION AND STATISTICS

1.2 NEONATAL WARD STATISTICS

Admissions by diagnosis	
a) Is there a summary of admissions by diagnosis? If yes proceed to b	Y ☐ N ☐
b) Diagnosis	Admissions (Jan 2022 –March 2022)
• Neonatal sepsis	
• Birth asphyxia	
• Low birth weight	
• Congenital malformations	
• Others	
Total	

2. NEONATAL INFORMATION AND STATISTICS

1.2 NEONATAL WARD STATISTICS

Mortality by diagnosis

a) Is there a summary of mortality by diagnosis? If yes proceed to b	Y ☐ N ☐
b) Diagnosis	Mortality (Jan 2022-March 2022)
• Neonatal sepsis	
• Birth asphyxia	
• Low birth weight	
• Congenital malformations	
• Others	
Total	

Mortality by age	
a) Is there a summary of mortality by age? If yes proceed to b	Y ☐ N ☐
b) Age at time of death	Mortality (Jan 2022- March 2022)
• 1-≤7 days (early neonatal deaths)	
• >7- ≤28 days (late neonatal deaths)	
Total	

2. NEONATAL INFORMATION AND STATISTICS

1.2 NEONATAL WARD STATISTICS

Mortality by length of stay	
a) Is there a summary of mortality by length of stay? If yes proceed to b	Y ☐ N ☐
b) Length of stay	Mortality (Jan 2022- March 2022)
• ≤24 hrs	
• >24 hrs	
Total	

2. LAYOUT OF NEONATAL WARD

This section is based on observation by the supervisor rather than interviewing health worker

2.1	**ORGANIZATION OF INPATIENT NEONATAL SERVICES**	
	Where are sick newborns cared for?	In postnatal ward ☐ In paediatric ward ☐ In a separate ward ☐ (NBU/Nursery)

		Nursery	**Paediatric Ward**
	Number of neonates (until midnight preceding the morning of the survey)		
	Number of rooms specifically for newborns		
	Number of cots		
	Number of patients in cots		
	Cots are clean	Y ☐ N ☐	Y ☐ N ☐
	Are babies sharing cots at time of visit?	Y ☐ N ☐	Y ☐ N ☐
	Number of incubators		
	Number of working incubators		
	Number of patients in incubators		
	Incubators are cleaned daily	Y ☐ N ☐	Y ☐ N ☐
	Incubators are clean	Y ☐ N ☐	Y ☐ N ☐

2. LAYOUT OF NEONATAL WARD

2.1	**ORGANIZATION OF INPATIENT NEONATAL SERVICES**

		Nursery	Paediatric Ward
	Are babies sharing incubators at time of visit	Y ☐ N ☐	Y ☐ N ☐
	Newborns have clean linen on the day of assessment	Y ☐ N ☐	Y ☐ N ☐
	The most seriously ill infants are cared for in a section near the nursing station for direct observation	Y ☐ N ☐	Y ☐ N ☐
	Can all the neonates who need it be kept warm?	Y ☐ N ☐	Y ☐ N ☐
	Newborns have own IP number	Y ☐ N ☐	Y ☐ N ☐
	Newborns have own medical record	Y ☐ N ☐	Y ☐ N ☐

2. LAYOUT OF NEONATAL WARD

2.2	**NURSERY ADMISSION POLICY (complete only if facility has a nursery/newborn unit)**	
	2.3 Outborn	

	2) Weight limit (gms)……	No limit ☐
	b) Age limit (days)……..	No limit ☐
	c) Are outborn babies isolated in nursery?	Y ☐ N ☐
	d) How are they isolated? (tick all that apply)	Separate cots ☐ Separate incubators ☐ Separate room ☐
	2.3 Inborn	
	2) Weight limit (gms)…….	No limit ☐
2.3	**PITC REGISTER**	

3. NEONATAL WARD FACILITIES

3.1	**PHOTOTHERAPY**	**Nursery**	**Paed. Ward**

	a) Is there a phototherapy unit?	Y ☐ N ☐	Y ☐ N ☐
	b) Is it working?	Y ☐ N ☐	Y ☐ N ☐
	c) How many tubes of the following colours	White..... Blue..... Green..... Other.....	
	d) Is there a record of when each tube was installed?	Y ☐ N ☐	

3. NEONATAL WARD FACILITIES

3.2 HYGIENE AND ACCIDENT PREVENTION		
Is there in the newborn unit (for handwashing);		**Comment and observations:**

	a) A sink ? number if Y ……	Y ☐ N ☐	
	b) Clean running water?	Y ☐ N ☐	
	c) Soap?	Y ☐ N ☐	
	d) A wall chart on hand washing instructions above each sink?	Y ☐ N ☐	
	e) Alcohol hand rub/ sanitizer available in service area?	Y ☐ N ☐	
	f) A wall chart on alcohol hand rub/sanitizer instructions	Y ☐ N ☐	
	Are rapid test kits for PITC available?	Y ☐ N ☐	
	What is used for cleaning potentially infected biological spills?	Dilute jik ☐ Disinfectant ☐ Soap+ water ☐ Other ☐	
	There is a clinical refuse waste bin correctly used	Y ☐ N ☐	

	There is a non-clinical refuse waste bin correctly used	Y ☐ N ☐	
	Are sharps disposed in safety boxes?	Y ☐ N ☐	
	There are boxes with sharps above the marked level	Y ☐ N ☐	

3. NEONATAL WARD FACILITIES

3.3 EMERGENCY CARE FOR NEWBORNS					
		Nursery	**Paediatric ward**	**Maternity**	**Theatre**
	Is there a defined room/space for handling newborn/infant emergencies with a suitable couch or bed?	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Is there a source of heat in this defined room/space for handling emergencies	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Is there an updated checklist of resuscitation equipment?	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	2 towels in delivery pack for newborn			Y ☐ N ☐	Y ☐ N ☐
	Sterile cord clamp			Y ☐ N ☐	Y ☐ N ☐
	Identity label			Y ☐ N ☐	Y ☐ N ☐

	Bag valve mask device-suitable for ALL of term/preterm/infant	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	b) Is the bag valve mask device working?	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Complete suction equipment	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	b) Is the suction equipment working?	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Oxygen (any source, working)	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Pulse oximeter (working)	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Working wall clock visible from emergency area	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐

3. NEONATAL WARD FACILITIES

3.4 EMERGENCY CARE FOR NEWBORNS cont...

		Nursery	**Paediatric ward**	**Maternity**	**Theatre**
	N/saline or Ringers	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Paediatric cannulae/Scalp vein sets*(all ,22 and 24G)*	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	I.V fluid giving sets	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	NGT tubes-suitable for ages (*all 8 and 10FG*)	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Needles *(21,22 and 24G)*	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Syringes (at least 2 of 1, 2 ,5 and 10mls)	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
	Exchange transfusion set/pack	Y ☐ N ☐	Y ☐ N ☐		
	Paediatric burrette	Y ☐ N ☐	Y ☐ N ☐		
	Blood transfusion giving set	Y ☐ N ☐	Y ☐ N ☐		

	3 way catheter for exchange transfusion	Y ☐ N ☐	Y ☐ N ☐		

3. NEONATAL WARD FACILITIES

3.5 KANGAROO MOTHER CARE

	Is Kangaroo Mother Care (KMC) offered routinely to low birth weight infants? (if Y proceed with a to f)	Y ☐ N ☐
	a) Is there a separate KMC room?	Y ☐ N ☐
	b) How many beds in the KMC room?	
	c) How many chairs for mothers practicing KMC?	Y ☐ N ☐
	d) Is there a written guideline on KMC?	Y ☐ N ☐
	e) Are there flow sheets for documenting KMC?	Y ☐ N ☐
	f) Is there a wall chart on KMC?	Y ☐ N ☐

3. NEONATAL WARD FACILITIES

3.6 JOB AIDES

	WALL CHARTS	**Nursery**	**Paed ward**
1	Newborn feeding	Y ☐ N ☐	Y ☐ N ☐
2	Newborn resuscitation (from Basic Paed. Protocol, Helping babies breathe or any other Ministry of medical services guideline)	Y ☐ N ☐	Y ☐ N ☐
3	Infant resuscitation (Basic Paed Protocol or any other Ministry of medical services guideline)	Y ☐ N ☐	Y ☐ N ☐
4	PMTCT (national)	Y ☐ N ☐	Y ☐ N ☐
5	Dosage Guidelines (from Basic paed. protocol)	Y ☐ N ☐	Y ☐ N ☐
6	Management of jaundice (from Basic paed. protocol)	Y ☐ N ☐	Y ☐ N ☐
7	Estimation of gestational age	Y ☐ N ☐	Y ☐ N ☐
8	Thermo neutral range incubator temperature settings	Y ☐ N ☐	Y ☐ N ☐
9	Pulse oximetry	Y ☐ N ☐	Y ☐ N ☐
10	Guidelines for decontamination of feeding utensils	Y ☐ N ☐	Y ☐ N ☐

3. NEONATAL WARD FACILITIES

3.6 JOB AIDES				
	GUIDELINES	**Nursery**	**Maternity**	**Paed ward**
1	Newborn Resuscitation	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
2	Infant resuscitation (Basic Paed. Protocol or any other Ministry of medical services guideline)	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
3	PMTCT (national)	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
4	Basic paediatric protocol	Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐

4. ESSENTIAL DRUGS, NON-PHARMACEUTICALS AND EQUIPMENT (check for availability on day of survey)

4.1. DRUGS		
	Nursery	Paed ward
Vitamin K	Y ☐ N ☐	Y ☐ N ☐
1% TEO	Y ☐ N ☐	Y ☐ N ☐
Nevirapine solution	Y ☐ N ☐	Y ☐ N ☐
Benzyl Penicillin	Y ☐ N ☐	Y ☐ N ☐
Gentamicin	Y ☐ N ☐	Y ☐ N ☐
Ampicillin /Cloxacillin(injection)	Y ☐ N ☐	Y ☐ N ☐
Metronidazole(injection)	Y ☐ N ☐	Y ☐ N ☐
Oral Amoxicillin	Y ☐ N ☐	Y ☐ N ☐
Oral Ampicillin /Cloxacillin	Y ☐ N ☐	Y ☐ N ☐
Phenobarbitone (injection)	Y ☐ N ☐	Y ☐ N ☐
Phenytoin (injection)	Y ☐ N ☐	Y ☐ N ☐

Ceftriaxone	Y ☐ N ☐	Y ☐ N ☐
Cefotaxime	Y ☐ N ☐	Y ☐ N ☐
Ferrous Fumarate Suspension	Y ☐ N ☐	Y ☐ N ☐
Folate tablets	Y ☐ N ☐	Y ☐ N ☐
Multivitamin syrup	Y ☐ N ☐	Y ☐ N ☐
Amikacin	Y ☐ N ☐	Y ☐ N ☐

4. ESSENTIAL DRUGS, NON-PHARMACEUTICALS AND EQUIPMENT (check for availability on day of survey)

4.2. I.V FLUIDS	Nursery	Paed w
Glucose 10%	Y ☐ N ☐	Y ☐
Normal saline IV	Y ☐ N ☐	Y ☐
Ringer's lactate IV	Y ☐ N ☐	Y ☐
Half Strength Darrows with five percent dextrose	Y ☐ N ☐	Y ☐
Plain Half Strength Darrows	Y ☐ N ☐	Y ☐
Other		

4.3 ALTERNATIVE FEEDS	Nursery	Paed w
Term formula	Y ☐ N ☐	Y ☐
Preterm formula	Y ☐ N ☐	Y ☐

4. ESSENTIAL DRUGS, NON-PHARMACEUTICALS AND EQUIPMENT (check for availability on day of survey)

4.4. EQUIPMENT	**Nursery**	**Paed ward**
All babies are in an adequately warmed area	Y ☐ N ☐	Y ☐ N ☐
Working wall thermometer	Y ☐ N ☐	Y ☐ N ☐
Working normal thermometer	Y ☐ N ☐	Y ☐ N ☐
Working low reading thermometer (can read below 35 Celsius)	Y ☐ N ☐	Y ☐ N ☐
How is oxygen from a single source distributed to more than one patient?	Y ☐ N ☐	Y ☐ N ☐
1. IV fluid bottle and giving sets (“octopus”)	Y ☐ N ☐	Y ☐ N ☐
2. 3 way adapter	Y ☐ N ☐	Y ☐ N ☐
3. 4 way adapter	Y ☐ N ☐	Y ☐ N ☐
4. Other (specify)	Y ☐ N ☐	Y ☐ N ☐
o Low reading flow meter	Y ☐ N ☐	Y ☐ N ☐

Examination/ Procedure light	Y ☐ N ☐	Y ☐ N ☐
Working Pulse Oximeter	Y ☐ N ☐	Y ☐ N ☐
Digital Weighing scale	Y ☐ N ☐	Y ☐ N ☐
	Y ☐ N ☐	Y ☐ N ☐