

# **An Assessment of the Practice of Kangaroo Mother Care Among Staff in the Specialised Neonatal Intensive Care Unit at Orotta Paediatric Hospital, Asmara, Eritrea**

**Elsa Semere Araya<sup>\*</sup>, Jawaya Shea, Nils Bergman**

School of Child and Adolescent's Health, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa

## **Email address:**

elsar\_semere@yahoo.com (E. S. Araya), jawaya.shea@uct.ac.za (J. Shea), nils@kangaroomothercare.com (N. Bergman)

<sup>\*</sup>Corresponding author

## **To cite this article:**

Elsa Semere Araya, Jawaya Shea, Nils Bergman. An Assessment of the Practice of Kangaroo Mother Care Among Staff in the Specialised Neonatal Intensive Care Unit at Orotta Paediatric Hospital, Asmara, Eritrea. *American Journal of Nursing Science*.

Vol. 11, No. 1, 2022, pp. 6-19. doi: 10.11648/j.ajns.20221101.12

**Received:** December 5, 2021; **Accepted:** January 7, 2022; **Published:** January 15, 2022

---

**Abstract:** Preterm delivery remains the major cause of newborn infants' morbidity and mortality globally and more so in low-income countries like Eritrea. Research has shown that the provision of Kangaroo mother care can contribute to a reduction in morbidity and mortality among newborn infants. However, there is limited research on the practice of KMC in Eritrea. A mixed methods approach was adopted in a phenomenographic study to collect the data. Eleven participants with work experience of at least two years were recruited from the Specialised Neonatal Intensive Care Unit at Orotta Paediatric Hospital, Asmara, Eritrea. Data were collected via individual interviews and observations. The results showed that participants had no prior KMC training and education. In addition, staff had limited knowledge and mixed attitudes about KMC practice. There were also no KMC guidelines and protocols. Furthermore, space was not adequate for full KMC practice except for implementation of the kangaroo position. The researcher's observation confirmed similar evidence of a lack of availability of a KMC ward and lack of protocols and guidelines. Limited interaction and communication about KMC between participants and parents was also observed. Some of the most common hindrances to KMC practice were the perception that KMC increased staff work load and that it was time consuming. In addition, lack of regular KMC training for staff, lack of a convenient setup and too few staff members were among the hindrances. One staff members also perceived that KMC practice was not culturally accepted. The results of this study concluded that there were no proper KMC guidelines and protocols in the ward. In addition, only the kangaroo position was practiced, not the full KMC protocol. Furthermore, staff had limited knowledge and mixed attitudes. The observation component of the research highlighted the lack of space and KMC protocols and guidelines as key limitations for delivering KMC. Therefore, it is recommended that a programme to improve staff knowledge be implemented, that evidence-based KMC guidelines and policies be made available, that the KMC ward be expanded, and that health education about KMC practice be brought to the population through mass media.

**Keywords:** Kangaroo Mother Care (KMC), Skin-to-skin Contact, Kangaroo Care, Neonatal Intensive Care Unit (NICU), Specialised Neonatal Intensive Care Unit (SNICU), Staff (Study Participants)

---

## **1. Introduction**

Kangaroo mother care (KMC) is standardised, an evidence based care for preterm infants and low birth weight infants (LBW) infants based on an immediate skin-to-skin contact between the newborn infant and mother [81]. More than three decades of KMC research conducted in North America, Europe and African countries such as South Africa and

Zimbabwe concluded that KMC is more effective than incubator care for stable newborn infants to maintain appropriate thermal care, decrease nosocomial infections, encourage and improve exclusive breastfeeding and weight gain, and nurture better maternal and family connections [8, 10-12, 16, 18, 24, 25, 39, 49, 57, 81].

A systematic review of KMC conducted by Conde-Agudelo, Belizan and Diaz-Rossello [24] concluded that there was a significant reduction in newborn infant mortality and morbidity in LICs where KMC is practiced. In LBW infants weighing less than 2,000 grams, KMC was found to contribute to improved survival and increased psychosocial and neurodevelopmental effects [2, 7, 16, 81]. As a result, KMC is highly recommended in LICs as it reduces infant mortality and morbidity [4, 24, 25]. It also significantly decreases the risk of mortality in newborn infants born in low resource settings [9, 19]. Thus, all these benefits occur at reduced cost when compared to incubator care [44, 49, 51, 52]. Global implementation of KMC could save the lives of an estimated 450,000 infants annually if the intervention covers 95 percent of preterm newborn infants [78-81].

Prematurity is a major public health concern and preterm birth is the leading cause of childhood death in children under five years of age worldwide [80, 81]. It is estimated that 20 million newborn infants are born premature annually [80]. Of the 20 million preterm births per year, one million (7%) infants die due to complications of prematurity during the neonatal period [6, 81]. The neonatal period is the period from birth to 28 days of life, and the first week of life is the most critical time for the survival of newborn infants [6, 17]. Approximately one fifth of deaths are due to LBW, which accounts for approximately 27 percent of premature deaths globally [6]. LBW is defined as a birth weight under 2,500 grams [21, 81]. Preterm and LBW infants who survive during the neonatal period are more likely to experience acute respiratory tract infections, gastrointestinal problems, immunologic problems, central nervous system problems, and hearing and vision difficulties compared to term and normal weight newborn infants [1, 6, 81].

Preterm complications constitute more than 35 percent of newborn infant mortality annually, and it increases the possibility that a newborn infant might die due to infection [11, 43]. The majority of preterm births occurs in developing countries in which (60 percent) happens in Africa and South Asia [78, 81]. It is estimated that 12 percent of infants in low-income countries (LICs) are born too early, compared to nine percent in high-income countries (HICs) [78]. In Eritrea, the preterm birth rate is 12 per 100 [75], and preterm birth complications globally were related to almost one million deaths in children under the age of five years in 2015 [80]. It is believed that approximately three quarters of these deaths could be prevented with current, cost-effective interventions such as KMC [78, 81].

An unpublished Eritrean survey showed that full KMC practice has not been introduced in Eritrea (Zemichael, personal communication 2014, July 10) despite the many benefits of KMC [24-26, 49, 81]. However, a component of KMC called skin-to-skin or the kangaroo position (an intermittent type of KMC), was introduced [83]. Therefore, the study explored the staff experience KMC practices, and the perceived and actual challenges of the practice of KMC experienced among staff working in the SNICU at OPH, in

Asmara, Eritrea. By creating a reflective space in which staff were able to share their understanding, attitudes, and practices of KMC, current challenges and potential facilitating factors for KMC implementation were elicited. This research is based on the belief that by improving continuous KMC practices at the SNICU and in the central zone of the city of Asmara, it is possible to improve the health outcomes of newborn infants, thereby contributing to United Nations Sustainable Development Goals (SDGs) Target 3.2, which is aimed at reducing child mortality by focusing on a reduction in neonatal mortality.

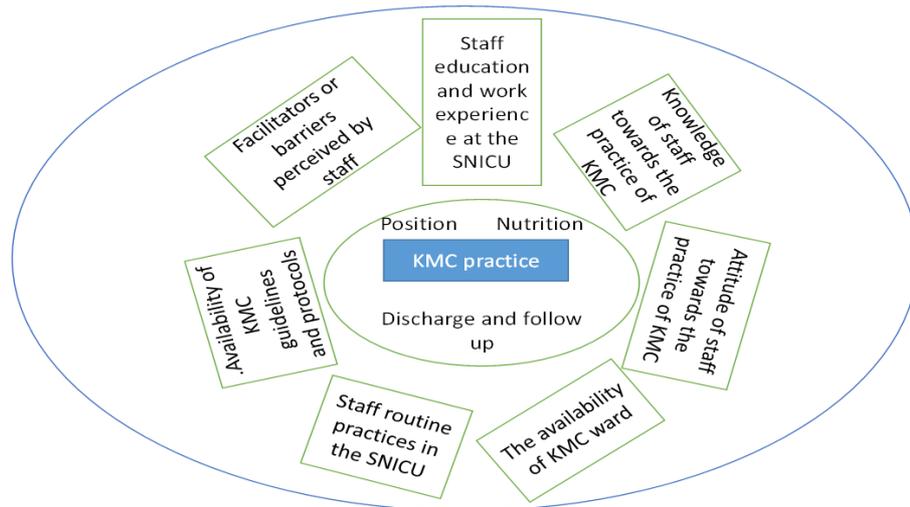
## 2. Methodology

### 2.1. Study Designs

A mixed methods approach was adopted in a phenomenographic study to collect information and perceptions of staff. The researcher is interested in exploring, from the perspective of staff delivering care to newborn infants, what they understand about the parts that constitute KMC, and how the practice of KMC relates to delivering care to newborn infants and their mothers, or the family in the SNICU at OPH. KMC has several structural parts and a meaning component. The experience of KMC must be discerned from the context the SNICU at OPH. As explained by Marton and Booth [47] the structural aspect of experiencing KMC is twofold, meaning discernment from the whole (practice of KMC) from the context (SNICU), and discernment of the parts and their relationship to the whole (newborn care). The referential aspect of experience in this study relates to what KMC practice means to staff who participated in the study [41]. Marton and Booth's perspective, applied to this study, relates to which constituent parts are discerned and appears in the staff member's focal awareness [47]. Individual experiences of KMC in the context of delivering care to newborns in the SNICU at depend on which critical aspects are brought into focal attention [41].

The theoretical framework phenomenography suggested by Marton [46], was used as a guide in recognising the themes from the qualitative interviews [55]. The aim of the phenomenographic approach is to recognize the phenomena as they are perceived by the participants [55].

Marton [46] emphasised that this framework could help "to answer questions about thinking and learning, particularly for educational research" [55]. Figure 1 depicts a model of the conceptual framework related to the factors that impact the practices of KMC. This included staff educational background and work experience, staff routine practices in the SNICU, staff knowledge about the practice of KMC, attitudes of staff towards KMC practice, availability of KMC guidelines and protocols, and availability wards in the unit dedicated to KMC [5, 8, 9, 15]. In addition, it included the facilitators, and barriers perceived by staff to the practice of KMC [9] and [14, 40].



**Figure 1.** Theoretical framework (the factors that impact KMC practice and facilitators and barriers perceived by staff).

## 2.2. Study Participants and Setting

The study population comprises of staff who had worked for more than two years in the SNICU at OPH in Asmara, Eritrea. It is located in Asmara with in Orotta National Maternity Referral Hospital in which it is far away from the other paediatric units in OPH [61]. Their recruitment was based on their work experience plus KMC knowledge [17]. Eleven of the staff that includes one physician, one registered nurse and nine health assistant participated in the study. They were capable of communicating in both English and Tigrigna, in which both the investigators are totally conversant with. The majority of them were health assistants who were assisting mothers to provide routine nursing care in an intermittent kangaroo position.

## 2.3. Ethics Approval and Consent to Participate

The research was approved by the Eritrean Ministry of Health (reference number: 62/4225/2014) and Human Research Ethics Committee, Faculty of Health Sciences the University of Cape Town (reference number: 345/2015). An informed consent was obtained from the participants before the in-depth interviews. Anonymous participant's identifiers were also used to protect the privacy and confidentiality of participants in the data analysis.

## 2.4. Data Analysis

For the observation section, the researcher used a combination of field notes and checklists to record the observation. These staff were compared and contrasted based on the low or high observations score they had. In addition, the scores were compared to the participants prior KMC training and work experience in the SNICU. The researcher followed four steps of qualitative data analysis. Firstly, identifying of the broad themes occurred. The second stage was focused on making comparisons and expanding the emerging thematic. Thirdly, categories were refined and the researcher searched for relations within the data. The fourth stage involved

theorising about the insights gained and understanding the meaning of KMC practice from the perspective of study participants and the context in which it was practiced [35]. The discussion involved expanding the themes in relation to other experiences of KMC practice [27, 73].

With the interview questions as a guide, data was collected using digital recordings and these were transcribed and translated into English. Participants were provided with an opportunity to share experiences in their own words regarding their understanding of the practice of KMC, especially skin-to-skin contact from the time of the newborn infant's admission to SNICU to their discharge.

Data analysis included thorough examination, scrutiny of recording content and analysis of each specific transcript of the 11 staff members who participated. A course of repetitive listening to interviewed recordings and reading of the transcribed interview data was commenced line by line. Then repetitive reading and marking were done where the participants gave responses to the three main questions such as KMC, presence and absence of KMC guidelines and KMC ward. In these passages aspect for what the focus of the staff attention was and how they described their way of KMC practice in the SNICU. An initial description of each participant principal way of understanding the KMC position in the SNICU followed. After that grouping was done based on their similarities and differences. Then formulation of categories of explanation occurred while looking for non-dominant ways of understanding. Finally, discovery of a structure in the outcome space to each category of description was done.

## 2.5. Trustworthiness and Rigour

Credibility, transferability, dependability and conformability were used to describe characteristics of trustworthiness of the study [65, 73]. In order to improve credibility, the researcher used researcher triangulation in which the researcher and the research assistant in the field collected and interpreted the data.

During the entire analysis process, the researcher and research assistant discussed the results until an agreement was reached; this strengthened the trustworthiness of the results. To improve credibility, the researcher used triangulation in which the researcher and the research assistant both interpreted the data to improve credibility [34]. The participants were staff who have some knowledge of KMC and the researcher reminded the participants on the importance of providing clear, honest responses so that the research question can be fully explored. Participants were reassured that their conversations would not influence their work in any way, and that their identities would be protected at all times through rigorous privacy mechanisms. The researchers also reflected on participant responses to ensure that they understood the information correctly. In addition, transferability was enhanced through participants' providing enough contextual information for others to reach judgements that are as similar as possible to those of the researchers. For dependability, the researcher made the research procedures clear and transparent so that the process was easy to understand and track. Additionally, the researcher kept thorough notes of all research procedures so that it could be understood and traced easily. Comparison of two sets of data revealed no interpretive discrepancies. Furthermore, conformability was assured through note-taking during the observation phase of the participants. Finally, an experienced qualitative data analyst was hired to review the transcribed interview data using ATLAS. TI to increase the rigour.

To assess the reliability of observations part of the study, the researcher used an inter-rater reliability [17, 65] This involved comparing the ratings of the observation done in the NICU, South Africa and the first few observations in the SNICU in Eritrea. In order to improve the validity of the observations, the participants were not aware of that they are being observed and did not behave in a certain way.

### 3. Results

The results includes the observation part of the communication between staff and caregivers regarding the assessed specific needs like post-partum KMC skills checklist and staff routine care observation. In addition, it will include

the results for the semi-structured interviews such as routine staff practice in the SNICU, participants' knowledge of KMC, participants' attitude towards the practice of KMC, KMC guidelines and protocols, availability of a KMC ward in SNICU and factors that facilitate or hinder KMC practice.

#### 3.1. Educational Background, Work Experience and KMC Training of the Staff Participants'

Eleven participants were interviewed and observed, nine for staff whom were health worker assistants with minimum work experience of two years at the SNICU. The other two were a physician and registered nurse. Seven of 11 (64%) of the staff had a working experience of 13 years each and two of 11 (18%) three years' work experience each respectively. In addition, one of 11 (9%) participants had a working experience of three years and one of 11 (9%) participants had two years' work experience. From this group, only three of 11 (27%) members of staff had formal KMC training. The rest of the staff had heard about KMC from their fellow SNICU staff members, mainly from the head nurse.

The table 1 describes participants' general information such as education level, working experience and KMC training at the SNICU. Staff education with level three were considered as medical doctors, level two as diploma nurse and level one as health assistant. Participants' working experience were ranged between two-thirteen years. However, work experience was coded from 0-4 for the participants work experiences. The code four was for participants who have the most work experience, code three participants were with more work experience, code two participants were with an average work experience and code zero for participants with less work experience. Staff KMC training in the SNICU was also coded one (yes) or zero (No). Participants' post-partum KMC Skills checklist and routine care contained 11 lists of questions and each list was scored as zero or one. Then the final score was added and compared to the staff working experience and KMC training that the staff had. Then the 11 questions for the post-partum KMC skills and routine care checklist scores for each participant were added and then they were compared and contrasted to each participant work experience and prior KMC training.

*Table 1. Participants' observation score.*

Participant	Education level	Work experience (years)*	KMC training	Observation score	
				Score out of 11	%
P1	Health assistant	4	No	2	18%
P2	Diploma nurse	4	Yes	11	100%
P3	Health assistant	4	No	3	27%
P4	Health assistant	3	Yes	6	55%
P5	Health assistant	0	No	2	18%
P6	Health assistant	4	No	4	36%
P7	Health assistant	3	No	4	36%
P8	Health assistant	4	No	2	18%
P9	Health assistant	2	No	4	36%
P10	Health assistant	4	No	2	18%
P11	Medical doctor	4	Yes	11	100%
Mean				4.64	42%

The table 1 above describes the participants' observation score. The average mean for the participants was 4.64 (42%). This means that the average number of questions responded by participants was 4.64, this indicates that the observation part of the study had low response rate. Overall, three of 11 (27%) of the participants had higher score for post-partum KMC skills checklist and staff routine care with 100% and 55% respectively. These three participants with the higher score were staff who had prior KMC training. On the other hand, the other four (36%) of the participant with low for post -partum KMC skills and staff routine score (18%) were staff with no prior KMC training.

### **3.2. Communication of Staff and Mothers During the Provision of Specific Needs (Post-partum KMC Skills and Routine Care)**

The interaction between study participants' and mothers focused mostly on providing health education, hygiene, importance of breastfeeding and the required nursing care, depending on the condition of the newborn infant. Therefore, the observation results showed that all (100%) of the participants were able to provide newborn infants the care and assess them for any feeding difficulties. Healthcare providers' communication with parents/mothers happens during their stay in SNICU. Two of 11 (18%) of the participants had conversation and demonstrations about skin to-skin contacts which happens once a week.

The only time participants encouraged mothers to practice regular skin-to-skin contact was whenever there was a power outage, which occurs once in a month in the SNICU. Four of 11 (36%) of the participants were able to do the observation while mothers practice for KMC position. It was also observed that five of 11 (45%) participants know how to position the newborn infant's head during KMC, and three of 11 (27%) of the participants were able to assess the mother for KMC position. In contrast, two of 11 (18%) of the participants were able to wrap the newborn infant's body, demonstrate the importance of baby naked for KMC, practice KMC position correctly, and ask the mother if they had any concerns during the practice of KMC position in comparison to nine of 11 (82%) of the participants who were not able to wrap the newborn infant and practice KMC position correctly.

### **3.3. Results of the Semi-structured Interviews**

#### **3.3.1. Routine Staff Practice in the SNICU**

Routine care in the SNICU included basic aspects of nursing care like monitoring of vital signs, nutrition and warmth as well as more advanced clinical care such as administration of intravenous lines or oxygen, withdrawing blood samples and neonatal resuscitation. Routine care was delivered mainly in caring for preterm newborn infants with complications such as birth asphyxia, hypothermia, neonatal jaundice and respiratory distress syndrome. Participants reported that all mothers should practice KMC as routine care. They also indicated that mothers were made aware that

supporting and preparing mothers to care for their newborn infants is integral to the routine care in the SNICU. All mothers of preterm infants were provided with information about KMC soon after delivery, especially if their newborn infant was preterm. Mothers were made aware of the whole range of care practices for newborn infants as explained by one of the participants:

"We involve mothers through practice by showing them how to clean neonate, how to feed neonate and apply Vaseline. We also provide information about vaccination, return if neonate is sick, breast feeding technique, hygiene (neonatal and maternal) not to practice harmful traditional practice-FGM and uvulectomy. We also inform them to comeback for circumcision if the newborn is male and advise them to exclusively breast feed for 6 months." (p. 10).

#### **3.3.2. Participants' Knowledge of KMC**

All participants explained that they feel that they are delivering KMC when they keep the infants warm. Ten of the eleven participants felt that they were delivering KMC when bonding, love and attachment between the mother and the infant was being promoted, and when mothers were made to feel confident about bonding with, and feeding the newborn infant. A participant expressed as follows:

"KMC prevents hypothermia, reduces unnecessary expenses, bonding with the infant, confidence for mothers, and facilitates breast milk production." (p. 2).

It is important for staff to be aware of KMC position for effective KMC practice. All participants considered the KMC position to be significant; most of the participants understood kangaroo position as placing the infant in a skin-to-skin, upright position between the breasts, with the infant's head turned to one side. A few of the participants were concerned about the KMC position as illustrated in the quotations below:

"The infant should be placed horizontally like breastfeeding." (p. 3).

"The infant should be placed for KMC with his own clothes." (p. 8).

The perception and experience of KMC shared by all participants was that the type of KMC practiced in the SNICU is an intermittent type of KMC care. Beliefs about how KMC should be practiced varied between the 11 participants: two felt that it should be practised continuously and two said daily while others stated that it should be provided during electrical power outages. The two participants who supported continuous KMC practice were with more working experience who had received training and workshops on KMC in Zimbabwe and Eritrea. The other two of the participants thought that KMC should be provided every three hours. However, three other participants stated that KMC should be provided when the newborn infant is cold. Only one participant urged that KMC should be provided every 25-30 minutes. Regardless of staff KMC training, staff said essentially the same common-sense thing, which implies that even those not trained in KMC have observed enough to know what to do. Some responses of the participants included:

“KMC should be provided continuously.” (p. 7).

“KMC should be provided when the electricity is off.” (p. 1).

Participants perceived the infant’s condition to be an important factor in KMC practice. Most participants indicated that KMC was not practical especially for unstable infants with complications and for infants less than one week old. Overall, most of the participants stressed that provision of KMC should start after stabilisation, which is after one week of survival. Nevertheless, a few participants urged that KMC should be provided as soon as they were born: “KMC can be provided for unstable infants but under close supervision and monitoring.” (p. 8).

“KMC is possible for unstable newborn infants with complications through a close monitoring.” (p. 9).

Participants perceived the newborn infant’s health status to be a major aspect for a KMC discharge. All the participants agreed that newborn infants who required KMC were only discharged once the infants were healthy and able to suck breast milk. Thereafter, the mother is then advised about the importance of KMC practice at home. Follow-up of all infants should happen every four weeks depending on the prematurity and complications of the newborn infants. However, one participant had a different point of view:

“The follow-up is provided after six hours, six days and six weeks depending upon the newborn infant’s condition.” (p. 11).

Participants perceived that KMC has scientific benefits for both the newborn infants and the mother. The three participants who had KMC training, and in which the two of them agreed that KMC practice is important for both the mother and newborn infant as demonstrated by the following:

“KMC is very important and scientifically proven in the health outcomes of preterm infants in low socioeconomic countries.” (p. 11).

“KMC is very important, more effective and natural method which keeps the infant warm.” (p. 4).

However, two participants disagreed that KMC is essential and they indicated that newborn infants could get conventional care using the available heaters and warmers:

“There is no need to provide KMC due to the presence of enough incubators and heaters in the SNICU.” (p. 1).

Participants perceived that KMC information and education for mothers is the routine care.

A participant reported that:

“KMC education is provided especially for mother’s preterm infants and the mothers should know about KMC during antenatal care and we make sure if they have a better understanding of the importance KMC practice.” (p. 5).

### 3.3.3. Participants’ Attitude and Perceptions Towards the Practice of KMC

Participants perceived the newborn infant’s condition to be a vital aspect for KMC practice. In general, participants had poor perceptions of KMC practice for preterm infants with complications as revealed. The following statement were from two of the participants:

“Provision of KMC for preterm infants with complications

is not practical at the SNICU, they should be stabilised first.” (p. 11).

“KMC cannot be provided for preterm infants with complications.” (p. 2).

However, two participants had a different view:

“KMC could be done for preterm infants with complications under close supervision.” (p. 8).

“KMC could be done for preterm infants but under frequent monitoring.” (p. 9).

Participants perceived that KMC practice provides parental confidence. They had the following comment:

“KMC makes the mother confident by making her believe that she is fit for handling her newborn infant.” (p. 2).

“KMC improves parental attachment.” (p. 9).

However, one participant who expressed reservations about the KMC practice:

“I am not sure whether KMC provides parental confidence or not.” (p. 11).

Most of the participants perceived that encouraging all parents to practice KMC at the hospital and at home after discharge as useful. One participant described a benefit of KMC as follows:

“Parents can practice KMC regularly.” (p. 4).

Mothers could practice KMC regularly if they are encouraged. Family members such as husband and mother-in-law encourage mothers to practice KMC. Half of the participants mentioned that the husbands of the women with newborn infants in the SNICU encouraged their practice of KMC. Some of the participants demonstrated this view as follows:

“The husband is the influencer for the mother to practice KMC.” (p. 2).

“The husband can be the main influencer and even he can participate in the practice.” (p. 10).

However, others had a different opinion. For example, this comment is from one participant:

“The mother herself is an influencer for KMC practice.” (p. 9).

Participants perceived that professional satisfaction is a key for regular KMC practice.

Amongst the 11 participants, 9 of them were professionally satisfied with the practice of KMC. Some of the participants illustrated this as follows:

“I am satisfied when practicing KMC as it prevents unnecessary deaths.” (p. 4).

“Provision of KMC provides me professional satisfaction as KMC is like other lifesaving interventions that I do.” (p. 7).

Participants perceived that KMC is time consuming and increased workload. This was due to staff perception that critically-ill newborn infants needed more follow-up, care and monitoring. Participants said that:

“KMC creates workloads as it should be monitored frequently.” (p. 3).

And

“There is no time to practice KMC because of many other critical newborn infants.” (p. 2).

On the other hand, some of the participants had different views:

“KMC doesn’t create workload as it is done occasionally only when there was an electricity outage.” (p. 4).

“KMC does not create workload as the mother holds the infant during KMC practice.” (p. 6).

Participants perceived that KMC practice is similar in function with incubator care. Therefore, most of the participants saw no need for KMC practice at the SNICU. Yet, some participants mentioned that KMC is much easier and safer than incubator care as illustrated in these quotes:

“At first frequent monitoring when the newborn infant is on KMC, later mother gets more experienced and she can monitor it herself.” (p. 7).

“A mother can assist even more when the newborn infant is on KMC.” (p. 8).

Nakedness’ above the waist for both a newborn infant and mother during skin-to-skin contact can be perceived as a taboo in a community. A participant expressed a concern about the cultural acceptability for KMC practice in the community and emphasised that:

“KMC is a public concern that is not culturally accepted since the culture is very conservative.” (p. 11).

Participants perceived that KMC practice during night could be challenging. Seven of the participants agreed that KMC is impossible to practice during night. Two participants demonstrated in the statements below:

“Mother is too tired.” (p. 1).

“No KMC at night. At night time, it is warmer to put newborn infants in the incubators and under radiant warmers.” (p. 4).

However, other participants were hesitant to practice KMC for newborn infants with less weight. They thought that: “KMC can be practiced but it should be monitored.” (p. 8).

“Mother should be cautious as it can suffocate the newborn infant during KMC practice in the night.” (p. 3).

### 3.3.4. KMC Guidelines and Protocols

Participants perceived that KMC guidelines and protocols is crucial for effective KMC practice although there were no KMC guidelines and protocols available in the SNICU. However, one participant emphasised that:

“KMC guidelines and protocols do exist in a combination of Integrated Management of Neonatal and Childhood Illness (IMNCI) but not particularly in the SNICU.” (p. 11).

The study results also showed that all the participants urged that there should be proper guidelines and protocols because:

“Guidelines and protocols would have made the KMC practice regular.” (p. 10).

### 3.3.5. Availability of a KMC Ward in SNICU

Most of the participants perceived that there is enough and convenient space for parents to practice the kangaroo position. However, two of them disagreed and they stated that:

“The space at the SNICU was not enough and convenient to practice full KMC.” (p. 2).

“The space at the SNICU was very limited and inconvenient to practice KMC.” (p. 11).

In addition, most participants stated that opening a new or extending to a KMC ward would not be expensive as the same

materials and staff available at SNICU could be used for the KMC ward. However, two of the participants emphasised that:

“Opening of a new KMC ward will need finding a bigger space, blankets and beds.” (p. 2).

Participants felt that KMC can be provided by the mother during a newborn’s transportation especially when they are stable. For instance, one of the participants commented that:

“KMC practice during travel to home is a good practice, however, it can be practiced under closer monitoring to prevent suffocation.” (p. 8).

In contrast, three of the participants were hesitant about as it as illustrated below:

“Ambulatory KMC is not possible because infants usually travel when they are too critical.” (p. 1).

### 3.3.6. Factors That Facilitate or Hinder KMC Practice

Participants revealed the factors that hinder and facilitate KMC practice. Most of the participants mentioned that a shortage of staff was one of the major challenges in the SNICU. In addition, lack of regular training, lack of convenient setup and unmotivated staff were among the other top challenges for the practice of KMC. Some of the participants said the following:

“There is no convenient set up and regular training for KMC here at the SNICU.” (p. 2).

“There is lack of staff motivation to practice KMC.” (p. 3).

Some of the participants mentioned that there were factors that could facilitate KMC as follows:

“The setup should be improved; mothers reside too far away from the neonates and thus it is impractical to provide regular KMC at the SNICU.” (p. 2).

“There should be practical training for parents on TV since KMC practice is not culturally accepted.” (p. 11).

However, the perception of some of the participants and who did not see a need to practice.

KMC could be seen as another barrier to implementation:

“We have enough radiant warmers and incubators and KMC is seldom necessary.” (p. 6).

“The infant can be kept warm artificially such as radiant warmers and incubators and bonding can be attained through proper breast feeding.” (p. 9).

## 4. Discussions

To the best of the researcher’s knowledge, this study is the first known KMC-focused study conducted at Orotta Paediatric Hospital (OPH) in Eritrea. This study does not necessarily represent the perceptions, attitudes and experiences of all staff caring for newborn infants in Eritrea, hence the findings of this study may not be generalizable to other contexts and should be implemented with caution. The focus of this study was to explore the experiences and perceptions of staff towards the practice of KMC and some key aspects of this study could be relevant in the SNICU at OPH, in Asmara, Eritrea.

In Eritrea, an intermittent type of KMC was introduced in 2008. However, the sustainability of continuous KMC

depends on adequate staff knowledge and positive attitudes towards KMC practice [15, 66]. The study results showed that there was limited staff knowledge of KMC practice and a mixed response regarding staff attitudes towards the practice of KMC. The literature suggests that a separate KMC ward and proper KMC guidelines and protocols facilitate regular KMC practice [28]. Yet, there was not a dedicated KMC ward nor were KMC guidelines and protocols available in the SNICU. Furthermore, community support for KMC practice, involvement of mothers to practice KMC at home and in the hospital setting, and good staff-parent relationships are also the requirements for regular KMC practices [12, 42, 45]. To date, community awareness for KMC has not yet been studied.

#### **4.1. Findings from the Observation Part of the Study**

The observation part of the study included an observational assessment of the interaction between staff and caregivers regarding specific needs such as post-partum KMC skills and staff routine care. It also assessed the presence or absence of KMC protocols and guidelines.

In the absence of KMC training, some staff were noted to implement the KMC position without due attention to other components of KMC practice such as nutrition. Some of the participants who had prior KMC training were also able to demonstrate the KMC position and ask the mother if she had any concerns during the practice thereof. Similarly, Flynn & Leahy-Warren [33] study proved that staff who had prior KMC training and knowledge tended to perform KMC components and interact with the parents nicely. Another study about staff who had more information and communication to parents, encouraged and motivated the parents to practice KMC [42].

Overall, the post-partum KMC skills and staff routine care were scored on a checklist for all of the eleven participants. Their scores were between 2 and 4 out of the 11 questions posed. Thus, most of the participants score was low and most of the participants lacked prior KMC training as they all scored low in this domain. However, some staff with more KMC experience and training had higher scores and better understanding in performing the KMC position effectively. A study done by Bogonko [15] showed that the staff with adequate knowledge are more likely to perform KMC effectively. In general, the staff with better score of KMC skills during observation were also the staff who had adequate knowledge and positive attitudes towards the practice of KMC during the individual interview.

#### **4.2. Discussion on the In-depth Interviews**

##### **4.2.1. Staff Knowledge and Attitude Towards the Practice of KMC**

The findings discussed here are what the 11 SNICU staff perceived about KMC for preterm infants. Some of the staff were experienced with intermittent KMC position. While the benefits of KMC practice are already known globally, an underuse of KMC in developing countries' NICUs remains.

The study results shows that the majority of the participants were aware of how to do the KMC position and knew the theoretical benefits of KMC practice. They mentioned that KMC keeps the newborn infant warm, increases bonding, love and attachment between the mother and the newborn infant, that KMC builds parental confidence, gives pleasure for mothers as well as it facilitates breast milk production. Despite this knowledge, KMC was not practiced fully in the SNICU. This finding is unlike studies that report that staff who had enough knowledge and who worked in hospitals where KMC was provided tended to practice KMC regularly [5, 13, 15]. El-Nagar, Lawend & Mohammed [30] study also showed the effectiveness of training staff using KMC guidelines and protocols on refining their knowledge and practice towards KMC practice.

Understanding that KMC is a means of facilitating the parent-infant attachment, leads to changed perceptions, attitudes and practices of staff in promoting KMC within NICU setting.

Therefore, KMC training is required for better practices and understanding of all the KMC components. The discharge and follow up is another component of KMC that begins in the NICU and continuous at home with regular follow-up appointments [76, 81]. This is to monitor the infant's growth, observe for danger signs like the onset of jaundice and respiratory distress syndrome, and to counsel mothers on breast feeding [52, 76]. Ambulatory care also supports a discharge and follow-up system. This happens when a preterm infant is discharged from hospital in the kangaroo position instead of conventional method that comes with a consistent follow-up system [22, 23]. The study found that newborn infants are supposed to be discharged with ambulatory care once they have stable vital signs. However, KMC position during discharge is rarely practiced at the SNICU.

KMC practice requires limited time and it can be practiced with less staff in LICs setting [79, 81]. The study results showed that participants were less prepared to encourage KMC components since they felt it might be time-consuming and increase the workload by placing additional demands on the limited number of staff in the SNICU. A study by Olsson et al., [54] agreed that KMC practice needed more time and increased staff workload in the context of staff shortages in numerous degrees, to various inhabitants and to varying degree. However, there are other opinions that suggest that for staff to become comfortable with implementation of KMC practice might require additional time initially. However, once they know that parents can take the responsibility for their newborn infants' care earlier and relieve staff from performing some responsibilities, it may improve their KMC practice [37]. This might be the situation for the SNICU staff.

Unstable newborn infants weighing 2000gram or less at birth or stable newborn infants with a birth weight under 2000gram should be cared for under radiant warmers or in incubators [79]. However, there is substantive evidence that KMC practice is safe even for preterm infants weighing even under 1500gram who were intubated but hemodynamically stable [3]. Participants in this study felt that unstable newborn

infants should first be stabilised before KMC administration. The staff were scared of losing control and access to the newborn infant to deliver the required care and carry out of the necessary interventions when mothers are holding their newborn infants too closely. This outcome is similar to studies in which the nurse's view on newborn infant security and medical risk has been recognised as an obstacle to an intermittent KMC practice [33, 54]. Nurses' fear of loss of control because of the limited access to the newborn infant was also reported by Mörelius & Anderson [50].

The lack of information, combined with the absence of a protocol supporting KMC practices, could possibly contribute to mixed attitude that participants had towards the KMC practice.

This finding contrasts with the knowledge and attitudes demonstrated by participants who had KMC training and worked in health services where KMC was integrated [33, 66]. Other studies showed that staff who have adequate knowledge and positive attitudes would encourage mothers to practice KMC frequently [67, 74]. Furthermore, researchers found that staff with advanced education and training about KMC would have a better understanding of the benefits of KMC for a newborn infant and the mother [5, 8, 15]. This outcome further supports the need for KMC training for staff.

There is evidence that the provision of continuous KMC has more benefits compared to an intermittent KMC practice [12, 23]. KMC facilitates mother-infant bonding which contributes to improved health outcomes for both the newborn preterm infant and the mother [2, 5, 7]. Another study also revealed that encouragement of continuous skin-to-skin contact could lead to continuous breastfeeding and parents' regular presence in the NICU setting [45]. Furthermore, in another study, lack of KMC continuation was associated with early death of newborn infants [38]. In this study, eight participants had poor understanding about continuous KMC as the unit was only practicing an intermittent kangaroo position. In contrast, the staff from another study were more positive and confident, and they used KMC practice more often with sick infants than the staff who restricted parents to practice continuous KMC [67].

KMC support is defined as the physical and emotional support and encouragement provided to the mother by the nursing staff, and family members such as the husband, mother, father and grandmother and community during KMC practice [69, 76]. As a result, KMC practice in communities is influenced by the attitudes of husbands, older children, the extended family and the community [48, 69, 75]. The fathers often regarded their role as providing support to the mother. Similarly, seven of the participants in this study mentioned that the husband and the mother herself were the most significant influencers for KMC practice in the SNICU. This suggests that the husbands can be a big part of the KMC practice.

Parental confidence is important for regular and safe practice of KMC both at home and in the NICU settings [19]. However, parents gaining parental confidence depends on good staff and parent relationships as this can impact their confidence in the hospital [42, 56]. These studies found that

most participants perceived that KMC improved parental confidence to provide care for their newborn infants. Other studies confirmed that KMC provides parental confidence [5, 45]. The husbands became more confident, less anxious and collaborative with their partner in the care of their newborn infants, both in the NICU, and after discharge at home [32]. The father can also offer the practical continuous KMC position, providing the mother some free time and an interval from almost continuous KMC position. Therefore, the husband's approval and support is important for effective KMC in a household where he is the head of the family, which is the case in a conservative country like Eritrea.

Nurses can promote the continuation of KMC practice at home by sharing information with relatives and friends who visit the newborn infant while still in hospital [42]. Hence, staff should support parents to share KMC information with family and visitors [29, 30]. Staff teaching both parents about KMC and encouraging them to practice KMC also has better outcomes [19, 56]. Similar views are confirmed in other studies which state that staff with strong views about KMC encouraged parents to participate in KMC [13, 56]. Mothers expressed a desire for a motivated staff to be present to provide them with continuous guidance, as well as the need for consistent information sessions [64].

Most of the participants in this study described encouraging all parents to practice KMC at the hospital and after discharge at home as useful. It is evident from the data that SNICU staff now have a better understanding that encouragement by staff could strength the bond between the mother and infant. Therefore, it is important to encourage parents to practice KMC as it can play a significant role in strengthening the bond between newborn infants and their mothers during the postnatal period.

Continuous KMC practice including during the night is crucial for the newborn's growth and development [79]. Three of the participants were more positive about parents' practice of KMC during night. This shows that majority of the participants were not ready to practice KMC during night. Therefore, training regarding the benefits of continuous KMC practice is required for SNICU staff. Although most of participants' knowledge and skills of KMC was low, nine of the participants found facilitating KMC professionally satisfying, a crucial aspect for effective KMC implementation. Yet, knowledge alone does not essentially modify clinical practice [37], it is key that all staff practice KMC on a regular basis to expand their experience and sustain practical skills. The main factor in developing staff positive attitude is when they find the facilitation of KMC practice professionally satisfying and observed the improved outcome for both parents and preterm infants during KMC, it provides them motivation to work toward further enhancement the KMC practice [30].

Being naked above the waist for KMC practice can be considered as a taboo in a community where there is little known about KMC benefits. One participant who had a prior KMC training expressed concern about the cultural acceptability of KMC in the community. However, educating

the community to accept KMC and involvement and awareness of the benefits of KMC was found to be one of the supporting factors for KMC practice. This is because community support and cultural acceptability is essential for parents to practice KMC continuously in the SNICU setting.

#### **4.2.2. Availability of KMC Guidelines and Protocols, and a Dedicated KMC Ward**

Clinical practice at the bedside, rules of procedures both at clinics and hospitals, and health expenses by administration and management are affected by the absence or presence of KMC guidelines and protocols in the KMC unit [72]. Staff with proper KMC guidelines and protocols perform better than staff without it [9, 50, 63]. In addition, if there is no KMC ward, it can impact the implementation of KMC guidelines and protocols in the KMC unit [28]. The current study results showed that there were no KMC guidelines and protocols except as part of the guidelines in the Integrated Management of Newborn and Childhood Illness at the SNICU that had been established in 2008 at OPH. Therefore, it would be beneficial for staff and management if the SNICU staff have evidence-based guidelines and protocols that will lead to effective implementation of KMC.

A KMC ward is a separate ward where the newborn infant stays for days, weeks or even months based on the newborn infant's level of prematurity [30]. This area is used to educate and demonstrate to parents on how to provide KMC practice [59]. Such a ward is the place where an optimal environment for the care of the premature newborn infant is demonstrated [66]. While the KMC position can be practiced in an overcrowded NICU, it might not be as effective as in a separate KMC ward. The current study found that only the KMC position was practiced when it was necessary. However, in a separate KMC ward, newborn infants would receive more attention as their mothers can be trained effectively to care for them in the KMC position [42, 58]. Creating a KMC ward in the SNICU is not likely to be expensive as the same materials and staff that are available at SNICU can be used. However, should a hospital decide to establish a dedicated KMC ward, space will be needed to provide for the full practice of KMC.

#### **4.3. Strengths and Limitations of the Study**

The phenomenographic mixed research methodology allowed the researcher to conduct an in-depth exploration about the practice of KMC at the SNICU. This also helped to identify the staff education needs and the importance of KMC protocols and guidelines, and a need for a separate KMC ward in the SNICU and in the Makeel region. Some strategies were put into place to address observer bias. The researchers made every effort to avoid distorting observed behavior by listening and observing without interrupting the flow of routine activities in the SNICU. The checklist was used as a guide to avoid observers focus on her own ideas. This made it easy to compare the data obtained from the interviews with notes obtained from the observations of KMC practice.

On the other hand, staff in the SNICU do not necessarily represent the perceptions, attitudes and experiences of all staff

caring for newborn infants in Eritrea, hence the findings of this study may not be generalisable to other contexts in Eritrea. However, it may be that some key aspects could be relevant in other parts of the country. Furthermore, the researcher was unable to do the data-collection herself, the research assistant appointed might not have had the same level of understanding of KMC practice as the researcher did.

## **5. Conclusions and Recommendations of the Study**

The current study showed that there is an intermittent type of KMC practised in the absence of a KMC ward, protocols and guidelines in SNICU by those staff who were willing to facilitate the practice. A convenient KMC ward, proper KMC training for staff and community support could help for implementation of regular KMC practice. This would include postnatal care policies with integrated KMC and implementation of the protocols and guidelines in the unit and at the regional level, which could potentially improve child health outcomes in the NICU setting. Once staff are provided with KMC training and guidelines, there will potentially be an increase of KMC practice, and a decrease in the neonatal mortality rate in the SNICU and at regional level. The results of the study highlighted that the lack of KMC implementation was due to several factors. The barriers included lack of a convenient set up and protocols and guidelines, unmotivated staff, shortage of skilled staff, irregular training, high staff workload and irregular practice of KMC.

Based on the findings of this study, the following recommendations are made: KMC training and education is recommended to improve staff performance in the SNICU and Makeel region. KMC training and education could potentially help for effective KMC practice in the SNICU then spread into the Makeel region. Knowledge gaps experienced by the participants highlight the necessity for on-going training and education. Teaching and training the staff to use models for the implementation of facility-based KMC integration are among the factors that can improve provision of KMC in the SNICU. The results showed that there is a need for regular KMC training and motivation of staff, which could contribute to improved understanding, attitudes and motivation in practicing KMC [63].

Notwithstanding the need to have sufficient skilled human resources, the unevenness of numerous in-service training platforms and workshops for nurses [68, 71] may end up removing some staff for long periods, thereby producing resentment among the staff left to carry a heavier load, and this could hinder care such as KMC practice [68, 71]. To diminish this, educators of in-service training, ongoing education and skills development should be cognisant of the need to minimize the impact on staff efficiency. This will then need a wisely-planned skills description in the mentorship for on the job training to avoid disrupting service provision. Internationally, the existence of Internet Communication Technology (ICT) has brought about other new ideas about KMC which can be

explored. As an example, ICT can be used in semi urban and urban settings around Asmara to advance the benefits of distance learning systems, which in turn can grow skills and at the same time improve output. ICT-based education will be convenient for staff who live all over Makeel region of Asmara.

As a way of inspiring professional skills building, the Eritrean Medical Doctors' and Nurses' Association should be tasked with a supervisory obligation to ensure that maintenance of licences to practice and registration is tied to annual, mandatory professional development. This is an initiative for the Eritrean Nursing Association to adopt, motivate and improve skill building among nursing staff.

Developing of KMC guidelines and protocols is recommended at the SNICU and Makeel region. It is essential to develop policy guidelines that can be used at the OPH, SNICU, Makeel region initially and later in the other regions in Eritrea. The results have shown that there were no KMC policy or guidelines for the Makeel region. Reviewing WHO KMC guidelines and protocols in the health agendas and policies could help in developing the guidelines and protocols, which could see KMC identified as an ordinary care for all preterm

newborn infants. The content of the policy should include an introduction of KMC, vision and mission of the KMC practice, the objectives and the resources that will be required for the implementation of KMC. The policy and guidelines should be for all health care workers including doctors, nurses, managers and policy makers in Eritrea. The policy development process should be a consultative process with many draft forms distributed throughout the six regions for comments and amendment. In the end, the developed policy should be translated in to Tigrigna, the national language. After implementation in the Makeel zone, an evaluation both in the SNICU and Makeel zone should be done to compare effectiveness. Once protocol is agreed upon, it should then be distributed to the other five district offices, district hospitals and health care services, regional health facilities, non-governmental organisations and other facilities for full implementation and support based on the results in the Makeel zone. Other facilities and executives such as the Provision of Services, Eritrean Human Resource Development and Health Information Systems should be consulted and participate in the policy development and implementation process.

## List of Abbreviations and Acronyms

CINAHL	Cumulative Index of Nursing and Allied Health Literature
HICs	High-income countries
HRD	Human Resource Development
HREC	Human Research Ethics Committee
ICT	Internet Communication Technology
KMC	Kangaroo Mother Care
LBW	Low birth weight
LBW infant	Low birth weight infant
LICs	Low-income countries
NICU	Neonatal Intensive Care Unit
OPH	Orotta Paediatric Hospital
SNICU	Specialised Neonatal Intensive Care Unit (in Eritrea)
SDGs	Sustainable Development Goals
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
WHO	World Health Organization

## Declarations

### Computing Interests

The authors declare that they have no competing interests.

### Funding

The Margaret McNamara Educations Grants for their generous funding that covered the tuition fees, and to the School of Child and Adolescent's health, Faculty of Health Sciences, University of Cape Town for funding the thesis.

## Acknowledgements

Thank you to my supervisor Dr. Jawaya Shea and Co

Supervisor Dr. Nils Bergman for their supervision and guidance throughout the study.

Special thanks and appreciation to Dr. Lemlem Weldemichael for collecting the data.

## References

- [1] Allen, M. C. 2008. Neurodevelopmental outcomes of preterm infants. *Current Opinion in Neurology*. 21 (2): 123-128. DOI: 10.1097/WCO.0b013e3282f88bb4.
- [2] Athanasopoulou, E. & Fox, J. R. 2014. Effects of kangaroo mother care on maternal mood and interaction patterns between parents and their preterm, low birth weight infants: a systematic review. *Infant Mental Health Journal*. 35 (3): 245-262.

- [3] Azevedo, V. M., Xavier, C. C. & Gontijo Fde, O. 2012. Safety of Kangaroo Mother Care in intubated neonates under 1500g. *Journal of Tropical Paediatrics*. 58 (1): 38-42. DOI: 10.1093/tropej/fmr033.
- [4] Baker-Rush, M. 2016. Reducing stress in infants: Kangaroo care. *International Journal of Childbirth Education*. 31 (3): 44-47.
- [5] Bang, K. 2011. Perception of nurses and physicians in neonatal intensive care units on kangaroo care. *Journal of Korean Academy of Child Health Nursing*. 17 (4): 230-237.
- [6] Beck, S., Wojdyla, D., Say, L., Betran, A. P., Merialdi, M., Requejo, J. H., Rubens, C., Menon, R. et al. 2010. The worldwide incidence of preterm birth: A systematic review of maternal mortality and morbidity. *Bulletin of the World Health Organization*. 88 (1): 31-38.
- [7] Bera, A., Ghosh, J., Singh, A. K., Hazra, A., Som, T. & Munian, D. 2014. Effect of kangaroo mother care on vital physiological parameters of the low birth weight newborn. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*. 39 (4): 245-249. DOI: 10.4103/0970-0218.143030.
- [8] Bergh, A., Charpak, N., Ezeonodo, A., Udani, R. H. & Van Rooyen, E. 2012. Education and training in the implementation of kangaroo mother care. *South African Journal of Child Health*. 6 (2): 38-45.
- [9] Bergh, A., Kerber, K., Abwao, S., de-Graft Johnson, J., Aliganyira, P., Davy, K., Gamache, N., Kante, M. et al. 2014. Implementing facility-based kangaroo mother care services: Lessons from a multi-country study in Africa. *BMC Health Services Research*. 14, 293-293. DOI: 10.1186/1472-6963-14-293.
- [10] Bergman, N. 2012. Skin-to-Skin Contact: Support for Kangaroo Mother Care Based on Science and Evidence. Available: <http://www.skintoskincontact.com/> [2017, January 12].
- [11] Bhutta, Z. A., Das, J. K., Bahl, R., Lawn, J. E., Salam, R. A., Paul, V. K., Sankar, M. J., Blencowe, H. et al. 2014. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *The Lancet*. 384 (9940): 347-370.
- [12] Blomqvist, Y. T. & Nyqvist, K. H. 2011. Swedish mothers' experience of continuous kangaroo mother care. *Journal of Clinical Nursing*. 20 (9-10): 1472-1480.
- [13] Blomqvist, Y. T., Ewald, U., Gradin, M., Hedberg Nyqvist, K. & Rubertsson, C. 2012. Kangaroo Mother Care in two Swedish NICUs.
- [14] Blomqvist, Y. T., Frölund, L., Rubertsson, C. & Nyqvist, K. H. 2013. Provision of kangaroo mother care: Supportive factors and barriers perceived by parents. *Scandinavian Journal of Caring Sciences*. 27 (2): 345-353.
- [15] Bogonko, G. B. 2013. Effect of 'Kangaroo Mother Care' training on knowledge, attitude and practice of health care providers in selected district hospitals in North Rift Region, Kenya. Master's Thesis. Moi University.
- [16] Boundy EO, Dastjerdi R, Spiegelman D, Fawzi WW, Missmer SA, Lieberman E, et al. 2016. Kangaroo Mother Care and Neonatal Outcomes: A Meta-analysis *Pediatrics*. 137 (1): 1-16.
- [17] Brink, H. 2012. *Fundamentals of research methodology*. 3rd ed. Cape Town, South Africa: Juta.
- [18] Broughton EI, Gomez I, Sanchez N, Vindell C. 2013. The cost-savings of implementing kangaroo mother care in Nicaragua. *Rev Panam Salud Publica*. 34 (3): 176-82.
- [19] Calais, E., Dalbye, R., Nyqvist, K. & Berg, M. 2010. Skin-to-skin contact of full-term infants: an explorative study of promoting and hindering factors in two Nordic childbirth settings. *Acta Paediatrica*. 99 (7): 1080-1090.
- [20] Chan, G. J., Labar, A. S., Wall, S. & Atuna, R. 2016a. Kangaroo mother care: A systematic review of barriers and enablers. *Bulletin of the World Health Organization*. 94 (2): 130-141. DOI: 10.2471/BLT.15.157818.
- [21] Chan, G. J., Valsangkar, B., Kajeepeta, S., Boundy, E. O. & Wall, S. 2016b. What is kangaroo mother care? Systematic review of the literature. *Journal of Global Health*. 6 (1).
- [22] Charpak, N., Gabriel Ruiz, J., Zupan, J., Cattaneo, A., Figueroa, Z., Tessier, R., Cristo, M., Anderson, G. et al. 2005. Kangaroo mother care: 25 years after. *Acta Paediatrica*. 94 (5): 514-522.
- [23] Charpak, N. & Gabriel Ruiz-Peláez, J. 2006. Resistance to implementing Kangaroo Mother Care in developing countries, and proposed solutions. *Acta Paediatrica*. 95 (5): 529-534.
- [24] Conde-Agudelo, A., Diaz-Rossello, J. & Belizan, J. 2014. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database of Systematic Reviews*. (2): 1-41.
- [25] Conde-Agudelo A, Díaz-Rossello JL. 2016. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database of Systematic Reviews*, Issue 8. Art. No.: CD002771.
- [26] Cong, X., Ludington-Hoe, S. M. & Walsh, S. 2011. Randomized crossover trial of kangaroo care to reduce biobehavioural pain responses in preterm infants: a pilot study. *Biological Research for Nursing*. 13 (2): 204-216. DOI: 10.1177/1099800410385839.
- [27] Creswell. J. W. 2009. *Research design: Qualitative, quantitative and mixed methods approach*. 4th ed. Thousand Oaks, CA: Sage.
- [28] Davanzo, R., Brovedani, P., Travan, L., Kennedy, J., Crocetta, A., Sanesi, C., Strajn, T. & De Cunto, A. 2013. Intermittent kangaroo mother care: A NICU protocol. *Journal of Human Lactation*. 29 (3): 332-338.
- [29] El-Nagger, N. S. M., El-Azim, H. A. & Hassan, S. M. Z. 2013. Effect of Kangaroo Mother Care on premature infants' physiological, behavioural and psychosocial outcomes in Ain Shams Maternity and Gynaecological Hospital, Cairo, Egypt. *Life Science Journal*. 20113 (10): 1.
- [30] El-Nagar, S., Lawend, J. & Mohammed, H., 2013. Impact of neonatal nurses' guidelines on improving their knowledge, attitude and practice toward Kangaroo Mother's Care. *Journal of Natural Sciences Research*. 3 (7): 175-186.
- [31] Fan, A. P., Buka, S. L., Kosik, R. O., Chen, Y., Wang, S., Su, T. & Eaton, W. W. 2014. Association between maternal behaviour in infancy and adult mental health: A 30-year prospective study. *Comprehensive Psychiatry*. 55 (2): 283-289.

- [32] Finigan, V. & Long, T. 2014. Skin-to-skin contact: multicultural perspectives on birth fluids and birth 'dirt'. *International Nursing Review*. 61 (2): 270-277. DOI: 10.1111/inr.12100.
- [33] Flynn, A. & Leahy-Warren, P. 2010. Neonatal nurses' knowledge and beliefs regarding kangaroo care with preterm infants in an Irish neonatal unit. *Journal of Neonatal Nursing*. 16 (5): 221-228. DOI: 10.1016/j.jnn.2010.05.008.
- [34] Hays, D. G. & Singh, A. A. 2012. Qualitative research paradigms and traditions. In *Qualitative Inquiry in Clinical and Educational Settings*. D. G. Hays & A. A. Singh, Eds. New York. The Guilford press: USA. 32-66.
- [35] Heath, H & Cowley, S. 2004. Developing a grounded theory approach: a comparison of Glaser and Strauss. *International journal of nursing studies*. Elsevier.
- [36] Jefferies, A. L. 2012. Kangaroo care for the preterm infant and family. *Paediatrics & Child Health*. 17 (3): 1205-7088.
- [37] Johnson, A. N. 2007. Factors influencing implementation of kangaroo holding in a special care nursery. *The American Journal of Maternal/Child Nursing*. 32: 25-9.
- [38] Lakew, W. & Worku, B. 2014. Follow-up profile and outcome of preterm managed with Kangaroo Mother Care. *Open Journal of Paediatrics*. 4: 2. DOI: 10.4236/ojped.2014.42020.
- [39] Lawn, J. E., Mwansa-Kambafwile, J., Horta, B. L., Barros, F. C. & Cousens, S. 2010. Kangaroo Mother Care' to prevent neonatal deaths due to preterm birth complications. *International Journal of Epidemiology*. 39 Suppl. 1: i144-54. DOI: 10.1093/ije/dyq031.
- [40] Lee, H. C., Martin-Anderson, S. & Dudley, R. A. 2012. Clinician perspectives on barriers to and opportunities for skin-to-skin contact for premature infants in neonatal intensive care units. *Breastfeeding Medicine*. 7 (2): 79-84.
- [41] Linder, C., & Marshall, D. 2003. Reflection and phenomenography: Towards theoretical and educational development possibilities. *Learning and Instruction*. 13: 271-284.
- [42] Lemmen, D., Fristedt, P. & Lundqvist, A. 2013. Kangaroo care in a neonatal context: Parents' experiences of information and communication of nurse-parents. *The Open Nursing Journal*. 7: 41.
- [43] Liu, L., Oza, S., Hogan, D., Perin, J., Rudan, I., Lawn, J. E., Cousens, S., Mathers, C. et al. 2015. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: An updated systematic analysis. *The Lancet*. 385 (9966): 430-440.
- [44] Ludington-Hoe, S. 2011. Thirty years of Kangaroo Care science and practice. *Neonatal Network*: 30 (5): 357-362. DOI: 10.1891/0730-0832.30.5.357.
- [45] Maastrup, R., Bojesen, S. N., Kronborg, H. & Hallstrom, I. 2012. Breastfeeding support in neonatal intensive care: A national survey. *Journal of Human Lactation*. 28 (3): 370-379. DOI: 10.1177/0890334412440846.
- [46] Marton, F. 1986. Phenomenography—a research approach to investigating different understandings of reality. *Journal of Thought*. 21: 28-49.
- [47] Marton, F., & Booth, S. 1997. *Learning and awareness*. Mahwah, NJ: Lawrence Erlbaum.
- [48] Maulik, P. & Darmstadt, G. 2009. Community-based interventions to optimize early childhood development in low resource settings. *Journal of Perinatology*. 29 (8): 531-542.
- [49] Moore, E. R., Bergman, N., Anderson, G. C. & Medley, N. 2016. Early skin-to-skin contact for mothers and their healthy newborn infants. The Cochrane Library. 11 (4). DOI: 10.1002/14651858.CD003519.
- [50] Mörelius, E. & Anderson, G. C. 2015. Neonatal nurses' beliefs about almost continuous parent-infant skin-to-skin contact in neonatal intensive care. *Journal of Clinical Nursing*. 24 (17): 2620-2627. DOI: 10.1111/jocn.12877.
- [51] Neu, M., Hazel, N. A., Robinson, J., Schmiede, S. J. & Laudenslager, M. 2014. Effect of holding on co-regulation in preterm infants: A randomized controlled trial. *Early Human Development*. 90 (3): 141-147.
- [52] Nyqvist, K. H., Anderson, G., Bergman, N., Cattaneo, A., Charpak, N., Davanzo, R., Ewald, U., Ibe, O. et al. 2010. Towards universal kangaroo mother care: recommendations and report from the first European conference and seventh international workshop on Kangaroo Mother Care. *Acta Paediatrica*. 99 (6): 820-826.
- [53] Olanders, M. Kangaroo Mother Care; an Interview with Dr. Nils Bergman. December 2004. Available: <http://home.mweb.co.za/to/torgren/eng-berg.html>. [2017, July 3].
- [54] Olsson, E., Andersen, R. D., Axelin, A., Jonsdottir, R. B., Maastrup, R. & Eriksson, M. 2012. Skin-to-skin care in neonatal intensive care units in the Nordic countries: A survey of attitudes and practices. *Acta Paediatrica*. 101 (11): 1140-1146.
- [55] Ornek, F. 2008. An overview of a theoretical framework of phenomenography in qualitative education research: An example from physics education research. *Asia-Pacific Forum on Science Learning and Teaching*. 9 (2): 11.
- [56] Pállas-Allonso, C. R., Losacco, V., Maraschini, A., Greisen, G., Pierrat, V., Warren, I., Haumont, D., Westrup, B. et al. 2012. Parental involvement and kangaroo care in European neonatal intensive care units: a policy survey in eight countries. *Paediatric Critical Care Medicine*. 13 (5): 568-577. DOI: 10.1097/PCC.0b013e3182417959.
- [57] Ruiz JG, Charpak N, Castillo M, Bernal A, Ríos J, Trujillo T, Córdoba MA. 2017. Latin American Clinical Epidemiology Network Series - Paper 4: Economic evaluation of Kangaroo Mother Care: cost utility analysis of results from a randomized controlled trial conducted in Bogotá. *J Clin Epidemiol*. 86: 91-100.
- [58] Rulo, A. 2013. 'Kangaroo care'. *JCCC Honours Journal*. 4 (1): 6.
- [59] Save the Children. 2008. *Community Kangaroo Mother Care: A training module facilitator's guide draft*. Available: [http://www.mchip.net/sites/default/files/MCHIP%20KMC%20Guide\\_English.pdf](http://www.mchip.net/sites/default/files/MCHIP%20KMC%20Guide_English.pdf) [2017, January 11].
- [60] Schoch, D. E., Lawhon, G., Wicker, L. A. & Yecco, G. 2014. An interdisciplinary multidepartmental educational program toward baby friendly hospital designation. *Advances in Neonatal Care*. 14 (1): 38-43. DOI: 10.1097/ANC.0000000000000029.

- [61] Shah, S., Zemichael, O. & Meng, H. D. 2012. Factors associated with mortality and length of stay in hospitalised neonates in Eritrea, Africa: A cross-sectional study. *BMJ Open*. 2 (5): e000792. DOI: 10.1136/bmjopen-2011-000792.
- [62] Sharan, M., Ahmed, S., Naimoli, J. F., Ghebrehiwet, M. & Rogo, K. 2010. Health system readiness to meet demand for obstetric care in Eritrea: Implications for results-based financing (RBF). World Bank. Available: <https://www.rbhealth.org/sites/rbf/files/eritrea.maternal.paper.pdf> [2017, January 15].
- [63] Stikes, R. & Barbier, D. 2013. Applying the plan-do-study-act model to increase the use of kangaroo care. *Journal of Nursing Management*. 21 (1): 70-78. DOI: 10.1111/jonm.12021.
- [64] Solomons, N. & Rosant, C. 2012. Knowledge and attitudes of nursing staff and mothers towards Kangaroo Mother Care in the Eastern sub-district of Cape Town. *South African Journal of Clinical Nutrition*. 25 (1): 33-39.
- [65] Speziale, H. J. & Carpenter, D. R. 2007. *Qualitative research in nursing: advancing humanistic imperative*. 4th ed. Philadelphia: Lippincott.
- [66] Strand, H. 2011. *Knowledge of and attitudes to the practice of Kangaroo Mother Care (KMC) among staff in two neonatal units*. Master's thesis. University of Uppsala. (Unpublished).
- [67] Strand, H., Blomqvist, Y. T., Gradin, M. & Nyqvist, K. H. 2013. Kangaroo Mother Care in the NICU: Staff attitudes and beliefs and opportunities for parents. *Acta Paediatrica (Oslo, Norway: 1992)*.
- [68] Strasser, R., Kam, S. M. & Regalado, S. M. 2016. Rural health care access and policy in developing countries. *Annual Review of Public Health*. 37: 395-412.
- [69] Tessier, R., Cristo, M. B., Velez, S., Giron, M., Nadeau, L., Figueroa de Calume, Z., Ruiz-Paláez, J. G. & Charpak, N. 2003. Kangaroo Mother Care: A method for protecting high-risk low-birth-weight and premature infants against developmental delay. *Infant Behaviour and Development*. 26 (3): 384-397.
- [70] UNICEF (United Nations Children's Fund). 2012. Country profile Eritrea. Maternal, newborn and child survival. Available: [https://www.unicef.org/esaro/DI\\_Profile\\_Eritrea.pdf](https://www.unicef.org/esaro/DI_Profile_Eritrea.pdf) [2016, June 12].
- [71] UNPF (United Nations Population Fund). 2012. *Evaluation of UNFPA Zambia Country case study support to maternal health Midterm evaluation of the Maternal Health Thematic Fund*. New York: United Nations Population Fund.
- [72] USAID (United States Agency for International Development). 2012. *Kangaroo Mother Care Implementation Guide*. Available: [http://www.mchip.net/sites/default/files/MCHIP%20KMC%20Guide\\_English.pdf](http://www.mchip.net/sites/default/files/MCHIP%20KMC%20Guide_English.pdf)[2015, October 24].
- [73] Ulin, R. P., Robinson, T. E., Tolley, E. E. & Mchneill. 2002. *Qualitative Methods: A field guide for applied research in sexual and reproductive health*. Family Health International, USA.
- [74] Valizadeh, L., Ajoodaniyan, N., Namnabati, M. & Zamanzadeh, V. 2013. Nurses' viewpoint about the impact of Kangaroo Mother Care on the mother-infant attachment. *Journal of Neonatal Nursing*. 19 (1): 38-43.
- [75] Wallin, L., Målvqvist, M., Nga, N. T., Eriksson, L., Persson, L., Hoa, D. P., Huy, T. Q., Duc, D. M. et al. 2011. Implementing knowledge into practice for improved neonatal survival; a cluster-randomised, community-based trial in Quang Ninh province, Vietnam. *BMC Health Services Research*. 11 (1): 239.
- [76] WHO (World Health Organization). 2003. Kangaroo mother care: A practical guide. World Health Organization.
- [77] WHO (World Health Organization). 2010. Preterm births per 100. Available: [http://www.who.int/pmnch/media/news/2012/2010\\_pretermbirthsper100births.pdf](http://www.who.int/pmnch/media/news/2012/2010_pretermbirthsper100births.pdf) [2017, February 14].
- [78] WHO (World Health Organization). 2012. Born too soon: the global action report on preterm birth. Available: [http://www.who.int/pmnch/media/news/2012/201204\\_borntoo soon report.pdf](http://www.who.int/pmnch/media/news/2012/201204_borntoo soon report.pdf) [2017, June 5].
- [79] WHO (World Health Organization). 2015. WHO recommendations on interventions to improve preterm birth outcomes. Available: [http://apps.who.int/iris/bitstream/10665/183037/1/9789241508988\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/183037/1/9789241508988_eng.pdf) [2017, June 6].
- [80] WHO (World Health Organization). 2016. Children: reducing mortality. Available: <http://www.who.int/mediacentre/factsheets/fs363/en/> [2016, May 25].
- [81] WHO (World Health Organization). 2019. Available: [https://www.who.int/elena/titles/kangaroo\\_care\\_infants/en/](https://www.who.int/elena/titles/kangaroo_care_infants/en/)[2021, Dec 20].
- [82] World Medical Association. 2013. Declaration of Helsinki – Ethical principles for medical research on human subjects. Available: <https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/> [2016, June 7].
- [83] Zemichael, O., Nyarango, P. & Mufunda, J. 2008. Cracking the whip on childhood mortality– role of the specialized neonatal unit in Eritrea. *Acta Paediatrica*. 97 (7): 838-843.