

KANGAROO MOTHER CARE: A STUDY OF OPPORTUNITIES AND CHALLENGES IN ITS IMPLEMENTATION AMONG MOTHERS OF PRETERM AND LOW BIRTH WEIGHT INFANTS IN KIRINYAGA COUNTY, KENYA

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ABSTRACT

Kangaroo Mother Care (KMC) is an essential newborn package for reduction of neonatal mortality rates among preterm and low birth weight babies. However, KMC uptake remains low in Kenya. This paper assessed the determinants of KMC utilization among mothers' post-hospitalization in Kirinyaga County, Central Kenya. A total of 152 KMC practicing mothers were enrolled in the study after discharge from Kerugoya County Hospital. The study adopted a descriptive and analytical cross-sectional design using both qualitative and quantitative methods. Structured questionnaires, key informant interviews, and focus group discussions were used to collect data. A systematic sampling method was adopted for recruitment of study participants. Chi-square was applied to test association between KMC predictors and their relationship with KMC uptake post-hospital discharge in Kirinyaga County. Of the 152 KMC-practicing mothers' included in the study were practicing KMC for ≥ 8 hours a day as recommended. Two demographic determinants (age and level of education) and two family support determinants (emotional/physical support and assistance to position) were associated with KMC uptake (p -value < 0.05) in this study. However, stigma, traditional beliefs, and cultural norms were identified as hindering the KMC practice among mothers' post-hospital discharge. Health system factors were also observed to have a moderating effect on determinants of KMC utilization. Results of this study demonstrate low KMC utilization in Kirinyaga County and highlights demographic, family support systems, sociocultural factors, and healthcare system factors as key determinants of KMC uptake.

Keywords: Kangaroo Mother Care, Utilization, Determinants, Post-Hospitalization, Kenya.

Key Messages

- Kangaroo Mother Care is a tried and tested method for promoting the survival of preterm and low-birth-weight infants. Despite efforts to promote KMC utilization among mothers' post-hospitalization, the uptake remains low.
- The study found demographic and family support determinants are associated with KMC uptake, but stigma, traditional beliefs, and cultural norms hindered practice among post-hospital discharge mothers, with health system factors moderating utilization.
- Interventions targeting community education and awareness, along with culturally sensitive approaches, may help address these barriers and increase KMC uptake among mothers.
- Additionally, strengthening health systems to provide ongoing support and resources for KMC implementation could further promote the intervention's adoption.

Introduction

Prematurity refers to babies born before 37 weeks' gestation, while low birth weight (LBW) refers to babies born weighing less than 2500 grams. Prematurity, along with low birth weight, directly contributes to neonatal mortality, making them significant risk factors for neonatal deaths. Currently, the majority of neonatal deaths are caused by being born prematurely, small for gestational age (SGA), or with a low birth weight¹. Preterm births not only increase the risk of neonatal mortality and morbidity but also have long-term effects on physical health, such as developmental delays, neurodevelopmental disorders, and long-term financial implications because of ongoing medical needs².

The World Health Organization recommends Kangaroo Mother Care (KMC) as a high-impact, low-cost, effective intervention for promoting survival and development in resource-limited settings³. A review of 31 trials comparing KMC with conventional care found that it reduces mortality risks during birth and possibly reduces severe infection until the latest follow-up⁴. The reduction in mortality rate was greater when KMC was initiated within 24 hours after the baby was born. Kangaroo Mother Care reduces sepsis in premature infants, promotes calmness, bonding, and stress reduction, and improves health outcomes, while also empowering mothers, promoting exclusive breastfeeding, and reducing postpartum depression^{2,5}. Notably, a recent Cochrane review revealed that neonates who received KMC had a 40% reduction in mortality, 72% reduction in hypothermia, and 65% reduction in severe infections when compared to standard care. KMC has also been reported to be affordable and reliable⁶.

Similar to any intervention, Kangaroo Mother Care (KMC) faces its own set of challenges. The utilization of KMC varies from 11.04% to 84.36%. Benin, Tajikistan, and Uganda have the highest rates, and Burundi, Bangladesh, and Pakistan have the lowest rates. Low uptake has been observed in most countries within Sub-Saharan Africa⁷. KMC has a low uptake rate in Kenya, standing at 59%⁸. Nevertheless, there is insufficient data on the extent of Kangaroo Mother Care (KMC) coverage in Kirinyaga County. Kenya's Ministry of Health formulated an official

guideline for kangaroo mother care in 2015 and launched it in 2016 ⁹. Later, KMC guidelines were revised in 2023 to upscale KMC uptake and reduce neonatal mortality rates⁸.

Despite the progress made in understanding KMC within healthcare facilities, continuity of KMC post-discharge in resource-limited settings such as Kenya remains unknown. This study therefore focuses on exploring and understanding the challenges, facilitators and barriers to implementation of KMC continuity at home post-hospital discharge within communities in Kirinyaga County, Kenya.

The cross-sectional study has been reported in line with the STROBES guidelines.

Materials and Methods

Study Design

A total of 152 mothers were enrolled in the study after discharge from Kerugoya County Referral Hospital in Kenya. The study used a cross-sectional design using quantitative and qualitative data. The chi-square test for association was used to examine association between demographic determinants, family support system determinants, and health system factors and utilization of KMC at home.

Location of the Study

The study was carried out in Kirinyaga County which is located in the Central region of Kenya approximately 107 kilometers northeast of Nairobi (Figure 1). Kirinyaga County has 109 public hospitals, consisting of 51 level one facilities, 45 level two facilities, 10 level three facilities, 3 level four facilities, and one level five facility (Kerugoya County Referral Hospital, KCRH). KCRH was selected for this study because it is the referral hospital for Kirinyaga County which has ultra-modern infrastructures and relatively adequate staffing level. The facility is a point of call to all patients referred from lower-level hospitals in Kirinyaga County for critical and specialized treatment thus reflecting a true representation of the population of Kirinyaga County. KCRH also serves neighboring counties of Embu, Nyeri and Murang'a thus representing a large socio-cultural diverse population which is ideal for study and generalization.

Sample Size and Sampling Technique

The study population comprised a total of 250 postnatal mothers of preterm infants and low-birth-weight infants attending the postnatal clinic. Fischer et al.'s (1991) formula was used to calculate the sample size.

$$nf = \frac{n}{(1 + \frac{n}{N})}$$

Where:

$nf \rightarrow$ sample adjustment

$n \rightarrow$ Sample size.

$N \rightarrow$ Population of the study $\rightarrow$ (250 attendants of neonatal clinic)

$$nf \rightarrow \frac{384}{1 + \frac{384}{250}} = \underline{\underline{152 \text{ participants}}}$$

A total of 152 participants were selected for the study. The inclusion criteria were KMC mothers of preterm/LBW babies with a minimum age of 18 years. KMC mothers with sick babies and multigravidae were excluded from the study. Participants were selected using a systematic sampling method. The clinic attendance register was used as a sampling frame. A sampling interval of two was adopted to identify study participants, which was obtained by dividing 250 by 152. Study participants were selected by identifying the first name of a study participant in the hospital attendance register. The second participant was identified by skipping the second and third names in the hospital clinic attendance register. This sampling procedure was repeated until the sample size of 152 participants was obtained.

Data Sources and Collection Tools

Data collection was undertaken using a structured questionnaire, an interview guide for the key informant interview and a focus group discussion guide for the focused group discussions.

Sources of Bias

To guarantee that data collection was appropriate for this study, the validity of the study instrument was assessed using content validity and construct validity. Content validity was assessed to check whether sampled specific domain indicators in the questionnaire accurately represent concepts under the study and assess what concept the instrument is attempting to measure. Construct validity was assessed using factor analysis to determine whether the instrument accurately measures the theoretical constructs it is intended to measure. Sources of bias or confounding variables were explored and addressed to improve the overall validity of the study. The instrument was evaluated for reliability to ensure consistent results when used multiple times. Test-retest reliability was used to determine stability over time

Data Collection Procedure

Structured questionnaires were administered to study participants. Two focus group discussions, each comprising 6 participants, were held. Participants with preterm babies and/or LBW babies were included in the focus group. The duration of the FDGs was 90 minutes. During the FDGs, study observations were recorded using tape, video recording, and note-taking. Qualitative data was also collected using KII with one (1) pediatric clinical officer and one (1) nurse.

Patient and Public involvement

The study population included mothers of preterm and low-birth-weight infants attending the postnatal clinic and two healthcare workers in the postnatal clinic. A formative exploratory phase involved clinical interviews and focus group discussions with mothers discharged from

the KCRH postnatal ward. A pilot study with a small cohort was further carried out to assess the feasibility of study materials and refine the data collection procedures. Results of this study are meant to inform future interventions and programs aimed at supporting mothers of preterm and low-birth-weight infants in the community.

Operational Definition of Variables

Demographic factors are defined as age, level of education, marital status, number of children, employment status and level of income.

The family support system is defined as physical and emotional support to the mother.

Socio-cultural factors are defined as community exposure, cultural attitudes and traditional beliefs as well as misconceptions about KMC.

Health system factors are defined as standardized protocols, attitude of health workers and access to healthcare services.

Utilization of KMC is defined as practicing KMC for more than 8 hours a day.

Data Analysis

Quantitative data was coded, cleaned and entered into an Excel sheet before analysis. The research questions and interview guide were used to create a coding frame. Analysis was done using SPSS version 20. Pearson coefficient of correlation and chi-square test for association were used to test for association between variables. A multiple linear regression model was used to determine the extent to which demographic factors, family support system, sociocultural factors and health system factors influence utilization of KMC. Data was presented in the form of tables. Qualitative data was transcribed and entered into a Word document. The research questions and study objectives were used to create a coding frame. Inductive thematic analysis was done using NVIVO version 12. Data was presented in themes.

Results

Demographic Characteristics of Participants

The demographic characteristics examined in the study included age, level of education, marital status, number of children, and monthly income of the respondents (Table 1).

Table 1: Demographic Characteristics of Participants

Demographic Factors (n = 152)	n (%)
Age band in years	
18-25	45 (29.6)
26-30	36 (23.7)
31-35	48 (31.6)
36-40	7 (4.6)

Demographic Factors (n = 152)	n (%)
>40	16 (10.5)
Level of Education	
Tertiary	61 (40.1)
Secondary school	54 (35.5)
Primary school	33 (21.7)
Never been to school	4 (2.6)
Marital Status	
Married	91 (59.9)
Single	43 (28.3)
Divorced/Separated	10 (6.6)
Widowed	4 (2.6)
Total	148 (97.4)
Missing	4 (2.6)
Parity (Number of children)	
Missing	4 (2.6)
1	50 (32.9)
2	42 (27.6)
3	32 (21.1)
4	21 (13.8)
5	3 (2)
Employment Status	
Unemployed	57 (37.5)
Self-employed	57 (37.5)
Employed	38 (25)
Level of income (income per month in Kenyan shillings)	
Less than 10000	40 (26.3)
10000-20000	30 (19.7)
20001-50000	40 (26.3)
Above 50000	17 (11.2)
Missing	25 (16.4)

Note. Missing represents number of participants who left the question item unanswered question in the questionnaire.

Level of KMC Utilization among Mothers Post Hospitalization

18 of 152 11.8% of participants practiced KMC post-hospitalization at KCRH for at least 8 hours (Table 2). The rest of participants practice KMC intermittently, the duration ranged from less than 3 hours to 8 hours and above.

Table 2: Level of Utilization

Utilization of KMC (n=152)	Frequency	Percent %
Continuity of kangaroo mother care at home		
Yes	140	92.10%
No	12	7.90%
Total	152	100.00%
Duration of KMC practice at home		
<3 hours	67	44.10%
3-7 hours	55	36.20%
≥8 hours	18	11.80%
Total	140	92.10%

A total of 140 out of 152 participants were used to analyze association between the predictor variables and Kangaroo Mother Care utilization among mothers' post-hospitalization. The remaining 12 participants were excluded from the analysis because they had discontinued the practice of KMC at home. The participants were further categorized based on the duration they practiced KMC (i.e., < 3 hours, 3–7 hours, and ≥ 8 hours). The chi-square test for independence was used to determine association between each predictor variable and the outcome variable. The level of significance was set at a p-value of < 0.05.

Demographic Determinants of KMC Utilization among Mothers Post Hospitalization

The demographic characteristics examined in the study included age, level of education, marital status, number of children, and monthly income of the respondents. This study revealed that employment status was the only demographic determinant that was significantly associated (p-value = 0.024) (Table 3).

Table 3: Association between Demographic Determinants and Utilization of KMC Among Mothers Post Hospitalization

Demographic determinants of KMC n = 140	Number of participants practicing KMC for different duration in hours (%)			Total	χ^2	P value
	<3	3 – 7	≥ 8			
Age category						
18-25	16 (23.9%)	12 (21.8%)	8 (44.4%)	36 (25.7%)	13.012	0.089 ^a
26-30	20 (29.9%)	12 (21.8%)	4 (22.2%)	36 (25.7%)		
31-35	15 (22.4%)	24 (43.6%)	6 (33.3%)	45 (32.1%)		
36-40	4 (6.0%)	3 (5.5%)	0 (0.0%)	7 (5.0%)		
>40	12 (17.9%)	4 (7.3%)	0 (0.0%)	16 (11.4%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Level of education						
Tertiary	31 (46.3%)	20 (36.4%)	7 (38.9%)	58 (41.4%)	6.264	0.177 ^a
Secondary school	28 (41.8%)	19 (34.5%)	6 (33.3%)	53 (37.9%)		
Primary school	8 (11.9%)	16 (29.1%)	5 (27.8%)	29 (20.7%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Marital status						
Married	47 (70.1%)	29 (56.9%)	15 (83.3%)	91 (66.9%)	9.188	0.120 ^a
Single	16 (23.9%)	12 (23.5%)	3 (16.7%)	31 (22.8%)		
Divorced/ Separated	4 (6.0%)	6 (11.8%)	0 (0.0%)	10 (7.4%)		
Widowed	0 (0.0%)	4 (7.8%)	0 (0.0%)	4 (2.9 %)		
Total	67 (49.3%)	51 (37.5%)	18 (13.2%)	136 (100 %)		
Number of children						
Missing	4 (6.0%)	0 (0.0%)	0 (0.0%)	4 (2.9%)	2.097	0.350 ^b
1	20 (29.9%)	18 (32.7%)	4 (22.2%)	42 (30.0%)		
2	19 (28.4%)	14 (25.5%)	5 (27.8%)	38 (27.1%)		
3	16 (23.9%)	7 (12.7%)	9 (50.0%)	32 (22.9%)		
4	8 (11.9%)	13 (23.6%)	0 (0.0%)	21 (15.0%)		
5	0 (0.0%)	3 (5.5%)	0 (0.0%)	3 (2.1%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Employment status						
Unemployed	20 (29.9%)	23 (41.8%)	5 (27.8%)	48 (34.3%)	11.106	0.024 ^a

Demographic determinants of KMC n = 140	Number of participants practicing KMC for different duration in hours (%)			Total	χ^2	P value
	<3	3 – 7	≥ 8			
Self Employed	28 (41.8%)	23 (41.8%)	3 (16.7%)	54 (38.6%)	7.023	0.314 ^a
Employed	19 (28.4%)	9 (16.4%)	10 (55.6%)	38 (27.1%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Monthly income (Ksh)						
Less than 10000	12 (25.5%)	19 (37.3%)	5 (27.8%)	36 (31.0%)	7.023	0.314 ^a
10000-20000	8 (17.0%)	15 (29.4%)	3 (16.7%)	26 (22.4%)		
20001-50000	19 (40.4%)	12 (23.5%)	6 (33.3%)	37 (31.9%)		
Above 50000	8 (17.0%)	5 (9.8%)	4 (22.2%)	17 (14.7%)		
Total	47 (40.5%)	51 (44.0%)	18 (15.5%)	116 (100.0%)		

Note. ^a Statistical significance was determined using chi square. ^b Statistical significance was determined using Kruskal Wallis test.

Note. Variations in the total number of responses across parameters are due to non-response on specific questionnaire items, in addition to cases excluded because they discontinued with KMC at home (n = 12).

Note. The total percentages in this table were calculated using the total study population (N = 140) as the denominator for each cell, rather than using the total number of responses per row or column.

Family Support System Determinants and KMC Utilization Among Mothers Post Hospitalization

127 of 140 (90.7%) mothers received family support to position the baby for KMC; 80 of 140 (57.9%) received support in taking care of the baby, while 22 of 140 (15.7%) received support in taking care of household duties such as cooking 109 of 140 (77.9%). Only 15.7% of mothers practicing KMC post-hospitalization received a negative perception of practicing KMC from family and friends. Support with taking care of the baby and household duties, positive perception of family and friends, and active family members' participation in KMC were significantly associated (p-value < 0.05) with KMC utilization post-hospitalization. (Table 4).

Table 4: Association between Family Support Determinants and Utilization of KMC Among Mothers Post Hospitalization

Family support determinants n = 140	Number of participants practicing KMC for different duration in hours (%)			Total	χ^2	P value
	< 3	3 – 7	≥8			
Emotional encouragement and hands on practical assistance in positioning the baby in KMC position.						
Yes	63 (94.0%)	46 (83.6%)	18 (100.0%)	127 (90.7%)	5.988	0.058
No	4 (6.0%)	9 (16.4%)	0 (0.0%)	13 (9.3%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Negative perception from family or friends about practicing KMC						
Yes	8 (11.9%)	14 (25.5%)	0 (0.0%)	22 (15.7%)	8.016	0.017
No	59 (88.1%)	41 (74.5%)	18 (100.0%)	118 (84.3%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Spousal assistance with baby care task (e.g. diaper change)						
Yes	39 (58.2%)	27 (49.1%)	13 (72.2%)	79 (56.4%)	3.117	0.210
No	28 (41.8%)	28 (50.9%)	5 (27.8%)	61 (43.6%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Family support with household duties such as cooking						
Yes	63 (94.0%)	33 (60.0%)	13 (72.2%)	109 (77.9%)	20.670	0.000
No	4 (6.0%)	22 (40.0%)	5 (27.8%)	31 (22.1%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Active family members participation in KMC and shared caregiving roles.						
Yes	31 (46.3%)	41 (74.5%)	9 (50.0%)	81 (57.9%)	10.428	0.005
No	36 (53.7%)	14 (25.5%)	9 (50.0%)	59 (42.1%)		
Total	67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		

Note. The total percentages in this table were calculated using the total study population (N = 140) as the denominator for each cell, rather than using the total number of responses per row or column.

Note. The total study population was 152. However, only 140 participants who reported to continue with KMC at home were used during the analysis. Variations in the total number of responses across parameters are due to non-response on specific questionnaire items, in addition to cases excluded because they discontinued with KMC at home (n = 12).

Health System Determinants of KMC Utilization Among Mothers Post Hospitalization.

It was observed that two health system factors were significantly associated with KMC uptake at KCRH post-hospitalization, namely training of mothers on KMC and post-discharge support and encouragement from healthcare workers on KMC (Table 5).

Table 5: Association between Health System Factors and Utilization of KMC Among Mothers Post Hospitalization

Health System Factor determinants	System	Number of Participants practicing KMC for different duration in hours (%)			Total	χ^2	P value
		< 3	3 – 7	≥8			
Receiving instructions on home based KMC							
Yes		60 (89.6%)	50 (90.9%)	15 (83.3%)	125 (89.3%)	0.823	0.640
No		7 (10.4%)	5 (9.1%)	3 (16.7%)	15 (10.7%)		
Total		67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Instructions given on home based KMC practice							
Cover the child with warm clothes while practicing KMC		48 (85.7%)	7(14.0%)	3 (16.7%)	58 (46.8%)	80.013	0.000
Ensure skin to skin contact		8 (14.3%)	36 (72.0%)	11 (61.1%)	55 (44.4%)		
Adequate breastfeeding alongside practice of KMC		0 (0.0%)	7 (14.0%)	1 (5.6%)	8 (6.5%)		
child will grow weak		0 (0.0%)	0 (0.0%)	3 (16.7%)	3 (2.4%)		
Total		56 (45.2%)	50 (40.3%)	18 (14.5%)	124 (100.0%)		
Perceived support and encouragement from healthcare workers on KMC post discharge							
Good		60 (89.6%)	34 (61.8%)	12 (66.7%)	106 (75.7%)	13.555	0.001
Fair		7 (10.4%)	21 (38.2%)	6 (33.3%)	34 (24.3%)		
Total		67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		
Engagement and listening by healthcare workers on concerns regarding KMC							
Yes		60 (89.6%)	41 (74.5%)	17 (94.4%)	118 (84.3%)	8.705	0.083
No		7 (10.4%)	11 (20.0%)	1 (5.6%)	19 (13.6%)		
I don't know		0 (0.0%)	3 (5.5%)	0 (0.0%)	3 (2.1%)		
Total		67 (47.9%)	55 (39.3%)	18 (12.9%)	140 (100.0%)		

Note. The total study population was 152. However, only 140 participants who reported to continue with KMC at home were used during the analysis. Variations in the total number of responses across parameters are due to non-response on specific questionnaire items, in addition to cases excluded because they discontinued with KMC at home ($n = 12$).

Discussion

This study revealed that employment status was the only demographic determinant that was significantly associated ($p\text{-value} = 0.024$) with KMC utilization among mothers post-hospitalization at KCRH, as reported elsewhere ¹⁰. Unemployed mothers, as compared to those in formal employment, were 5.111 times more likely to practice KMC for 3 – 7 hours. Self-employed mothers were 4.912 times more likely to carry out for less than three (3) hours and 8.519 times more likely to carry out KMC for 3 – 7 hours as compared to employed mothers who carried out KMC for more than eight (8) hours. Hence, 55.6% of the mothers who practiced KMC for eight or more (≥ 8) hours were employed. These results suggest that employed mothers are more likely to practice KMC post-hospitalization at KCRH. This is plausibly due to guaranteed regular income and the availability of 90-day maternity leave in Kenya ¹¹.

Support with taking care of the baby and household duties, positive perception of family and friends, and active family members' participation in KMC were significantly associated ($p\text{-value} < 0.05$) with KMC utilization post-hospitalization at KCRH. The likelihood of mothers who received family support with household duties in practicing KMC for 3 hours was 6.274. Specifically, for a one-unit increase in family support with household duties, log odds of practicing KMC for three (3) hours increases by 1.836. On the other hand, the likelihood of those who received support from family members in carrying the baby in KMC and shared caregiving roles practicing KMC for 3 – 7 hours was 3.628. Specifically, for a one-unit increase in active family members' participation in KMC and shared caregiving roles, the log odds of practicing KMC for 3 – 7 hours increased by 1.289. 41 of 55 (74.5%) of the mothers who practiced KMC did it for 3 – 7 hours. Previous studies have shown that physical and emotional support from family members, particularly spouses, significantly contributes to the uptake of childbirth management (KMC) ^{12,13, 14,15}. However, financial burdens, such as time spent in the hospital and lack of transport, also hinder KMC implementation. This highlights the importance of family support systems in promoting KMC adoption and overcoming challenges in implementing KMC.

Home-based KMC instructions and receiving support and encouragement from healthcare workers were significantly associated with KMC utilization in this study. Previous studies suggest that the strength of healthcare systems greatly affects the uptake of KMC. In particular, previous studies demonstrate that improved and adequate healthcare support promote the uptake of KMC ¹⁵⁻¹⁷.

Qualitative Data Findings and Interpretation

Qualitative data was gathered through key informant interviews and focus group discussions. Data was transcribed, coded and analyzed. Three major themes were identified which included: mothers' experiences, community perception, healthcare support system.

One KII stated, *"it is difficult to sustain follow-up care. A significant number of mothers are in remote areas and yet we have inadequate staffing to reach them. Additionally, the healthcare facilities in remote areas tend to be overburdened. They have limited resources such as counselling facilities as well as staff to offer individualized and personalized care to the mothers."* This perspective underscores inadequate health workers and distance from the hospital to the residence of mothers practicing KMC as plausible barriers to the utilization of KMC post-hospitalization in Kerugoya county.

Another barrier to KMC uptake was the lack of support groups for KMC, which are organized and run by healthcare workers, and a place to hold group discussions. This was exemplified by a comment by a healthcare worker who stated, *"we cannot give enough KMC follow-up as expected. Some of the mothers complain that they would like support group forums to share their experiences and learn from other mothers. Unfortunately, we do not have designated rooms for that. Some of the mothers are lost to follow up. We have inadequately trained healthcare staff at KMC to provide consistent follow-up at the community level"*. Transition can be particularly challenging for mothers in rural areas who may face additional barriers in accessing healthcare services and support ¹⁸. The findings are congruent with a study in China that reported insufficient health resources impede KMC practice. The study reported a low nurse-to-patient ratio hinders effective implementation of KMC ¹⁸.

Provision of unclear and conflicting information on KMC by healthcare workers was also observed in the study. For example, a mother practicing KMC stated that on one hand she was advised to, *"do skin to skin contact' and 'continue with KMC until the baby is 3 kilograms'* whereas in another instance she was advised to *'keep the child warm when doing KMC', 'position the baby in KC position for one hour in a day', 'put the baby in KC position only when it is cold', 'do skin to skin contact and continue with exclusive breastfeeding'*". Similar findings have been reported elsewhere. For instance, a study in China reported a lack of uniformity or standardization in the KMC standard operational procedure ¹⁸. It is also worth noting that suboptimal monitoring of the outcome of KMC in this study was manifested in this study. This is shown by the contextualization of KMC outcomes with statements such as *"my baby is fat", "my baby is thin", "my baby is big", "my baby is small"* to assess growth and monitoring of the preterm babies/LBW. This is in contrast with a study conducted in Pakistan that reported the existence of protocols to monitor and encourage the practice of KMC ¹⁹. The discrepancy in the findings could be explained by the research design. Thus, the study carried out in Pakistan adopted a mixed-method approach involving a formative research phase and an interventional phase. Whereas this study adopted a purely analytical cross-sectional design.

Conclusion

Demographic factors such as employment, family support such as emotional and physical support, health system factors, specifically home-based instructions on how to continue with KMC at home, and perceived support and encouragement of KMC mothers by health care workers all influenced KMC utilization.

Limitations of the Study

The study employed a descriptive and analytical cross-sectional study designs that has the potential for overgeneralization. This study employed methodological triangulation by making use of both qualitative and quantitative research methodologies to provide a comprehensive analysis by combining qualitative and quantitative data giving a more holistic view of the determinants of this intervention.

Acknowledgement Statement

- *Assistance with the study:* none
- *Presentation:* none

Data Sharing statement

All data relevant to the study has been included in the article or uploaded as supplementary information.

Ethical Statement

This study involves human participants and was approved by the Mount Kenya University Ethics Review Committee and the National Commission for Science, Technology and Innovation.

- National Commission for Science, Technology and Innovation - NACOSTI/P/25/414906
- Mount Kenya Institution Ethics Review Committee – MKU/ISERC/4612

Additionally, authorization was sought from the county research officer and hospital administrator. Informed consent was obtained from the study participants in written form.

References

1. Ashorn P, Ashorn U, Muthiani Y, et al. Small vulnerable newborns-big potential for impact. *Lancet Lond Engl*. 2023;401(10389):1692-1706. doi:10.1016/S0140-6736(23)00354-9
2. Wang Y, Zhao T, Zhang Y, Li S, Cong X. Positive Effects of Kangaroo Mother Care on Long-Term Breastfeeding Rates, Growth, and Neurodevelopment in Preterm Infants. *Breastfeed Med*. 2021;16(4):282-291. doi:10.1089/bfm.2020.0358
3. Arya S, H N, K, et al. Immediate “Kangaroo Mother Care” and Survival of Infants with Low Birth Weight. *N Engl J Med*. 2021;384(21):2028-2038. doi:10.1056/NEJMOA2026486
4. Sivanandan S, Sankar MJ. Kangaroo mother care for preterm or low birth weight infants: a systematic review and meta-analysis. *BMJ Glob Health*. 2023;8(6): e010728. doi:10.1136/bmjgh-2022-010728
5. Cristóbal Cañadas D, Parrón Carreño T, Sánchez Borja C, Bonillo Perales A. Benefits of Kangaroo Mother Care on the Physiological Stress Parameters of Preterm Infants and Mothers in Neonatal Intensive Care. *Int J Environ Res Public Health*. 2022;19(12):7183. doi:10.3390/ijerph19127183

6. Adejuyigbe EA, Agyeman I, Anand P, et al. Evaluation of the impact of continuous Kangaroo Mother Care (KMC) initiated immediately after birth compared to KMC initiated after stabilization in newborns with birth weight 1.0 to <1.8 kg on neurodevelopmental outcomes: Protocol for a follow-up study. *Trials*. 2023;24(1):265. doi:10.1186/s13063-023-07192-5
7. Lawal TV, Lawal DI, Adeleye OJ. Determinants of Kangaroo Mother Care among low-birth-weight infants in low resource settings. *PLOS Glob Public Health*. 2023;3(9):e0002015. doi:10.1371/journal.pgph.0002015
8. Murianki C, Irimu G, Musoke R, Maugo B. Prevalence, Facilitators of and Barriers To Kangaroo Mother Care Practice in the Newborn Unit At Kenyatta National Hospital. In: *Kenya Pediatric Organization*. ; 2018:1-5.
9. Ministry of Health. Kangaroo Mother Care: Clinical Implementation Guidelines 2016. Published online 2016:50.
10. Samsudin S, Chui PL, Kamar ABA, Abdullah KL. Maternal Kangaroo care education program in the neonatal intensive care unit improved mothers' perceptions, knowledge, perceived barriers and stress relates to premature infant. *Nurs Open*. 2023;10(1):349-357. doi:10.1002/nop.2.1311
11. *Employment Act*.; 2019. Accessed May 12, 2025. <https://new.kenyalaw.org/akn/ke/act/2007/11/eng%402019-11-25>
12. Jamali QZ, Shah R, Shahid F, et al. Barriers and enablers for practicing kangaroo mother care (KMC) in rural Sindh, Pakistan. *PLoS ONE*. 2019;14(6):e0213225. doi:10.1371/journal.pone.0213225
13. Gidey S, Gebremariam DS, Hadush MY, et al. Practice of Kangaroo Mother Care Among Low-Birth-Weight Infants Discharged from Health Facilities and Its Outcome in Mekelle City, Tigray, Northern Ethiopia. *Int J Gen Med*. 2023;16:757-768. doi:10.2147/IJGM.S396471
14. Lydon M, Longwe M, Likomwa D, et al. Starting the conversation: community perspectives on preterm birth and kangaroo mother care in southern Malawi. *J Glob Health*. 2018;8(1):010703. doi:10.7189/jogh.08.010703
15. Bilal SM, Tadele H, Abebo TA, et al. Barriers for kangaroo mother care (KMC) acceptance, and practices in southern Ethiopia: a model for scaling up uptake and adherence using qualitative study. *BMC Pregnancy Childbirth*. 2021;21(1). doi:10.1186/s12884-020-03409-6
16. Lydon MM, Lwisha V, Likomwa D, Chimtembo L, Guenther T, Longwe M. Re-envisioning Kangaroo Mother Care Implementation Through a Socioecological Model: Lessons From Malawi. *Glob Health Sci Pract*. 2022;10(4):e2100727. doi:10.9745/GHSP-D-21-00727
17. Mathias CT, Mianda S, Ginindza TG. Facilitating factors and barriers to accessibility and utilization of kangaroo mother care service among parents of low birth weight infants in Mangochi District, Malawi: a qualitative study. *BMC Pediatr*. 2020;20(1). doi:10.1186/s12887-020-02251-1
18. Cai Q, Zhou Y, Hong M, Chen D, Xu X. Healthcare providers' perceptions and experiences of kangaroo mother care for preterm infants in four neonatal intensive care units in China: a qualitative descriptive study. *Front Public Health*. 2024;12:1419828. doi:10.3389/fpubh.2024.1419828

19. Muhammad S, Soomro A, Ahmed Khan S, et al. Scaling Up Kangaroo Mother Care Through a Facility Delivery Model in Rural Districts of Pakistan: Protocol for a Mixed Methods Study. *JMIR Res Protoc*. 2025;14:e56142. doi:10.2196/56142

Figure Legend

Figure 1: Map of Kirinyaga County

This figure shows the map of Kirinyaga County which was the study location.

