

# Kangaroo mother care practice and its associated factors in mothers who had under-five years of age children: Evidence from the 2016 Ethiopian demographic and health survey

**Mesfin Wudu Kassaw**

**mesfine12a@gmail.com**

Department of Pediatrics and Child Health Nursing, Asrat Woldeyes Health Science Campus, Debre Berhan University

**Tewodros Mulugeta Nigussie**

Department of Pediatrics and Child Health Nursing, Asrat Woldeyes Health Science Campus, Debre Berhan University

**Selam Tadele Markos**

Department of Pediatrics and Child Health Nursing, Asrat Woldeyes Health Science Campus, Debre Berhan University

**Wegayehu Zeneb Teklehymanot**

Department of Pediatrics and Child Health Nursing, Asrat Woldeyes Health Science Campus, Debre Berhan University

---

## Research Article

**Keywords:** KMC, Associated Factors, Under-five Children, EDHS

**Posted Date:** September 25th, 2026

**DOI:** <https://doi.org/10.21203/rs.3.rs-10800596/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.  
[Read Full License](#)

**Additional Declarations:** No competing interests reported.

---

# Abstract

**Background:** Worldwide, 44% of under-five child deaths occur during the neonatal period, and the proportion of under-five deaths continues to rise because of neonatal causes. In developing countries, neonatal mortality accounts for 40% of all causes of deaths of under-five children. Ethiopia is one of the ten countries with the highest number of neonatal deaths, in which 320,000 preterm neonates born each year and 24,400 under-five children died due to preterm birth. Many of those neonatal deaths are preventable through accessible interventions. Kangaroo mother care (KMC) is one of the major interventions that can substantially contribute to decrease mortality in neonates weighing less than 2000gm.

**Methods:** This study used the 2016 Ethiopian Demographic and Health Survey data (EDHS). The 2016 EDHS data were collected using a stratified two stage sampling method to select a representative sample. The study sample after cleaning the 2016 EDHS data was 8252 children. A logistic regression model was used to assess the association of independent variables and KMC practice.

**Results:** The coverage of KMC among mothers who had under-five children was 2054 (24.9%), 95%CI (24.0, 25.8). Of the included 8252 mothers, 2664 (32.3%) mothers gave birth at health facilities. Wealth index (AOR, (95%CI)); poorest (0.60, (0.47, 0.78)), poorer (0.74, (0.57, 0.99)), rural residence (0.77, (0.60, 0.97)), and home-delivery (0.06, (0.05, 0.07)) were increasing the odds of lack of KMC practice, but Khat chewing (1.26, (0.03, 1.54)) was associated positively with practicing KMC.

**Conclusions:** The coverage of KMC practice was much low in 2016 in Ethiopia. Lowest wealth index, rural residence, and home delivery were factors to lack of KMC practice. However, Khat chewing was a factor that increased KMC practice.

The government of Ethiopia and other partners may develop a policy to increase KMC coverage in Ethiopia with special emphasis on mothers with low economic class.

## Introduction

Worldwide, 44% of under-five child deaths occur during the neonatal period, and the proportion of under-five deaths continues to rise because of neonatal causes (1, 2). Neonatal mortality accounts for 40% of all causes of deaths of under-five children in developing countries (3), and the three major causes were birth asphyxia, neonatal infections (sepsis), and complications due to prematurity and low birth weight (LBW) (4). Ninety nine percent of preterm deaths in low income countries (5) occurred because of home deliveries in which access to specialized neonatal medical care is limited (6). In addition, preterm infants are more risk for bacterial sepsis and home deliveries doubled the chance of mortality (7). Ethiopia is one of the ten countries with the highest number of neonatal deaths in which 320,000 preterm neonates born each year and 24,400 under-five children died due to preterm (8, 9). In Ethiopia, nearly 90% of deliveries take place at home (10). Fortunately, many of the neonatal and infant deaths are preventable through accessible interventions. Kangaroo mother care (KMC) is one of the major

intervention that can substantially contribute to decrease the risk of mortality in neonates weighing less than 2000gm(11, 12). KMC promotes thermal regulation, on-demand breast feeding and maternal–infant bonding(11, 12). Studies ascertained that KMC can reduce newborn mortality (NMR) and infant mortality(11, 13). World Health Organization's (WHO) recommendations for the care of preterm infants also includes kangaroo mother care (KMC)(14). KMC has three main components; 1) thermal care through continuous skin-to-skin contact by being wrapped with a cloth to the bare chest of the care giver, 2) support for exclusive breastfeeding or other appropriate feeding; and 3) early recognition and response to complications(15). However, the modes of KMC practice are two types; continuous KMC (24 hours per day) and intermittent KMC (recurrent skin-to-skin contact) over a variable number of days(16). In comparison with incubator, KMC has been found to reduce infection, hypothermia, and lower respiratory tract disease. The study also reported the association of KMC with infant growth (height, head circumference, and weight gain)(12). In addition to WHO, the Every Newborn Action Plan (ENAP) has identified KMC as essential component of newborn health initiatives, and many other agencies have also made KMC as a priority(17).

KMC is an anniversary available and biologically sound method of care for all premature babies and is cost effective, and has abundant advantages for mother, and infant [5,14]. Irrespective of such significance of KMC, only few preterm neonates in low-income countries have access to KMC(18). A study in Yirgalem, Ethiopia showed that KMC practice was low(19). The aim of this study is to assess Kangaroo mother care practice and its associated factors in mothers who had under-five children in Ethiopia.

## **Methodology**

### **Data collection period, and study population**

The data collection period for the 2016 EDHS was from January 18 to 27 June 2016. The 2016 Ethiopian Demographic and Health Survey (EDHS) data was used for this study. The 2016 EDHS data was the fourth survey conducted in Ethiopia. The survey comprise information on household's and respondent's characteristics, child health, infant and child mortality, malaria, maternal health, maternal mortality, nutrition, tobacco use, women's empowerment, anemia, domestic violence, environmental health, family planning, female genital cutting, fertility and fertility preferences, and etc. The purpose of EDHS is to provide up-to-date estimates of the key demographic and health indicators of the population (20). The survey included reproductive age group women, under-five children, and productive age group men (15–59 years old) (20, 21)

### **Sampling technique and study population**

The 2016EDHS used a stratified two stage sampling method to select a representative sample for the country. All the regions of the country were stratified into urban and rural areas. From all the

11 administrative states, 21 sampling strata were yielded. The samples of enumeration areas (EAs) were selected independently in each stratum by two stages. The explicit stratification and proportional allocation were achieved at each of the lower administrative levels by sorting the sampling frame within each sampling stratum before sample selection according to the administrative units in the different levels, and by using a probability proportion to size selection at the first stage of sampling. The 2016 EDHS selected 645 EAs with a probability proportional to the EA size and with independent selection in each sampling stratum.

The EA size is the number of residential households in the EA that was determined in the 2007 Ethiopian Population and Housing Census. According to the 2016 EDHS procedures, a household listing operation was implemented in the selected EAs, and the resulting lists of households served as the sampling frame for the selection of households in the second stage.

The data collectors interviewed only the pre-selected households. In the EDHS, there was no replacements or changes of the pre-selected households in the implementing stages to prevent bias. All the under-five children, who were usual members of the selected households or who spent the night before the survey in the selected households were eligible for the child survey (21). After managing the missing data, 8252 respondents that had under-five children were included for this study.

## **Data collection tools and study variables**

The EDHS usually use five groups of questionnaires in conducting the survey. Those questionnaires are the Household questionnaire, the woman's questionnaire, the man's questionnaire, the biomarker questionnaire, and the health facility questionnaire. The questionnaires were adapted from the DHS program's standard demographic and health survey questionnaires in a way to reflect the population and health issues relevant to the Ethiopia's current context. Questions that stated about children were integrated to woman's questionnaire or write-down separately.

The outcome variable of this study is practice of KMC. The independent variables were socio-demographic variables of both children and mothers, health services provided to children and the wider community, and substance use like cigarette smoking and Khat chewing in considering the availability of those variables in the 2016 EDHS data.

## **Definition**

### **KMC**

Holding a small neonate (< 2000gm) in the mothers' skin in a prone and upright position on the maternal chest that also enclosed in maternal clothing for thermal regulation(13, 15).

## **Data analysis**

The data analysis started with a summary of socio-demographic characteristics using both descriptive and inferential statistics. Before analyzing the data, sampling weight, cluster and strata were considered and adjusted to have representative sample and get appropriate to population size estimates.

A logistic regression model was used to assess the association of KMC practice with the preselected independent variables among mothers. A statistically significant association was determined at a p-value of less than 0.05.

## Results

### Socio-demographic characteristics of respondents

In this study, 4727(57.3%) male heads of the household have agricultural jobs, but 5048(61.2%) mothers had no professional jobs. More than eighty three percent 6878(83.3%) of mothers were rural residents, 8182(99.2%) mothers were married, and 3040(36.8%) mothers were from households with poorest wealth index. Regarding religion, 4262(51.6%) mothers were Muslim, and 5433(65.8%) mother were unable to read and write (Table1).

**Table1:** The socio-demographic position of respondents and children in assessing the KMC practice among mothers in Ethiopia

| Variables           | Categories              | Frequency (n=8252) | Percent(%) |
|---------------------|-------------------------|--------------------|------------|
| Husband occupation  | Did not work            | 914                | 11.1       |
|                     | Professional/managerial | 640                | 7.8        |
|                     | Clerical                | 55                 | 0.7        |
|                     | Sales                   | 685                | 8.3        |
|                     | Agricultural employee   | 4727               | 57.3       |
|                     | Service                 | 322                | 3.9        |
|                     | Skilled manual          | 553                | 6.7        |
|                     | Unskilled manual        | 356                | 4.3        |
| Maternal occupation | Did not work            | 5048               | 61.2       |
|                     | Professional/managerial | 138                | 1.7        |
|                     | Clerical                | 37                 | 0.4        |
|                     | Sales                   | 868                | 10.5       |
|                     | Agricultural employee   | 1658               | 20.1       |
|                     | Service                 | 145                | 1.8        |
|                     | Skilled manual          | 250                | 3.0        |
|                     | Unskilled manual        | 108                | 1.3        |
| Head of household   | Male                    | 6865               | 83.2       |
|                     | Female                  | 1387               | 16.8       |
| Residence           | Urban                   | 1374               | 16.7       |
|                     | Rural                   | 6878               | 83.3       |
| Maternal age        | 15-19                   | 282                | 3.4        |
|                     | 20-24                   | 1634               | 19.8       |
|                     | 25-29                   | 2482               | 30.1       |
|                     | 30-34                   | 1887               | 22.9       |
|                     | 35-39                   | 1303               | 15.8       |
|                     | 40-44                   | 507                | 6.1        |
|                     | 45-49                   | 157                | 1.9        |
| Maternal education  | No education            | 5433               | 65.8       |

|                   |                |      |      |
|-------------------|----------------|------|------|
|                   | Primary        | 2035 | 24.7 |
|                   | Secondary      | 518  | 6.3  |
|                   | Higher         | 266  | 3.2  |
| Region            | Tigray         | 767  | 9.3  |
|                   | Afar           | 817  | 9.9  |
|                   | Amhara         | 812  | 9.8  |
|                   | Oromia         | 1293 | 15.7 |
|                   | Somali         | 1150 | 13.9 |
|                   | Benishangul    | 695  | 8.4  |
|                   | SNNPR          | 1055 | 12.8 |
|                   | Gambela        | 473  | 5.7  |
|                   | Harari         | 492  | 6.0  |
|                   | Addis Adaba    | 305  | 3.7  |
|                   | Dire-dawa      | 393  | 4.8  |
| Religion          | Orthodox       | 2372 | 28.7 |
|                   | Catholic       | 52   | 0.6  |
|                   | Protestant     | 1433 | 17.4 |
|                   | Muslim         | 4262 | 51.6 |
|                   | Traditional    | 69   | 0.8  |
|                   | Other          | 64   | 0.8  |
| Wealth index      | Poorest        | 3040 | 36.8 |
|                   | Poorer         | 1448 | 17.5 |
|                   | Middle         | 1190 | 14.4 |
|                   | Richer         | 1048 | 12.7 |
|                   | Richest        | 1526 | 18.5 |
| Readiness         | Wanted then    | 6630 | 80.3 |
|                   | Wanted later   | 1136 | 13.8 |
|                   | Wanted no more | 486  | 5.9  |
| Cigarette smoking | No             | 8176 | 99.1 |

|                            |                             |      |      |
|----------------------------|-----------------------------|------|------|
|                            | Yes                         | 76   | 0.9  |
| Chat chewing               | No                          | 7344 | 89.0 |
|                            | Yes                         | 908  | 11.0 |
| Type of birth              | Single birth                | 8073 | 97.8 |
|                            | 1 <sup>st</sup> of multiple | 93   | 1.1  |
|                            | 2 <sup>nd</sup> of multiple | 86   | 1.0  |
| Sex of the child           | Male                        | 4203 | 50.9 |
|                            | Female                      | 4049 | 49.1 |
| Marital status             | Married                     | 8182 | 99.2 |
|                            | Living with partner         | 70   | 0.8  |
| ARDS                       | No                          | 7496 | 90.8 |
|                            | Yes                         | 756  | 9.2  |
| Size of the child at birth | Very large                  | 1312 | 15.9 |
|                            | Large                       | 1192 | 14.4 |
|                            | Average                     | 3523 | 42.7 |
|                            | Small                       | 797  | 9.7  |
|                            | Very small                  | 1428 | 17.3 |

### Practice of KMC and place of delivery

The coverage of KMC among mothers who had under-five children was 2054(24.9%), 95%CI (24.0, 25.8). Of the included 8252 mothers, 2664(32.3%) of them gave birth at health facilities.

### Factors associated with maternal practice of KMC

On binary logistic regression analysis; wealth index, place of delivery, and size of the child at birth were associated with maternal practice of KMC.

In the final multivariable logistic regression model; wealth index (AOR, (95%CI)), poorest (0.60, (0.47, 0.78)), poorer (0.74, (0.57, 0.99)), residence; rural (0.77, (0.60, 0.97)), and place of birth; home (0.06, (0.05, 0.07)) were increasing the odds of lack of maternal KMC practice. However, Khat chewing (1.26, (1.03, 1.54)) was increasing the odds of maternal KMC practice (Table2).

**Table2:** The associations of maternal KMC practice with maternal, environmental, child and household related factors in Ethiopia

| Variable                 | Categories      | KMC (n=8252)   |                | OR    |      | 95% CI |       | P-value |
|--------------------------|-----------------|----------------|----------------|-------|------|--------|-------|---------|
|                          |                 | No             | Yes            | COR   | AOR  | Lower  | Upper |         |
| Wealth index             | Poorest         | 2693<br>(43.4) | 347<br>(16.9)  | 0.11* | 0.60 | 0.47   | 0.78  | 0.001   |
|                          | Poorer          | 1173<br>(18.9) | 275<br>(13.4)  | 0.19* | 0.74 | 0.57   | 0.99  | 0.03    |
|                          | Medium          | 904<br>(14.6)  | 286<br>(13.9)  | 0.26* | 0.97 | 0.74   | 1.27  | 0.82    |
|                          | Richer          | 742<br>(12.0)  | 306<br>(14.9)  | 0.34* | 1.09 | 0.83   | 1.42  | 0.53    |
|                          | Richest         | 686<br>(11.1)  | 840<br>(40.9)  | 1     | 1    | –      | –     | –       |
| Residence                | Rural           | 5611<br>(90.5) | 1267<br>(61.7) | 0.17  | 0.77 | 0.60   | 0.97  | 0.03    |
|                          | Urban           | 587<br>(9.5)   | 787<br>(38.3)  | 1     | 1    | –      | –     | –       |
| Sex of Head of household | Male            | 5179<br>(83.6) | 1686<br>(82.1) | 1     | 1    | –      | –     | –       |
|                          | Female          | 1019<br>(16.4) | 368<br>(17.9)  | 1.11  | 1.00 | 0.85   | 1.19  | 0.96    |
| Was child wanted         | Wanted then     | 4992<br>(80.5) | 1638<br>(79.7) | 1     | 1    |        |       | –       |
|                          | Wanted latter   | 833<br>(13.4)  | 303<br>(14.8)  | 1.11  | 0.94 | 0.79   | 1.12  | 0.49    |
|                          | Wanted no more  | 373<br>(6.0)   | 113<br>(5.5)   | 0.92  | 1.08 | 0.83   | 1.42  | 0.57    |
| Khat chewing             | No              | 5539<br>(89.4) | 1805<br>(87.9) | 1     | 1    | –      | –     | –       |
|                          | Yes             | 659<br>(10.5)  | 249<br>(12.1)  | 1.16  | 1.26 | 1.03   | 1.54  | 0.02    |
| Child sex                | Male            | 3192<br>(51.1) | 1011<br>(49.2) | 1     | 1    | –      | –     | –       |
|                          | Female          | 3006<br>(48.5) | 1043<br>(50.8) | 1.10  | 1.11 | 0.98   | 1.26  | 0.09    |
| Place of delivery        | Home            | 5182<br>(83.6) | 406<br>(19.8)  | 0.05* | 0.06 | 0.05   | 0.07  | 0.001   |
|                          | Health facility | 1016<br>(16.4) | 1648<br>(80.2) | 1     | 1    | –      | –     | –       |

|                            |            |                |                |       |      |      |      |      |
|----------------------------|------------|----------------|----------------|-------|------|------|------|------|
| Size of the child at birth | Very large | 942<br>(15.2)  | 370<br>(18.0)  | 1     | 1    | –    | –    | –    |
|                            | Large      | 877<br>(14.1)  | 315<br>(15.3)  | 0.91  | 1.07 | 0.86 | 1.34 | 0.53 |
|                            | Average    | 2589<br>(41.8) | 934<br>(45.5)  | 0.92  | 1.17 | 0.98 | 1.39 | 0.09 |
|                            | Small      | 647<br>(10.4)  | 150<br>(7.3)   | 0.59* | 0.89 | 0.68 | 1.16 | 0.38 |
|                            | Very small | 1143<br>(18.4) | 285<br>(13.9)  | 0.64* | 0.97 | 0.78 | 1.22 | 0.82 |
| ARDS                       | No         | 5632<br>(90.9) | 1864<br>(90.7) | 0.99  | 1.00 | 0.81 | 1.24 | 0.10 |
|                            | Yes        | 566<br>(9.1)   | 190<br>(9.3)   | 1     | 1    | –    | –    | –    |

\*=p-value<0.05

## Discussions

In this study, the practice of maternal KMC practice was 24.9% (24.0, 25.8). However, the majority 75.1% (74.2%, 76.0%) of mothers didn't practice KMC. The current study's maternal practice of KMC is lower than a study that conducted in Yirgalem, Ethiopia, 41.9% KMC(22). The difference in between these studies might be because of study population difference. The study from Yirgalem considered only mothers who gave LBW or premature neonates that forced mothers to visit health facilities which in turn create an occasion to practice KMC as treatment modalities. However, the current study considers all mothers who gave birth in the last five years before the 2016EDHS data collection period despite the type of birth either LBW, normal or overweight.

The current study's report is lower than a study conducted in Ghana that reported 84.6% maternal KMC practice(23). The difference might be due to health care service, and socio-economic discrepancy between these countries. In this scenario, Ghana might have better health care service, and socio-economic status than Ethiopia. The current study reported a lower coverage of maternal KMC practice than a study conducted in Oromia, Ethiopia, 41.9%(24). A study from Hawassa, Ethiopia also reported a lower coverage of maternal KMC practice, 61.6%(25). The difference might be due to sample size, and study population variation. The studies from Oromia, and Hawassa used mother-infant pair who visited Hospitals and whose neonates were LBW. The weight of children, being LBW might force professionals to put on radiant warmer/incubator than KMC. This might decrease the level of KMC practice than the current study that consider all mothers irrespective of child weight at birth.

In the multivariable logistic regression model; wealth index of households mainly poorest (AOR, 95%CI, (0.60, (0.47, 0.78)) and poorer (AOR, 95%CI (0.74, (0.57, 0.97)) income increase the odds of lack of

maternal KMC practice than households with richest wealth index by 40%, and 26% respectively. This degree of association might be due to that poorer and poorest mothers have poor awareness about KMC and ANC child care information compared to mothers from highest economic status. However, there was no other evidence that indicate the association of KMC and wealth index. Residence was associated with KMC practice. Mothers from rural area (AOR, 95%CI (0.77, (0.60, 0.97) increase the odds of lack of maternal KMC practice than urban residents by 23%. The difference might be because of socio-economic variation between urban and rural residents.

In addition, the high prevalence of LBW and premature birth from rural areas might cause neonates to be admitted in to neonatal intensive care unit(NICU) and separate them from their mothers(26). However, Khat chewing (AOR, 95%CI (1.26, (1.03, 1.54)) increases the odds of maternal KMC practice by 26%. Mothers who chewed Khat were 1.26 times more likely to practice KMC. The justification might be difficult why Khat chewing mothers practiced KMC than mothers who did not chew Khat. Place of delivery was also associated with KMC, in which mothers who delivered in home (AOR, 95%CI (0.76, (0.63, 0.91)) increase the lack of maternal KMC practice by 24% than others who gave birth in health facilities. This is similar with a study that conducted in Yirgalem(22) and the similarity might be that mothers who gave birth in health facilities got better information about KMC.

## Conclusions

The prevalence of KMC practice was low. Lowest wealth index and home delivery were factors to practice KMC. However, Khat chewing was a factor for not practicing KMC. The reason might be that mothers from higher income households might not initiate breast feeding, which might contribute for not practicing KMC. Thus, the government should draft implementation strategy to increase KMC Coverage in the country.

## Limitations

Some of the variables were excluded while managing the missing values. Due to this, the sample size was small that might compromise the inclusiveness of this research.

## Abbreviations

AOR - adjusted odds ratio; CI - confidence interval; SPSS - statistical package for social science; WHO - World Health Organization; EDHS - Ethiopian demography and health survey, DHS - Demography and health survey; SNNPR - Southern nation nationalities and people representatives; EA - Enumeration areas; USAID- The United states Agency for International Development, and ICF- Inner City Fund, KMC- Kangaroo Mother Care; LBW- low-birth weight; NMR-newborn mortality.

## Declarations

### Ethics approval and consent to participate

This further EDHS data base analysis used a collected data from the online library by email request, DHS. Thus, the ethical issue is usually waived.

The 2016 EDHS data is a reviewed and approved document by the Federal Democratic Republic of Ethiopia, Ministry of Science and Technology, and the Institutional Review Board of ICF International.

### **Consent for publication**

Not applicable

### **Availability of data and materials**

The data that support the conclusions of this research is already online in the DHS database online at <https://www.dhsprogram.com/>

### **Competing interests**

The authors have no conflict of interests

### **Funding**

Not applicable

### **Author's contribution**

For this study MWK, TMN, STM, and WZT conceived the title and designed the study, preparing a complex data for analysis, analyzing the complex data, critically revising the work and writing the final manuscript. All the authors read and approved the final version of this manuscript. The study was conducted by principles outlined in the declaration of Helsinki. The authors agreed to be accountable for all aspects of this work.

### **Acknowledgments**

We would like to acknowledge the central statistical agency of Ethiopia for the data (EDHS) they collected and provide it online in collaboration with the USAID. We also acknowledge the USAID for supporting the project, publishing the data online, and allow researchers to use it for free.

## **References**

1. Bhutta Z, Das J, Bahl R, Sankar MJ, The Lancet Every Newborn Study Group. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? (384, pg 347, 2014). Lancet. 2014;384(9940):308.
2. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000–13 with projections to inform post-2015 priorities: An updated systematic

- analysis. *Lancet*. 2015;385(9966):430–40.
3. Godlonton S, Okeke EN. Does a ban on informal health providers save lives? Evidence from Malawi. *J Dev Econ*. 2016;118:112–32.
  4. Nagai S, Andrianarimanana D, Rabesandratana N, Yonemoto N, Nakayama T, Mori R. Earlier versus later continuous Kangaroo Mother Care (KMC) for stable low-birth-weight infants: A randomized controlled trial. *Acta Paediatr*. 2010;99(6):826–35.
  5. Oestergaard MZ, Inoue M, Yoshida S, Mahanani WR, Gore FM, Cousens S et al. Neonatal mortality levels for 193 countries in 2009 with trends since 1990: a systematic analysis of progress, projections, and priorities. *PLoS Med*. 2011;8(8).
  6. Quasem I, Sloan NL, Chowdhury A, Ahmed S, Winikoff B, Chowdhury A. Adaptation of kangaroo mother care for community-based application. *J Perinatol*. 2003;23(8):646–51.
  7. Soon BT. The global action report on preterm birth. Geneva: World Health Organization; 2012.
  8. Lawn JE, Kinney MV, Black RE, Pitt C, Cousens S, Kerber K, et al. Newborn survival: a multi-country analysis of a decade of change. *Health Policy Plann*. 2012;27(suppl3):iii6–28.
  9. World Health Organization. Guidelines on optimal feeding of low birth-weight infants in low-and middle-income countries. World Health Organization; 2011.
  10. CSA-Ethiopia I, Ethiopia Demographic and Health Survey. 2011. Central Statistical Agency of Ethiopia and ICF International Addis Ababa, Ethiopia and Calverton, Maryland, USA. 2012.
  11. Lawn JE, Mwansa-Kambafwile J, Horta BL, Barros FC, Cousens S. Kangaroo mother care to prevent neonatal deaths due to preterm birth complications. *Int J Epidemiol*. 2010;39(suppl1):i144–54.
  12. Conde-Agudelo A, Díaz-Rossello JL. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane database Syst Reviews*. 2016(8).
  13. Rey E, Martinez H. Manejo racional del niño prematuro. Universidad Nacional, Curso de Medicina Fetal, Bogotá, Universidad Nacional. 1983:23 – 5.
  14. Nyqvist KH, Anderson G, Bergman N, Cattaneo A, Charpak N, Davanzo R et al. Towards universal kangaroo mother care: recommendations and report from the first European conference and seventh international workshop on kangaroo mother care. *Acta Paediatrica*. 2010;99(6):820-6.
  15. Charpak N, Gabriel Ruiz J, Zupan J, Cattaneo A, Figueroa Z, Tessier R, et al. Kangaroo mother care: 25 years after. *Acta Paediatr*. 2005;94(5):514–22.
  16. Bergh AM, Kerber K, Abwao S, Johnson JG, Aliganyira P, Davy K, et al. Implementing facility-based kangaroo mother care services: lessons from a multi-country study in Africa. *BMC Health Serv Res*. 2014;14(1):293.
  17. Bahl R, Martinez J, Bhandari N, Biloglav Z, Edmond K, Iyengar S et al. Setting research priorities to reduce global mortality from preterm birth and low birth weight by 2015. *J global health*. 2012;2(1).
  18. Shrivastava SR, Shrivastava PS, Ramasamy J. Utility of kangaroo mother care in preterm and low birthweight infants. *South Afr Family Pract*. 2013;55(4):340–4.

19. Yusuf E, Fiseha F, Dulla D, Kassahun G. Utilization of Utilization of Kangaroo Mother Care (KMC) and Influencing Factors Among Mothers and Care Takers of Preterm/Low Birth Weight Babies in Yirgalem Town, Southern, Ethiopia. *Diversity & Equality in Health and Care*. 2018;15.
20. Yohannes Dibiaba Wado. Women's autonomy and reproductive health-care-seeking behavior in Ethiopia. *Women Health*. 2017;1–15.
21. Paul Gelter. Do conditional cash transfers improve child health? Evidence from PROGRESA's control randomized experiment. *Am Econ Rev*. 2004;94(33641):22.
22. Yusuf E, Fiseha F, Dulla D. Utilization of Kangaroo Mother Care (KMC) and Influencing Factors Among Mothers and Care Takers of Preterm/Low Birth Weight Babies in Yirgalem Town. Ethiopia: Southern; 2018.
23. Nguah SB, Wobil PN, Obeng R, Yakubu A, Kerber KJ, Lawn JE, et al. Perception and practice of Kangaroo Mother Care after discharge from hospital in Kumasi, Ghana: A longitudinal study. *BMC Pregnancy Childbirth*. 2011;11(1):99.
24. Mathewos BD, Valsangkar B, Musena Y, Tadesse L, Chan G, Tadesse Y. Delivery of Kangaroo Mother Care in Ethiopian facilities: Results from a Rapid Assessment in Three Zones. 2015.
25. Kassahun G, Samuel H. Takers of Preterm and Low Birth Weight Infants in Health Care Settings. Hawassa, Southern Ethiopia; 2018.
26. Keyes EB, Haile-Mariam A, Belayneh NT, Gobezie WA, Pearson L, Abdullah M, et al. Ethiopia's assessment of emergency obstetric and newborn care: Setting the gold standard for national facility-based assessments. *Int J Gynecol Obstet*. 2011;115(1):94–100.