



Original Research

Immediate Kangaroo Maternal Care and Survival of Low-Birth-Weight Infants in Bamako (Mali)

Pratique Immédiate de la Méthode Kangourou et Survie des Nouveau-Nés de Faible Poids de Naissance à Bamako (Mali)

Ghislain G Poda^{1,2,3}, Hawa Kone², Fatoumata Traore¹, Foussemi Dao³, Niani Mounkoro^{2,4}

1 Higher Institute of Public Health, Bamako, Mali
 2 University Pedagogical Institute, Bamako - Mali.
 3 University of Ouagadougou, Burkina Faso
 4 Teaching Hospital Point G, Bamako - Mali.

Corresponding author

Ghislain G Poda
 Higher Institute of Public Health, Bamako, Mali
 Email podaghis@yahoo.fr

Keywords: Low-birth weight, Kangaroo Mother Care, Mali

Mots clés : Faible poids de naissance, peau à peau mère-enfant, Mali

ABSTRACT

Background. Low birthweight is a global public health problem and progress in reducing the prevalence of low birthweight has been slow. Mali, like all other countries, would like to eliminate avoidable deaths of newborns by implementing kangaroo mother care for low-birth-weight newborns. This study aimed to assess the practice of immediate maternal kangaroo care for low-birth-weight newborns in the communes of Bamako, Mali. **Patients and Methods.** This was a cross-sectional quantitative study carried out in the six health districts of Bamako in Mali, using an adapted questionnaire from previous studies. The required sample for this study was 343 mothers of newborns. We recorded mother-newborns socio-demographics information, mother knowledge and attitudes on kangaroo mother care as independent variables. Practices on kangaroo mother care mother care and survival of newborns with low birth weight were defined as dependent variables. Chi-square test was done to assess the distribution between the variables. **Results.** The prevalence of underweight at birth was 20.8% at the time of the survey. About 9.1% of newborns had poor general health. A weak positive correlation was also reported between knowledge and practice ($p < 0.01$). A significant relationship was observed between mothers' KMC practices and the following socio-demographic characteristics: age ($p = 0.04$), ethnic origin ($p < 0.001$), marital status ($p = 0.028$), level of education ($p = 0.001$), occupation ($p = 0.001$) and monthly income ($p < 0.001$). **Conclusion.** Parents of preterm infants and infants with low birth weight should be educated and encouraged in the practice of KMCS. More research is needed to elaborate strategies and develop models for the implementation of KMCS in Mali.

RÉSUMÉ

Contexte. L'insuffisance pondérale à la naissance est un problème de santé publique mondial et les progrès dans la réduction de sa prévalence sont lents. Le Mali, comme tous les autres pays, souhaite éliminer les décès évitables de nouveau-nés en mettant en œuvre le peau à peau mère-enfant pour les nouveau-nés de faible poids. Cette étude visait à apprécier la pratique du peau à peau mère-enfant immédiat chez les nouveau-nés de faible poids de naissance dans les communes de Bamako, au Mali. **Patients et méthodes.** Il s'agit d'une étude transversale quantitative menée dans les six districts sanitaires de Bamako au Mali, utilisant un questionnaire adapté d'études antérieures. L'échantillon requis pour cette étude était de 343 mères de nouveau-nés. Cette étude a utilisé les informations sociodémographiques des mères et des nouveau-nés, les connaissances et les attitudes des mères sur le peau à peau mère-enfant comme variables indépendantes. Les pratiques du peau à peau mère-enfant et la survie des nouveau-nés de faible poids de naissance ont été définies comme variables dépendantes. Un test du chi carré a été effectué pour évaluer la distribution entre les variables. **Résultats.** La prévalence de l'insuffisance pondérale à la naissance était de 20,8 % au moment de l'enquête. Environ 9,1 % des nouveau-nés avaient une mauvaise santé générale. Une faible corrélation positive a également été rapportée entre les connaissances et la pratique du peau à peau mère-enfant immédiat ($p < 0,01$). Une relation significative a été observée entre les pratiques de peau à peau mère-enfant des mères et les caractéristiques sociodémographiques suivantes : l'âge ($p = 0,04$), l'origine ethnique ($p < 0,001$), l'état matrimonial ($p = 0,028$), le niveau d'éducation ($p = 0,001$), la profession ($p = 0,001$) et le revenu mensuel ($p < 0,001$). **Conclusion.** Les parents de nourrissons prématurés et de nourrissons de faible poids de naissance devraient être éduqués et encouragés à pratiquer le peau à peau mère-enfant. Des recherches supplémentaires sont nécessaires pour proposer des stratégies et développer des modèles de mise en œuvre du peau à peau mère-enfant au Mali.

HIGHLIGHTS**What is already known on this topic**

Kangaroo mother care for preterm and low-birth-weight infants is associated with less postpartum maternal depression, stress and anxiety, and better mother-infant attachment and bonding.

What question this study addressed

To assess the practice of immediate maternal kangaroo care for low-birth-weight newborns in the communes of Bamako, Mali.

What this study adds to our knowledge

More than three-quarters of mothers have good knowledge and practice. Half of the mothers practice kangaroo mother care at least between one to two hours a day.

How this is relevant to practice, policy or further research.

Parents of preterm infants and infants with low birth weight should be educated and encouraged in the practice of KMCs.

INTRODUCTION

Low birthweight is a global public health problem. Progress in reducing the prevalence of low birthweight has been slow or non-existent in all regions. The greatest decline has been in South Asia, where prevalence has fallen by 4.5 percentage points over 20 years. Slight decreases in prevalence were observed between 2000 and 2020 in West and Central Africa, East and Southern Africa, and Europe and Central Asia. Several regions saw no change or a slight increase in prevalence between 2000 and 2020, including Latin America and the Caribbean, North America, the Middle East and North Africa, and East Asia and the Pacific (UNICEF, 2023).

By the end of 2020, 19.8 million newborns, or around 14.7% of all babies born worldwide that year, were suffering from low birthweight (UNICEF, 2023). These babies were more likely to die within their first month of life, and those who survived face lifelong consequences, including a higher risk of stunting (Christian et al., 2013), lower IQ (Gu et al., 2017) and chronic adult illness (Jornayvaz et al., 2016). Babies with low birth weight have a 2.5 times higher risk of newborn death compared to babies born with normal weight (Saputri et al., 2023)

Kangaroo mother care, originally defined as skin-to-skin contact between a mother and her newborn, frequent and exclusive or almost exclusive breastfeeding and early discharge from hospital, has been proposed as an alternative to conventional neonatal care for low-birth-weight infants (Conde-Agudelo et al., 2016). A systematic review reported that kangaroo mother care for preterm and low-birth-weight infants was associated with less postpartum maternal depression, stress and anxiety, and better mother-infant attachment and bonding (Pathak et al., 2023). Barriers to the practice of SMK are often related to gaps in SMK knowledge, attitudes, and practices among parents of preterm and low-birth-weight babies; socioeconomic, cultural, and structural factors; community beliefs and values regarding preterm and low-birth-weight babies; health professionals' acceptance of SMK as well as their motivation to implement practices;

and shortages of supplies in health facilities (Bilal et al., 2021).

In Mali, despite the successes achieved in the health sector in recent years, the health situation remains characterized by persistently high morbidity and mortality, particularly for mothers and children. Around 54 deaths per 1,000 births were recorded at the end of 2018 (EDS, 2018). Furthermore, the Ministry of Health through the DHIS2 reports that 16613 and 18402 cases of low birth weight were recorded in 2019 and 2020, respectively (Mali Ministry of Health, 2021). At the reference hospital, CHU Gabriel Touré, which is the reference center for newborn care, prematurity is the second leading cause of hospitalization (CHU Report, 2022). Almost all these premature babies stay in the kangaroo unit. Another previous study conducted in Mali reported that, 29% of neonatal deaths are due to babies born before 37 weeks' gestation (USAID, 2019). This situation reflects a real concern and worry.

Mali, like all other countries, would like to eliminate avoidable deaths of newborns and children under 5. This study aims to appreciate the practice of immediate kangaroo mother care for low-birth-weight newborns in the communes of Bamako, Mali.

PATIENTS AND METHODS**Study design**

This study was carried out in the six communes of Bamako in Mali in the CSRéf. In Bamako, each commune is equivalent to a health district. There are six health districts in the entire city, and each district corresponds to a health area. This is a cross-sectional quantitative study using an adapted questionnaire from previous studies (Adipamide et al., 2021; Esan et al., 2020; Nabiwemba et al., 2014) to achieve the objective of the study. This questionnaire was designed in four parts: (i) the socio-demographic characteristics of mother-newborn couples; (ii) mothers' knowledge of kangaroo mother care; (iii) mothers' attitudes towards kangaroo mother care; and (iv) mothers' practices on kangaroo mother care and survival of low-birth-weight newborns.

Population

This study involved mother-newborn couples in the six health districts of Bamako, Mali. According to the Ministry of Health's report in 2021, about 3156 low-birth weight newborns are registered in the communes of the district of Bamako, Mali. Of these newborns, about 1560 received resuscitation (DHIS2-Ministry of Health, 2022). Sample size was calculated using Raosoft software. The following parameters were used (i) a 95% confidence interval; (ii) a margin of error of 5%; and (iii) an average response distribution of 50%.

The required sample for this study is 343 mothers of newborns. The information is collected in the maternity wards of the six (6) CSRéf in the district of Bamako. This study used the simple random sampling method.

Study variables

This study used mother-newborns socio-demographics information, mother knowledge and attitudes on Kangaroo mother care as independent variables. Practices

on kangaroo mother care and survival of newborns with low birth weight was defined as dependant variables in this study.

Definition of terms

- Low birth weight has been defined by WHO as weight at birth of < 2500 grams (5.5 pounds).

Kangaroo mother care is a method of care of preterm infants. The method involves infants being carried, usually by the mother, with skin-to-skin contact.

Study instrument

The instrument of this study was aim to collect data leading to the assessment of mothers' knowledge, attitudes, and practices about kangaroo maternal care and survival of newborns with a birth weight below norm in communes in Bamako district, Mali.

The questionnaire was adapted from previous studies and consisted of four parts.

- Part A is related to the socio-demographic information of the subject, these are age, ethnicity, marital status, type, level of education, monthly income, parity, gestation, weight, and sex of the newborn.
- Part B examines mothers' knowledge of kangaroo maternal care and survival of newborns with a birth weight below norm using a 10-item questionnaire. For knowledge, each question is scored using a 2-point scale (0 = wrong answer or "don't know", 1 = correct answer). The total knowledge score ranges from 0 to 10. A higher score means better knowledge and a score below 6 is defined as low knowledge.
- Part C explores mothers' attitudes towards kangaroo maternal care and survival of newborns with a below-normal birth weight using a six-item questionnaire with a 4-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = agree and 4 = strongly agree). To determine the attitude of the participants, negative sentences are recorded, and scores assigned accordingly (1 = most negative attitude, 4 = most positive attitude). The total attitude score ranges from 6 to 24. A higher score means a more positive attitude and a score below 16 is defined as a negative attitude.
- Part D refers to mothers' practices on kangaroo maternal care and survival of newborns with low birth weight. The practice is assessed in Part D, using a 10-item questionnaire. Each question is scored using a 2-point scale (1 = Best practice, 0 = Bad practice). A higher score means better practice and a score below 6 is defined as bad practice.

Data collection and analysis process

Data collections are collected by using a questionnaire b. A pilot study was conducted with 10% of the sample. The purpose of the pilot study is to evaluate feasibility, time, cost, and adverse effects, to improve the study design before our large-scale research project is carried out. Data from the pilot study were used to determine the reliability of the questionnaire prior to data collection. Data collection was conducted from June to October 2022. Data were entered into an Excel version 2016 file and then exported to SPSS version 22 for descriptive and inferential analyses. Descriptive analysis included frequencies and percentages, was used. A chi-square test was done to assess the distribution between the variables. The significance level was set at P <0.05 for all analyses.

Research ethics

The protocol for this study has been submitted to the Ethics Committee for Health Research in Mali for approval. Subsequently, a request for authorization to conduct the study was sent to the authorities of the Ministry of Health of Mali. Also, a written consent form was submitted to each participant prior to data collection. Participants' data is kept confidential. All study data is stored in a safe place by the researcher for at least three years and then destroyed.

RESULTS

Newborn information

More than half (56.4%) of newborns are girls and nearly two-thirds (64.3%) have good overall health. The prevalence of underweight at birth was 20.8% at the time of the survey. About 9.1% of newborns have poor general health. Please find detailed information on newborn in Table I

Table I . Newborn Information

	Frequence	Percentage
Sex		
Girl	390	56.4
Boy	302	43.6
Birth weight		
Normal Weight	548	79,2
Low weight	144	20,8
Health status		
Good	445	64.3
Fair	184	26.6
Poor	63	9.1

Correlation between knowledge, attitudes, and practices

The Pearson correlation test (Table II) reported a mean positive correlation between knowledge and attitudes (P< 0.001). A weak positive correlation was also reported between knowledge and practice (P<0.01).

Table II. Correlation between knowledge, attitudes, and practices with.....

		Knowledge	Attitudes	Practices
Knowledge	Pearson Correlation	1		
Attitudes	Pearson Correlation	0,556***	1	
Practices	Pearson Correlation	0,221**	0,190**	1

*** P< 0,001; ** P<0,01

Tableau III. Distribution between socio-health characteristics and kangaroo maternal care practice			
	Bad practice n(%)	Best practice n(%)	P-value
Knowledge			<0.001
Poor	55 (71.4)	103 (16.7)	
Good	22 (28.6)	512 (83.3)	
Attitude			<0.001
Negative	57 (74.0)	137 (22.3)	
Positive	20 (26.0)	478 (77.7)	
Age (years)			0.04
15-25	41 (53.2)	355(57.7)	
26-49	36 (46.7)	260 (42.2)	
Marriage Situation			0.028
Married	45 (58.4)	369 (60.0)	
Single	23 (29.9)	218 (35.4)	
Divorced/Widowed	9 (11.7)	28 (4.6)	
Level of education			0.001
Non educated.	40 (51.9)	195 (31.7)	
Primary/Secondary	26 (33.8)	238 (38.7)	
University	11 (14.3)	182 (29.6)	
Profession			0.001
Employment	15 (19.5)	235 (38.2)	
No Job	62 (80.5)	380 (61.8)	
Monthly income			<0.001
< 100 000 FCFA	72 (93.5)	282 (45.9)	
≥ 100,000 FCFA	5 (6.5)	333 (54.1)	
Parity			<0.001
0-1	17 (22.1)	205 (33.3)	
2-3	46 (59.7)	225 (36.6)	
4 and more	14 (18.2)	185 (30.1)	
Antenatal care			0.741
0-1	16 (20.8)	127 (20.7)	
2-3	21 (27.3)	193 (31.4)	
4 and more	40 (51.9)	295 (48.0)	
Duration of KMC (hours)			0.113
Less than 3 hours	33 (42.9)	313 (50.9)	
3 hours and more	44 (57.1)	302 (49.1)	

Distribution between socio-health characteristics and kangaroo maternal care practice

The chi-square test (Table III) reported a significant relationship between mothers' KMC-related practices and the following variables: knowledge ($P>0.001$) and attitudes ($P>0.001$). In addition, a significant relationship was also observed between mothers' KMC practices and the following socio-demographic characteristics: age ($p=0.04$), ethnic origin ($p<0.001$), marital status ($p=0.028$), level of education ($p=0.001$), occupation ($p=0.001$) and monthly income ($p<0.001$). There is also a significant relationship with parity ($p<0.001$).

DISCUSSION

The prevalence of low birth weight is 20.8% at the time of the survey and about 9.1% of newborns have poor overall health. The results of our study are almost similar with the prevalence of NPF globally which varies between 15-20% worldwide (WHO, 2022).

Good knowledge leads to positive attitudes and good practices. The Pearson correlation test reported a positive correlation between knowledge, attitudes, and practices. This study reported that more than three-quarters of mothers have good knowledge and practice. And nearly three-quarters of mothers displayed a positive attitude towards KMCs. This figure is better than that of a meta-analysis conducted in Ethiopia whose results reported that the combined prevalence of good knowledge of kangaroo mother care is 64.62%. More than half (61.5%) of women who have given birth in Ethiopia have a positive attitude

towards kangaroo maternal care. The combined level of good practice in kangaroo maternal care is 45.7% (Gebeyehu et al., 2022). This systematic review and meta-analysis revealed that there is a significant gap in kangaroo mother care knowledge, attitudes, and practices among Ethiopian women. In addition, the combined prevalence of knowledge, attitudes, and practices differs across study parameters, regions, publications, gestational ages, birth weights, and components of kangaroo maternal care (Gebeyehu et al., 2022). Another previous study conducted in the Harar region of Ethiopia reinforces our findings by reporting that 82.53% of mothers have good knowledge, 82.53% have a positive attitude towards KMCs, 32.12% practice KMCs correctly. Participants also reported the benefits of KMCs, such as protection against infection, warmth for the baby, exclusive breastfeeding, weight gain and growth, early hospital discharge, safety, and love (Jamie, 2020). Another previous study conducted in Nigeria reports that mothers attending antenatal clinics have little knowledge about kangaroo mother care, but they do know what KMC practice is. Most women don't know that the practice is called kangaroo mother care, but they are used to seeing mothers practicing KMC. The results revealed that participants have poor knowledge of kangaroo maternal care (Olu-Abiodun et al., 2022).

In this study, two-thirds of mothers displayed a positive attitude, reporting that KMCs improve the mother's confidence in handling her baby and that they are simple to carry and handle the baby. More than three-quarters of

mothers immediately placed the newborn on their chest. Skin-to-skin contact occurs when a full-term naked newborn is placed on the mother's abdomen or bare chest within 10 minutes of birth or shortly after. Due to its multiple benefits for both mother and newborn, skin-to-skin contact is highly recommended by the World Health Organization. This figure aligns with that of an earlier study conducted in Arab countries whose results reported that Arab mothers have positive attitudes towards skin-to-skin contact (Hawsawi et al., 2021).

This study reported that half of the mothers practice kangaroo mother care at least between one to two hours a day. This can be explained by the lack of privacy and motivation that reduces the amount of time mothers practice KMC. An earlier study of kangaroo mother-based community care for babies with sub-norm birth weight reported that more than three-quarters of mothers received health education about KMC during the prenatal period and nearly two-thirds of family members also attended KMC sessions with pregnant women. More than half of women started KMC within 72 hours of birth (Rasaily et al., 2017).

Strategies to increase family support prior to discharge from the maternity ward can overcome these barriers and increase the amount of time infants experience skin-to-skin contact. KMC education and teaching with ongoing support for families with low-birth-weight infants should be prioritized for the continuation of KMC at home after hospital discharge. Future programs can increase the spread and uptake of KMC by specifically addressing the enablers and barriers related to the duration of home-based KMS.

This study could not include mothers in hospitals and private clinics. Also, this study could not include home births where some babies were born with a low birth weight. More researches are needed to design best strategies and models for the implementation of KMCs in Mali

Acknowledgment

We would like to acknowledge the mothers and their newborns from the six health districts of Bamako in Mali.

Financial support and sponsorship

None.

Authors' contributions

All authors participated in the conceptualization and design of this manuscript. All authors provided essential comments for data analyses and manuscripts. All authors have read and approved the final version for submission.

Conflict of interest

The authors declare no conflicts of interest.

REFERENCES

1. Adisasmita A, Izati Y, Choirunisa S, Pratomo H, Adriyanti L (2021). Kangaroo mother care knowledge, attitude, and practice among nursing staff in a hospital in Jakarta, Indonesia. *PLoS One.*; 16(6):e0252704. doi: 10.1371/journal.pone.0252704. PMID: 34086791; PMCID: PMC8177461.
2. Bilal SM, Tadele H, Abebo TA, Tadesse BT, Muleta M, W/Gebriel F, Alemayehu A, et al. (2021). 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*;21(1):25. doi: 10.1186/s12884-020-03409-6. PMID: 33413193; PMCID: PMC7789316.

3. Christian P, Lee SE, Donahue Angel M, Adair LS, Arifeen SE, Ashorn P, et al. (2013). Risk of childhood undernutrition related to small-for-gestational age and preterm birth in low- and middle-income countries. *Int J Epidemiol*; 42(5):1340-55.
4. Conde-Agudelo A, Díaz-Rossello JL (2016). Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev.*;2016(8):CD002771. doi: 10.1002/14651858.CD002771.pub4. PMID: 27552521; PMCID: PMC6464509.
5. Esan DT, Adedeji OA, Bello CB, Omolafe MC (2020). Knowledge and practices of immediate newborn care among midwives in selected health care facilities in Ekiti State, Nigeria. *Pan Afr Med J*;37:263. doi: 10.11604/pamj.2020.37.263.24628. PMID: 33598078; PMCID: PMC7864274.
6. Gebeyehu NA, Gelaw KA, Azeze GA, Admass BA, Lake EA, Adela GA (2022). Knowledge, attitude and practice towards kangaroo mother care among postnatal women in Ethiopia: Systematic review and meta-analysis. *PLoS One.*;17(5):e0265411. doi: 10.1371/journal.pone.0265411. PMID: 35522657; PMCID: PMC9075620.
7. Gu H, Wang L, Liu L, Luo X, Wang J, Hou F, Nkomola PD, Li J, Liu G, Meng H, Zhang J, Song R (2017). A gradient relationship between low birth weight and IQ: A meta-analysis. *Sci Rep*; 7(1):18035.
8. Hawsawi A, Fernandez R, Mackay M, Alananzeh I (2021). Knowledge, Attitudes, Practices, Barriers and Facilitators to Skin-To-Skin Contact Among Arabian Mothers and Health Care Providers in Arab Countries: A Systematic Scoping Review. *International Journal of Childbirth.*; Vol 12 Issue 4 , DOI: 10.1891/IJC-2021-0049
9. Jamie A. H. Knowledge, attitude and practice of kangaroo mother care among postnatal mothers in a tertiary care center of Harari region, Harar, Ethiopia. *Public Health of Indonesia*, (2020). 6(4),116–122
10. Jornayvaz FR, Vollenweider P, Bochud M, Mooser V, Waeber G, Marques-Vidal P (2016). Low birth weight leads to obesity, diabetes and increased leptin levels in adults: the CoLaus study. *Cardiovasc Diabetol.* 15: 73.
11. Ministry of Health of Mali. 2020 DHIS2 data, Bamako, Mali, 2021.
12. Nabiwemba EL, Atuyambe L, Criel B, Kolsteren P, Orach CG (2014). Recognition and home care of low-birth-weight neonates: a qualitative study of knowledge, beliefs and practices of mothers in Iganga-Mayuge Health and Demographic Surveillance Site, Uganda. *BMC Public Health*;14:546. doi: 10.1186/1471-2458-14-546. PMID: 24888464; PMCID: PMC4064282.
13. National Institute of Statistics (INSTAT), Planning and Statistics Unit for the Health-Social Development and Family Promotion Sector (CPS/SS-DS-PF) and ICF. 2019. Mali Demographic and Health Survey 2018. Bamako, Mali and Rockville, Maryland, USA: INSTAT, CPS/SS-DS-PF and ICF.
14. Olu-Abiodun O, Sodimu O, Fadipe O, Anokwuru R, Alli A, Abiodun O (2022). Knowledge and perception of the practice of kangaroo mother care among women attending antenatal clinic. *Journal of Neonatal Nursing*; ISSN 1355-1841, <https://doi.org/10.1016/j.jnn.2022.06.006>.
15. Pathak BG, Sinha B, Sharma N, Mazumder S, Bhandari N (2023). Effects of kangaroo mother care on maternal and paternal health: systematic review and meta-analysis. *Bull World Health Organ*;101(6):391-402G. doi: 10.2471/BLT.22.288977. Epub 2023 Mar 31. PMID: 37265678; PMCID: PMC10225947

16. Rasaily R, Ganguly KK, Roy M, Vani SN, Kharood N, Kulkarni R, et al. (2017). Community based kangaroo mother care for low-birth-weight babies: A pilot study. *Indian J Med Res*;145(1):51-57. doi: 10.4103/ijmr.IJMR_603_15. PMID: 28574014;
17. Saputri CS, Rizki AW, Flora VH, Murti B, Wulandari AY (2023). Meta Analysis: Associations between Prematurity, Low Birth Weight, and Residence on the Risk of Newborn Death. *J Matern Child Health*. 09(02): 138-151. <https://doi.org/10.26911/thejmch.2024.09.02.02>
18. UNICEF. Low birthweight. UNICEF, 2023. Available on the following website and accessed on 20 April 2024 <https://data.unicef.org/topic/nutrition/low-birthweight/>
19. USAID . Kangaroo Maternal Care Helps Premature Baby Survive, 2019; USAID. <https://www.mchip.net/sites/default/files/Mali%20KMC%20Report.pdf>
20. WHO. Newborn health. Geneva, WHO; 2022. Available at the following website <https://www.euro.who.int/en/health-topics/Life-stages/maternal-and-newborn-health/data-and-statistics/newborn-health>