

Morbidity and Mortality Rate of Low Birth Weight at the Reference Health Center of Markala in Mali

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DOI: <https://doi.org/10.36348/sijtem.2026.v09i08.001>

| Received: 11.06.2026 | Accepted: 03.08.2026 | Published: 08.08.2026

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Abstract

The aim of the study was to assess morbidity and mortality among low birth weight newborns in the Markala Health District. **Patients and Methods** : This was a cross-sectional, descriptive and quantitative study conducted in the Markala Health District. **Inclusion Criteria**: Newborns with a birth weight of less than 2,500 g who were born and/or received care at a healthcare facility in the Markala Health District during the data collection period were included. **Exclusion Criteria**: Newborns with a birth weight of less than 2,500 g who came from another health district were excluded. **Results**: The average weight of low birth weight newborns was 1,964.58 grammes, with a mode of 2,000. The standard deviation was 402.972. The sex ratio favoured females, at 1.07. Factors associated with morbidity and mortality included, amongst others: Infection (60 per cent), respiratory distress (30 per cent) and hypothermia (10 per cent). It should also be noted that 90 per cent of deaths among low birth weight (LBW) infants occurred in pregnancies with a CPN rate of less than three (03). One third (70 per cent) of these LBW infants were delivered vaginally. The mortality rate was 8.8 per cent. **Conclusion**: This study identified the factors associated with morbidity and mortality in low birth weight newborns, with the main determinants identified including infections, respiratory distress, low birth weight, low rates of antenatal care, and obstetric history (e.g. hypertension).

Keywords: Low birth weight, morbidity and mortality, MARKALA CSRéf.

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INTRODUCTION

A low birth weight (LBW) newborn is one who weighs less than 2,500 grammes at birth. LBW newborns fall into two categories:

- Preterm or premature newborns ;
- Newborns who are small for gestational age (SGA).

They share common characteristics : weight below 2,500 g; small stature (less than 45 cm on average) ; and a submammary nodule measuring less than 5 mm.

The arrival of a child into the family, whilst a natural and social phenomenon, remains a very significant event for parents and the community. However, the child's survival and the occurrence of health problems remain a major concern not only for parents but also for the community and healthcare providers.

Malnutrition and low birth weight are two common causes of morbidity and mortality among children in sub-Saharan Africa [1].

Birth weight is described as the main determinant of survival chances among newborns [2]. Low birth weight is associated with infant mortality and postnatal health complications [3].

Low birth weight is considered a major public health problem, particularly in developing countries where poor maternal nutritional status is identified as a cause of both short- and long-term adverse outcomes [2]. A study confirms the extreme vulnerability of very low birth weight babies, who have high rates of morbidity and mortality [4].

In 2020, 19.8 million newborns – representing 14.7 per cent of all babies born worldwide that year – were underweight at birth. These babies were more likely to die during their first month of life, and those who

survived faced lifelong consequences, including an increased risk of stunted growth (Krasevec *et al.*, 2022) [6].

Globally, around 15 per cent of newborns are born with low birth weight (LBW) as a result of preterm birth, intrauterine growth restriction, or both. Up to 70 per cent of neonatal deaths occur in this group within the first 3 days after birth. It has been shown that kangaroo mother care (KMC), when applied after the infant has been stabilised, reduces mortality by 40 per cent among hospitalised infants weighing less than 2.0 kg [7].

Low birth weight (LBW) is defined as a birth weight of 2,500 g or less, regardless of the duration of pregnancy [8].

It is one of the main factors affecting infant morbidity and mortality worldwide. Every day, around 800 women die from causes related to pregnancy and childbirth across the globe. Maternal illness increases the risk of low birth weight [9]. Low birth weight is associated with infant mortality and postpartum health complications.

The proportion of low birth weight infants is lower in the Bamako District (10 per cent) than in other regions. According to the 2018 DHS, this proportion is highest in the Gao region (54 per cent) [10].

Newborns with low birth weight often require intensive care. However, in the absence of resources, home-based care could theoretically replace essential healthcare [11].

Malnutrition and low birth weight are two common causes of morbidity and mortality among children in sub-Saharan Africa. Infants with low birth weight (LBW) were at higher risk of death during their first year of life [1].

Early administration of colostrum to preterm infants was associated with a higher volume of breast milk at discharge, which was a significant benefit in the care of very low birth weight (VLBW) preterm infants [12].

In a study conducted by Gillone *et al*, survival among babies weighing no more than 500 g in the cohort remained poor despite advances in neonatal care, with considerable short-term neonatal morbidity among survivors. This may be due to a combination of clinical practices and a rather conservative approach to resuscitation and intensive care, as well as the intrinsic nature of these very small babies [13].

In the study by Wu F *et al.*, the overall survival rate at discharge was 52.5 per cent. 5.7 per cent died despite active treatment, and 31.9 per cent died after medical care was withdrawn. The overall survival rate is

lower than that in developed countries, and the withdrawal of medical care is a serious problem in China [14].

In these studies, infants were randomised and KMC (SMK) was initiated after approximately 3 days, by which time the majority of neonatal deaths had already occurred (iKMC 2020) [7].

The rate of preterm births in France stands at 6 per cent and is rising, as is the rate of extremely preterm births. Morbidity and mortality rates in this population remain high despite significant medical advances [4].

Prematurity accounted for 26.7 per cent of admissions of newborns to Ségou Hospital, with a case-fatality rate of 47.50 per cent among preterm infants and 20 per cent among those with low birth weight. Prematurity accounted for 26.7 per cent of hospitalised newborns and 47.50 per cent of deaths at Ségou Regional Hospital, according to the study on neonatal mortality and morbidity in paediatrics [15].

METHODOLOGY

The study was conducted in the Markala Health District. This was a descriptive, quantitative cross-sectional study using primary data. The study variables were both dependent and independent. The target population comprised all low birth weight newborns (< 2,500 g) treated in healthcare facilities within the Markala Health District during the study period, as well as their mothers.

Inclusion Criteria: Participants were included in the study based on the following criteria:

- Having a birth weight of less than 2,500 g
- Having been born and/or received care at a healthcare facility in the Markala district
- Having been admitted during the data collection period
- The biological mother being present and having given her informed consent.

Exclusion Criteria:

- Newborns whose birth weight is not documented
- Mothers who were absent or who refused to participate in this study.

Study Instrument : The main data collection tool in this study is a structured questionnaire, developed on the basis of the specific research objectives.

Data Collection Period: Data collection and follow-up took place over a three-month period following birth, from May to August 2025.

Statistical Analyses: The data were entered into Excel and then transferred to SPSS for descriptive analyses.

RESULTS

Our study involved data collection and a three-month follow-up period after birth, running from May to August 2025. During this study period, we recorded 114 newborns with low birth weight. The sex ratio favoured females at 1.07.

The mean gestational age was 34.52 weeks, with a mode of 36 weeks' gestation and a standard

deviation of 3.3. The mean weight of the low birth weight newborns was 1,964.58 grammes, with a mode of 2,000. The standard deviation was 402.972.

The short-term outcomes are generally positive, with a high survival rate (86 per cent) and a short hospital stay for the majority of cases (94 per cent were discharged within three days) (Table 1).

Table 1 : Short-term clinical outcomes.

Variable	Category	Effectif	Percentage
Length of hospital stay (days)	1	62	54,4
	2	45	39,5
	≥ 3	7	6,1
Output type	Alive	98	86,0
	Death	10	8,8
	Evacuated	6	5,3
Sheduled Care (CPON)	Yes	114	100,0
Protocol applied	PNP SR	54	47,4
	Kangaroo Protocol	39	34,2
	None	20	17,5
Adequate Human Resources	Yes	54	47,4
Adequate material Resources	Yes	94	82,5

All children were cared for in accordance with the CPON programme, but only 47.4 per cent received care under the PNP SR protocol, and 34.2 per cent under the kangaroo care protocol. The use of clearly defined protocols still appeared to be limited (17.5 per cent without a protocol). Finally, nearly half of the facilities lack sufficient human resources (52.6 per cent), although the majority have the necessary material resources (82.5 per cent), which could affect the quality of care.

All female newborns weighing between 500 and 1,000 g were transferred, whilst 94.3 per cent of female newborns weighing between 2,001 and 2,499 g survived. We observed a high mortality rate in the ≤ 2,000-gramme weight group, with 80 per cent of cases split equally between the two sexes (40 per cent/40 per cent) (Table 2).

Table 2: Breadown of newborns' weights and sex by type of discharge

Sex			Output type			
			Death	Evacuated	Alive	Total
Female Weight(g)	500-1000	Effectif	0	1	0	1
		%	0.0	100.0	0.0	100.0
	1001-1500	Effectif	1	1	10	12
		%	8.3	8.3	83.3	100.0
	1501-2000	Effectif	3	2	6	11
		%	27.3	18.2	54.5	100.0
	1001-1500	Effectif	0	2	33	35
		%	0.0	5.7	94.3	100.0
	Total	Effectif	4	6	49	59
		%	6.8	10.2	83.1	100.0
Male Weight(g)	1001-1500	Effectif	3	0	3	6
		%	50.0	0.0	50.0	100.0
	1501-2000	Effectif	1	0	12	13
		%	7.7	0.0	92.3	100.0
	2001-2499	Effectif	2	0	34	36
		%	5.6	0.0	94.4	100.0
	Total	Effectif	6	0	49	55
		%	10.9	0.0	89.1	100.0
Total Weight(g)	500-1000	Effectif	0	1	0	1
		%	0.0	100.0	0.0	100.0

Sex		Output type				
		Death	Evacuated	Alive	Total	
	1001-1500	Effectif	4	1	13	18
		%	22.2	5.6	72.2	100.0
	1501-2000	Effectif	4	2	18	24
		%	16.7	8.3	75.0	100.0
	2001-2499	Effectif	2	2	67	71
		%	2.8	2.8	94.4	100.0
	Total	Effectif	10	6	98	114
		%	8.8	5.3	86.0	100.0

The highest number of deaths was observed among mothers who had suffered from hypertension.

recorded among those who had suffered from neonatal infections (Table 3).

Fewer newborns survived among those with feeding difficulties (2 per cent), whilst more deaths were

Table 3: Breakdown of discharge categories by complications observed in children

Observed Complications								
Type sortie		Distress Suffering	Hypo thermia	Severe jaundice	Infection	Nothing to report	Refusal to breastfeed	Total
Deceased	Effectif	3	1	0	6	0	0	10
	%	30.0	10.0	0.0	60.0	0.0	0.0	100.0
Evacuated	Effectif	1	0	0	3	2	0	6
	%	16.7	0.0	0.0	50.0	33.3	0.0	100.0
Alive	Effectif	4	9	1	14	68	2	98
	%	4.1	9.2	1.0	14.3	69.4	2.0	100.0
Total	Effectif	8	10	1	23	70	2	114
	%	7.0	8.8	0.9	20.2	61.4	1.8	100.0

75.5 per cent of survivors were born via vaginal delivery, and 30 per cent of deaths occurred in cases where delivery was by caesarean section.

whilst amongst survivors, newborns whose mothers had a PPN of 4 or above were more prevalent.

Deceased newborns were more prevalent amongst those born with a PPN below 4 (90 per cent),

Newborns with a body temperature of 36°C or below ($\leq$) accounted for 90 per cent of all deaths (Table 4).

Table 4: Breakdown of exit types by number of CPNs completed

Output type		Newborns' Temperature (°C)				Total
		34-35.4	35.5-36	36.1-37.4	37.5-38.5	
Death	Effectif	2	7	1	0	10
	%	20.0	70.0	10.0	0.0	100.0
Evacuated	Effectif	0	4	1	1	6
	%	0.0	66.7	16.7	16.7	100.0
Alive	Effectif	13	83	2	0	98
	%	13.3	84.7	2.0	0.0	100.0
Total	Effectif	15	94	4	1	114
	%	13.2	82.5	3.5	0.9	100.0

The mortality rate remained moderate (8.8 per cent), though not insignificant, and highlights the importance of prompt and appropriate care.

DISCUSSION

The mean birth weight was 1,964.58 grammes, with a mode of 2,000. The standard deviation was 402.972. This mean is higher than that reported in Vietnam by Tran HT *et al.*, [16], whose study found a mean birth weight of 1,247 grammes.

The sex ratio favoured females at 1.07; this result is similar to that reported in Rwanda by Gérard Uwimana *et al.*, [17], where female newborns were associated with an increased risk of FPN (aOR : 1.43; 95% CI : 1.18, 1.73) compared with male newborns. However, this finding contrasts with that of a study conducted in Kenya by Onesmus Maina Muchemi *et al.*, [18]. There were 51.1 per cent (n = 165) male newborns and 48.9 per cent (n = 158) female newborns.

Short-term clinical outcomes in newborns

The above findings are corroborated by the meta-analysis conducted by Narciso *et al.*, (2022) [19] in Brazil, which concluded that KMC significantly reduces the length of hospital stay for preterm or low-birth-weight newborns.

A WHO study states that the median daily duration of skin-to-skin contact in neonatal intensive care units was 16.9 hours (Sugandha Arya *et al.*, 2021) [5].

This finding was particularly relevant for facilities such as the one in Markala, where hospital resources are limited. A high proportion of LWBs – approximately 94 per cent – had a hospital stay of less than three (03) days whilst in a clinically stable condition. The short-term outcomes are generally positive, with a high survival rate (86 per cent). The mortality rate remained moderate (8.8 per cent), though not negligible; 60 per cent of deaths were attributable to infections and 30 per cent to respiratory distress. This rate highlights the importance of prompt and appropriate care. All children were managed in accordance with the CPON programme, but only 47.4 per cent benefited from the PNP SR protocol, and 34.2 per cent from the kangaroo care protocol.

We found that 80 per cent of deaths occurred among LBW infants weighing 2,000 grammes or less, with an equal distribution between the sexes.

These figures reflect a system that is generally functioning effectively.

Extremely low birth weight (ELBW) infants are particularly vulnerable at birth, and stabilising them in the delivery room (DR) remains challenging [20].

Furthermore, an economic modelling study reported in AJOG demonstrated that the immediate introduction of KMC in resource-poor countries (notably Malawi, India, Nigeria, Tanzania and Ghana) reduced neonatal mortality, septicaemia and hypothermia, whilst generating gains in quality-adjusted life years (QALYs) and reducing healthcare costs. [21]. These multiple clinical, economic and organisational benefits confirmed the relevance of the kangaroo mother care method for contexts similar to that of Markala.

In Niger, Mahaman *et al.*, [22] reported a neonatal mortality rate of 12 per cent among low-birth-weight newborns, which was higher than that observed in Markala. This difference could be explained by the protocols in use at Markala.

In Ghana, Agyepong *et al.*, [23] observed a survival rate of 80 per cent in urban centres, slightly lower than that at Markala. The widespread adoption of the kangaroo care protocol also plays a key role there,

confirming that care focused on warmth, feeding and close monitoring significantly improves survival.

50 per cent of deaths were observed among low birth weight (LBW) infants from pregnancies without adequate antenatal care (ANC); however, one study found a statistically significant association between antenatal consultations and low birth weight in sub-Saharan Africa [24].

The primary outcome was mortality during hospitalisation.

Our study shows a link between hypothermia ($\leq 36^{\circ}\text{C}$) and mortality in low birth weight infants, accounting for 90 per cent of cases, as well as hypertension, which accounts for 40 per cent of deaths. Impaired thermoregulation is one of the most detrimental adverse effects during the 'golden period' and subsequently in the neonatal intensive care unit. Hypothermia is an independent risk factor for increased morbidity and mortality and can affect many of the body's systems, making management even more challenging [26].

CONCLUSION

The aim of this study was to assess the factors associated with the outcomes of low birth weight newborns in the Markala health district. Through a descriptive and comparative analysis of clinical, maternal, obstetric and neonatal data, the study identified factors associated with morbidity and mortality in low birth weight infants. The main determinants identified included infections, respiratory distress, low birth weight, low attendance at antenatal check-ups, obstetric history (hypertension) and early seeking of care.

Conflict of Interest: None.

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