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Original Research Article

Assessment of Factors Contributing to Low Birth Weight in Newborns at the Markala Reference Health Center in Mali

Ouattara Boubacar[1]*, Kanthé D[1], Kassogué A[2], Doumbia M[1], Kemenani M[1], Malle K[3]

[1]Markala Reference Health Centre (CSRéf)
[2]Paediatrics Department, Nianankoro Fomba Hospital, Ségou
[3]Ségou Regional Health Directorate (DRS)

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***Corresponding author:** Ouattara Boubacar
Markala Reference Health Centre (CSRéf)

Abstract

A low birth weight (LBW) newborn is one who weighs less than 2,500 grams at birth. Birth weight is described as the main determinant of survival chances in newborns. Low birth weight is associated with infant mortality and postpartum health complications. The aim of our study was to evaluate the factors contributing to low birth weight in newborns in the Markala Health District. ***Patients and Methods***: We conducted a descriptive, quantitative cross-sectional study in the Markala Health District. This study included newborns weighing less than 2,500 g at birth who were born and/or cared for in a health facility in the Markala District during the data collection period. Newborns weighing less than 2,500 g at birth and coming from another health district were not included. Sampling was non-probabilistic and exhaustive: all low birth weight newborns treated in health facilities in the Markala district during the collection period were included, as far as possible. The main data collection tool in this study was a structured questionnaire, developed on the basis of the specific objectives of the research. Data were collected over a three-month period after birth, from May to August 2025. ***Results***: The study identified several factors associated with low birth weight, including twin births (25.4%), young maternal age (22.8% among 15–19-year-olds) and medical conditions such as high blood pressure (17.5%) and malaria (10.5%). The average weight of low birth weight newborns was 1964.58 grams, with a mode of 2000. The standard deviation was 402.972. The sex ratio favoured females, at 51.8%. Mothers aged 30 to 34 were the most represented, at 25.4%, followed by the two extreme age groups, 15-19 and 35-39, at 22.8% each. ***Conclusion***: This study identified factors associated with low birth weight, the main determinants being twin births, teenage mothers, high blood pressure, infections, malaria and low attendance at prenatal consultations.

Keywords: Low Birth Weight, Assessment, MARKALA Health District.

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INTRODUCTION

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

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

They share common characteristics: Weight less than 2,500 g; Small size (less than 45 cm on average); Submammary nodule size less than 5 mm.

The arrival of a child in the home, although a natural and social phenomenon, remains a very important event for parents and the community. However, survival and the occurrence of defects remain a major concern for parents, as well as the community and caregivers.

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 in newborns [2]. Low birth weight is associated with infant mortality and postpartum 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 long-term and short-term adverse outcomes [2]. One study confirms the high vulnerability of very low birth weight babies, with high morbidity and mortality rates [4].

In 2020, 19.8 million newborns, or 14.7% of all babies born worldwide that year, were underweight at birth. These babies were more likely to die within their first month of life, and those who survived faced lifelong consequences, including an increased risk of stunted growth [5].

Globally, approximately 15% of newborns are born with low birth weight (LBW) as a result of premature birth or intrauterine growth restriction, or both. Up to 70% of neonatal deaths occur in this group within the first 3 days after birth. Kangaroo maternal care (KMC) applied after stabilisation of the infant has been shown to reduce mortality by 40% in hospitalised infants weighing less than 2.0 kg [6].

Low birth weight (LBW) is defined as a birth weight of 2,500 g at birth, regardless of gestational age [7].

It is one of the main factors affecting infant morbidity and mortality worldwide. Every day, approximately 800 women die from causes related to pregnancy and childbirth worldwide. Maternal illness increases the risk of LBW [8].

Low birth weight is associated with infant mortality and postpartum health complications.

The percentage of low birth weight children is lower in the Bamako District (10%) than in other regions. According to the 2018 DHS [9], the highest percentage is found in the Gao region (54%).

Birth weight has declined in recent years, with greater reductions among infants born to African-American women. These trends may be explained by the accumulation of risk factors such as hypertension and early obesity, which disproportionately affect African-American women [10].

Newborns with low birth weight often require intensive care. However, in the absence of resources, home 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 LBW had a higher risk of death during their first year of life [1].

The rate of premature births in France is 6% and is increasing, as is the rate of extremely premature births. Morbidity and mortality rates in this population remain high despite significant medical advances [4]. This study was conducted in Markala due to the scarcity of data on the factors contributing to low birth weight.

METHODOLOGY

Setting and Location of the Study

The study was conducted in the Markala Health District, which was created in 2005 when the Ségou Health Circle was split up in order to strengthen efforts to combat maternal and neonatal mortality. This district, covering an area of 7,686 km² with an estimated population of 355,713 in 2025, is subdivided into four districts and ten municipalities, with a health network comprising 26 functional health areas. This study site was chosen because of the persistent difficulties in caring for low-birth-weight newborns (high number of deaths or emergency evacuations) and because the investigator is present in the facility as a health professional. The Markala Reference Health Centre (CSRéf), the district's reference facility, has several medical departments (paediatrics, medicine, surgery, gynaecology, imaging, laboratory, ophthalmology, odontostomatology), equipment suitable for neonatology (incubators, phototherapy, oxygen extractors, etc.) and an Intensive Nutritional Recovery Unit (URENI). The area also benefits from microfinance structures, a few industrial units, an important river network (the Niger River) and the presence of the Office du Niger, which plays a key role in local agriculture. Finally, the district is also characterised by a remarkable cultural richness and a Sudanese-type climate.

We conducted a descriptive, quantitative cross-sectional study using primary data. The study variables are dependent and independent. The target population includes all low birth weight newborns (< 2,500 g) cared for in health facilities in the Markala health district during the study period, as well as their mothers.

Inclusion Criteria:

Participants were included in the study according to the following criteria:

- Birth weight less than 2,500 g
- Born and/or treated in a health facility in the Markala district
- Admitted during the data collection period
- Presence of biological mother and her informed consent.

Exclusion Criteria

- Newborns whose birth weight is not documented
- Mothers who are absent or have refused to participate in the study

Sampling Method:

Non-probability sampling with exhaustive coverage: All low birth weight newborns treated in health facilities in the Markala district during the data collection period were included, as far as possible.

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 after birth, from May to August 2025.

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

RESULTS

During the study period, we collected data on 114 low birth weight newborns who met our inclusion criteria. The sex ratio favoured females, with 51.8%. The average weight of low birth weight newborns was 1964.58 grams, with a mode of 2000. The standard deviation was 402.972. (Table I). The mean gestational age was 34.52 weeks, with a mode of 36 weeks and a standard deviation of 3.3. (Table II).

The average age of mothers of low birth weight babies was 27.66 years, with a mode of 30 years and a standard deviation of 7. The most representative antenatal care (ANC) was that with four or more antenatal visits, at 25.4%. The lowest was ANC 0, at 14%. (Figure 1). The most represented maternal age groups were 15-19 years and 35-39 years.

PPWs of 500-1000g were 100% in the 15-19 age group.

Mothers aged 30 to 34 were the most represented with 25.4%, followed by the two extreme age groups 15-19 and 35-39 with 22.8% each. (Table III). All newborns weighing between 500-1000g were delivered vaginally, and 21% were delivered by caesarean section and weighed between 2001 and 2499g. (Figure 2). All low birth weight newborns in the 500-1000 g range were female, while 54.2% of those in the 1501-2000 g range were male. All LBW babies in the 500-1000 g range were born in June. August saw a decline in all trends, but significantly to 0% for LBW babies weighing less than 1000 g.

The most representative week of amenorrhoea was 29-32 (SA) with a peak of 100% in the lower 1000g range, followed by the 33 to 36 SA range with 59.2%. (Figure 3). Single pregnancies were the most common, accounting for 74.6% of the total, especially in the 2001 to 2499 gram range (82.7%).

Regarding the outcome of LBW babies, there were fewer survivors among newborns with feeding difficulties (2%) and a higher mortality rate among those who had suffered neonatal infections.

Table 1: Statistics on the weight (g) of newborns

N	Valid	114
	Missing	0
Mean		1964.58
Mode		2000[a]
Standard deviation		402.972
Variance		162386.759
Minimum		890
Maximum		2490

Table 2: Statistics on gestational age in weeks of amenorrhea during pregnancy

N	Valid	114
	Missing	0
Mean		34.52
Mode		36
Standard deviation		3.276
Variance		10.730
Minimum		25
Maximum		41

Table 3: Statistics on mothers' ages

N	Valid	114
	Missing	0
Mean		27,66
Mode		30
Standard deviation		6,985
Variance		48,793
Minimum		17
Maximum		39

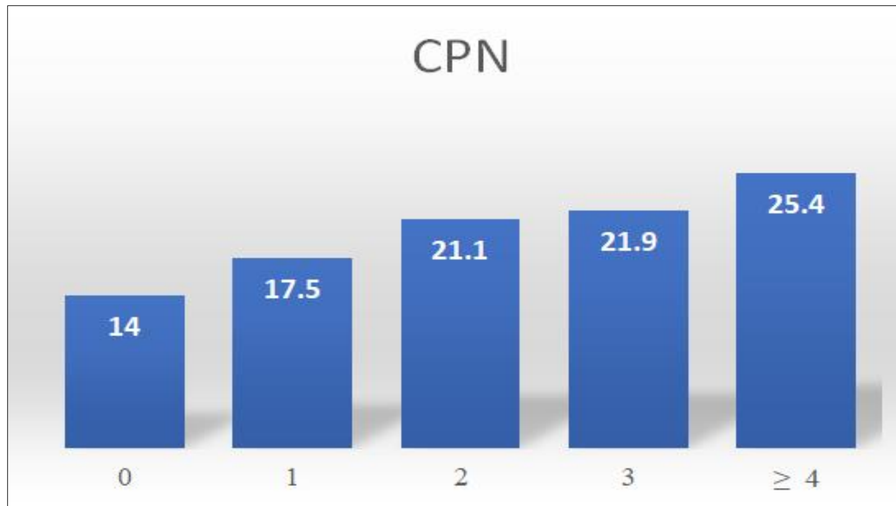

Figure 1: Frequency of antenatal consultations

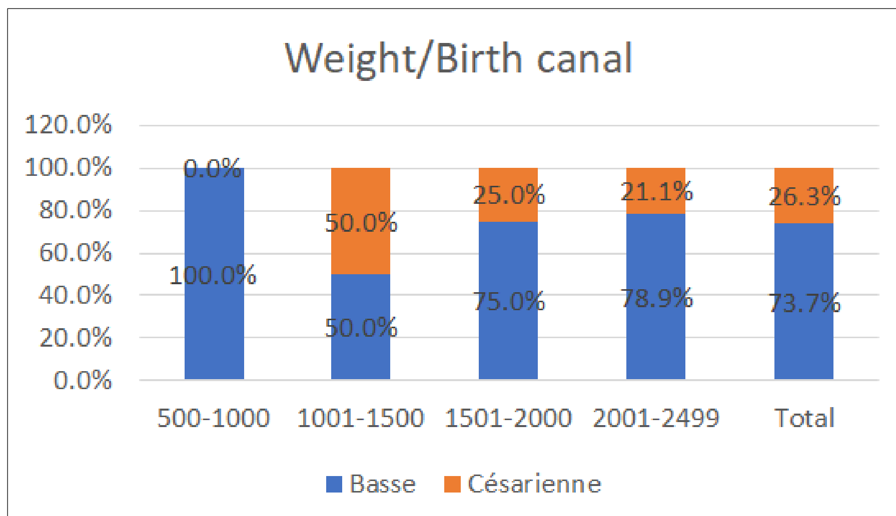

Figure 2: Distribution of birth weights according to delivery methods

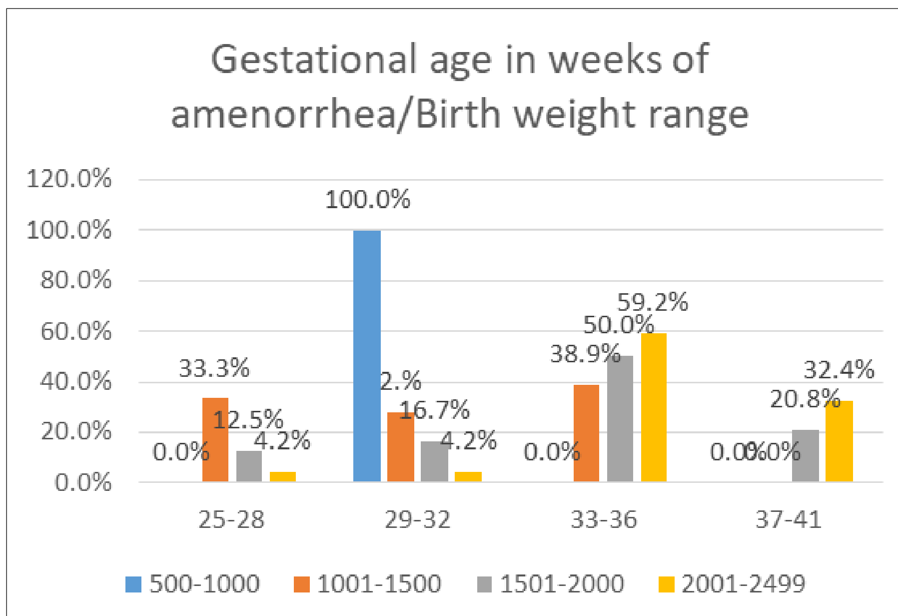

Figure 3: Distribution of newborn weight according to gestational age in weeks of amenorrhea

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DISCUSSION

The average weight of low birth weight newborns was 1,964.58 grams, with a mode of 2,000. The standard deviation was 402.972. This average is higher than the average birth weight of 1,247 grams found in Vietnam [14]. In the study by Gueye *et al.*, the average weight was 1,487 g [7].

The sex ratio favoured females, with 51.8% in our study. In Rwanda, female newborns were associated with an increase in low birth weight (aOR: 1.43; 95% CI: 1.18; 1.73) compared to male newborns [12], however, in Kenya, a study found that 51.1% (n = 165) of newborns were male and 48.9% (n = 158) were female [13].

The mean gestational age in our study was 34.52 weeks, with a mode of 36 weeks and a standard deviation of 3.3. The mean gestational age was 32 weeks. A median gestational age of 29 weeks was found in Vietnam [14].

The average age of mothers of low birth weight babies was 27.66 years, with a mode of 30 years and a standard deviation of 7. Mothers in the 30-34 age group were the most represented with 25.4%, followed by the two extreme age groups, 15-19 and 35-39, with 22.8% each.

In Nepal, a study found that low birth weight in newborns was significantly affected by the younger age of the mother and fewer weeks of gestation at birth. There was no significant impact on prenatal clinic visits, parity, sex of the baby, or type of delivery [15].

The most representative antenatal consultation in this study was that with four or more pregnancy follow-ups, at 25.4%. The lowest was zero antenatal consultations (CPN 0), at 14%. The role of low prenatal consultation rates in the risk of low birth weight has been described in several studies. Alirah *et al.*, report in their study that mothers who had 8 or more prenatal visits were less likely to have low birth weight babies than mothers who had fewer than 8 prenatal visits [cOR = 0.66; CI = 0.55 - 0.79], and this remained true after controlling for covariates [aOR = 0.68; CI = 0.56 - 0.82].
The average age of mothers of low birth weight babies was 27.66 years, with a mode of 30 years and a standard deviation of 7. Mothers in the 30-34 age group were the most represented with 25.4%, followed by the two extreme age groups, 15-19 and 35-39, with 22.8% each.

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The covariates associated with low birth weight were maternal age, marital status, educational level, age of the child, and wealth index. This study showed a statistically significant association between antenatal care and low birth weight in sub-Saharan Africa [16].

Similarly, Gérard *et al.*, state in their study that the use of high-quality prenatal care increased slightly over the three years of the survey and that low birth weight declined slowly [12]. This opinion is shared by another study, which states that fewer than eight prenatal visits were a determining factor [8].

In our study, low birth weight (500 to 1000 g) was 100% in the 15-19 age group.

100% of babies weighing less than 500 g were female, while 54.2% of those weighing 1501-2000 g were male. 100% of LBW births in the 500-1000 g range were born in June, while August coincided with a decline in all trends, but significantly to 0% for weights below 1000 g.

In the study by Kiy *et al.*, a total of 80 premature underweight children born to hypertensive mothers and 101 born to normotensive mothers were studied [17].

The most representative week of amenorrhoea was 29-32 weeks of gestation, with a peak of 100% in the under 1000 g range, followed by 33 to 36 weeks of gestation with 59.2%.

For Traore *et al.*, single pregnancies were the most common, accounting for 74.6% of the total, especially in the 2001 to 2499 gram range (82.7%). Gestational age, maternal age, gestation, parity, and prenatal care were found to be factors associated with low birth weight in our study [18].

Our study identified several factors associated with low birth weight, including twins (25.4%), young maternal age (22.8% among 15–19-year-olds) and medical history such as high blood pressure (17.5%) and malaria (10.5%). These determinants are well documented in the literature, particularly in low-income countries where prenatal care may be inadequate or delayed.

In Niger, Mahaman *et al.*, (2022) identified gestational hypertension (21%), urinary tract infections

(15%) and lack of antenatal care (32%) as the main factors associated with low birth weight. In our study, 14% of women did not attend any prenatal consultations, which supports the critical importance of medical monitoring during pregnancy [19].

In Côte d'Ivoire, Kouakou *et al*., (2020) highlighted a strong association between maternal malaria and the birth of premature or low birth weight babies. This trend is observed in our study, where 10.5% of mothers reported a history of malaria, highlighting the need to intensify antimalarial chemoprophylaxis during pregnancy [21].

A multicentre study in sub-Saharan Africa conducted by Mwangi *et al*., (2023) revealed that twin pregnancies triple the risk of low birth weight [22]. The high rate of twin pregnancies (25.4%) observed in our study exceeds regional averages (approximately 15%), which may partly explain the increased frequency of low birth weight in this district.

In summary, the risk factors identified in our study largely correspond to those observed in neighbouring countries, confirming the importance of strengthening prenatal care, preventing maternal pathologies and paying particular attention to pregnant adolescents in order to reduce the incidence of low birth weight in the region.

The short-term clinical results in our study showed a high survival rate (86%), a short hospital stay (94% of newborns discharged within 3 days), but also a significant mortality rate (8.8%).

In Niger, Mahamane *et al*., (2022) reported a neonatal mortality rate of 12% among low birth weight newborns, which is higher than our mortality rate. This difference could be explained by sample size and the practice of kangaroo mother care in our context [19].

In Ghana, Agyepong *et al*., (2023) observed a survival rate of 80% in urban centres, slightly lower than that in our study. The widespread use of the kangaroo protocol also plays an essential role there, confirming that care focused on warmth, feeding and close monitoring significantly improves survival [20].

CONCLUSION

The objective of this study was to evaluate the factors associated with low birth weight in the Markala health district in Mali. Through a descriptive and comparative analysis of clinical, maternal, obstetric and neonatal data, the study identified factors associated with low birth weight, with the main determinants being twin births, teenage mothers, high blood pressure, infections, malaria and low attendance at antenatal consultations.

REFERENCES

1. Mischlinger JC, Dejon-Agobé JC, Basra A, Mackanga JR, Akerey Diop D, Adegnika AA, Agnandji ST, Lell B, Kremsner PG, Matsiegui PB, Gonzalez R, Menendez C, Ramharter M, Mombo-Ngoma G. Poids à la naissance, croissance, état nutritionnel et mortalité des nourrissons de Lambaréné et Fougamou au Gabon au cours de leur première année de vie. PLoS One. 2021 Fév. 9;16(2):e0246694. doi: 10.1371/journal.pone.0246694. PMID : 33561169; PMCID : PMC7872243.
2. Sangi R, Ahsan AK, Khan AT, Aziz SN, Afroze M, Jamro S, Haque T, zaidi 'A, Tebha SS. Évaluation de l'Association de l'état nutritionnel de la mère avec le poids de la naissance néonatale dans les grossesses à terme: étude transversale avec des résultats inattendus. Cureus. 2021 août 31;13(8):e17621. doi: 10.7759/cureus.17621. PMID : 34650840; PMCID : PMC8489543.
3. Tamene A, Habte A, Tagesse M, Sewalem, Afework A. Utiliser les données de l'enquête sur les ménages pour explorer les effets de l'environnement du domicile sur le poids à la naissance: une analyse à effets mixtes à plusieurs niveaux de l'enquête démographique éthiopienne de 2016. BMC Grossesse Enfant. 2023 mars 20; 23(1):194. doi: 10.1186/s12884-023-05521-9. PMID : 36941555; PMCID : PMC10026414.
4. Carriere D, Kantor E, Torchin H, Le Ray C, Jarreau PH, zana-Taieb E. Mortalité et morbidité des nouveau-nés prématurés pesant moins de 750 g : Une étude de cohorte rétrospective de 2 ans. Arch Pediatr. 2020 mai;27(4):227-232. doi: 10.1016/j.arcped. 2020.02.003. Epub 2020 Avril 8 avril. PMID : 32278588.
5. Krasevec J, Blencowe H, Coffey C et al. Protocole d'étude pour les estimations de l'UNICEF et de l'OMS sur la prévalence mondiale, régionale et nationale du faible poids à la naissance de 2000 à 2020. Gates Open Res 2022, 6:80
6. Groupe d'étude Immédiat de l'OMS sur la KMC. Impact des Mother Care borko kangourous initiés immédiatement après la naissance (iKMC) sur la survie des nouveau-nés ayant un poids à la naissance de 1,0 à moins de 1,8 kg : protocole d'étude pour un essai contrôlé randomisé. Procès. 2020 19 mars;21(1):280. doi: 10.1186/s13063-020-4101-1. PMID: 32188485; PMCID: PMC7081677.
7. Gueye M, Sow A, Boiro D, Ibrahim YM, Bathily AC, Amane B, Sylla A, Faye PM, Ndiaye O. Développement de la taille et du poids des nourrissons de faible poids à la naissance à 9 mois. Arch Pediatr. 2023 Feb;30(2):100-103. doi: 10.1016/j.arcped.2022.11.013. Epub 2023 Jan 24. PMID: 36702713.
8. M. Diabelkova J, Rim-rovc K, Urdzak P, Dorko E, Hou-vicovic A, Andrakova, Drabiak E, 'kre'kov' G. Facteurs de risque associés à l'insuffisance pondérale à la naissance. Cent Eur J Santé publique.

2022 Jun;30 (Supplément):S43-S49. doi: 10.21101/cejph.a6883. PMID : 35841225.

9. Enquête Démographique et de Santé (EDSM VI) Mali 2018
10. Catov JM, Lee M, Roberts JM, Xu J, Simhan HN. Disparités raciales et diminution du poids à la naissance : tous les bébés sont-ils plus petits ? Am J Epidemiol. 2016 Jan 1;183(1): 15-23. doi:10.1093/aje/kwv194. Epub 2015 Dec 13. PMID: 26667251; PMCID: PMC 4690476.
11. Khadivi R, Mirzaeian S, Toghyani R. Taux de mortalité néonatale et hospitalisation chez les personnes à haut risque vaccinés à domicile. Iran J Nurs Midwifery Res. 2022 Sep 14;27 (5): 466-471.doi: 10.4103/ijnmr.IJNMR-406/20. PMID: 36524145; CID: PMC9745853.
12. Gérard Uwimana [1], Mohamed Elhoumed [1 2], Mitslal Abrha Gebremedhin [1], Mougni Mohamed Azalati [1], Lin Nan [1], Lingxia Zeng [3 4] 2023) Association entre les soins prénatals de qualité et le faible poids à la naissance au Rwanda : une étude transversale utilisant les données des enquêtes démographiques et de santé du Rwanda Affiliations Développer PMID : 37254102 PMCID : PMC10230721 DOI : 10.1186/s12913-023-09482-9
13. Onesmus Maina Muchemi 1, Elizabeth Echoka 2, Anselimo Makokha 3 Facteurs associés à l'insuffisance pondérale à la naissance chez les nouveau-nés nés à l'hôpital du district d'Olkalou, région centrale, Kenya Affiliations PMID : 26090056 PMCID PMC4458305 DOI : 10.11604/pamj.2015.20.108.4831 Article PMC gratuit Résumé
14. Tran HT, Le TD, Skinner A, Narchi H. Les nourrissons très prématurés admis dans une unité néonatale tertiaire dans le centre du Viêt Nam ont présenté une faible croissance postnatale. Acta Paediatr. 2022 Feb;11(2) (2):307-313. doi: 10.1111/apa.16116. Epub 2021 septembre 23. PMID : 34536961.
15. Prajapati R, Shrestha S, Bhandari N. Prévalence et facteurs associés de faible poids à la naissance chez les nouveau-nés dans un hôpital de niveau tertiaire au Népal. Katmandou Univ Med J (KUMJ). 2018 Jan.-Mar; 16(61):49-52. PMID: 30631017.
16. Alirah Emmanuel Weyori [1], Abdul-Aziz Seidu [2 3 4], Richard Gyan Aboagye [5], Francis Arthur-Holmes [6], Joshua Okyere [7], Opoku Ahinkorah brillant [8] 2022). Consultations prénatales et faible poids à la naissance des naissances en institution en Afrique subsaharienne
17. Kiy AM, Rugolo LM, Luca AK, Corrente JE. Croissance de l'insuffisance pondérale prématurée des nourrissons en bas âge jusqu'à l'âge de 24 mois corrigé : effet de l'hypertension maternelle. J Pediatr (Rio J). 2015 mai-juin;91(3):256-62. doi: 10.1016/j.jped.2014.07.008. Epub 2014 26 novembre. PMID : 25431856.)
18. Traore et al., 2016 8 Annales des Sciences de la Santé, ISSN: 2421-8936 Facteurs associés au faible poids de naissance au centre de santé communautaire de Yirimadio (Mali) Factors associated with low birth weight in community health center of Yirimadio Bakary Moro TRAORE, Hamed DIALLO, Abdoul Salam DIARRA, Samira El FAKIR, Chakib NEJJARI Centre de santé communautaire de Yirimadio –Bamako (Mali) N° 7, Vol. 1: 8-15.
19. Mahamane S, Garba M, Mahaman M, Almoustapha A, Maïga M, morbidité et mortalité des nouveaux nés de faible poids de naissance à l'Hôpital National de Niamey. Revue Nigérienne de santé publique 2022 ; 12(2) :15-22
20. Agyepong KO Owusu-Antwi R, Amoah S, Adanu R incidence oflow birth weight among newborns delivered in health facilities in the Volta Region, 2019-2023 BMC Pregnancy Childbirth. 7639. DOI: 10.1186/s12884-025-07639-4.
21. Kouakou AS, Konan CB, Kouame VN, Gbessi EA, Soumahoro I, et al risk factors for placental malaria and associated low birth weight in a rural high malaria transmission setting of Cote d'Ivoire. Trop parasitol. 2020;10(2): 102-8 DOI: 10.4103/TP_58_19.
22. Mwangi mn, gachohiJM, kimani LW, kanyina EW,mumbo HM, Mwangi JW, predictors of low birth weight in a multicentre study in sub-Saharan Africa: a case control study. BMC Pregnancy childbirth. 2023; 23fev (1) : 154.

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