

Epidemiological and Clinical Profile and Immediate Outcome of Neonates Transferred from the Maternity Unit to the Neonatology Unit of the CSREF in Commune V of Bamako District, Mali

Maimouna Kante^{1*}, Ya Traoré¹, Balilé Harber Beydari², Mamadou Traoré¹, Issiaka Koné¹, Diéneba Sacko¹, Maimouna Haidara¹, Korotoumou Bamba¹, Assitan Farota¹, Abdoulaye Kassogué², Mohamed Diarra³, Dramane Touré⁴, Abdoul Salam Diarra⁵, Leyla Maïga⁶, Dicko Fatoumata⁷

¹Paediatric Ward, CSRéf CV, Bamako, Mali

²Paediatric Ward of Nianankoro Fomba Hospital, Ségou, Mali

³Paediatric Ward of Kalaban CoroCSREF, Bamako, Mali

⁴Pediatric Department of the Mopti Reference Health Center, Mopti, Mali

⁵National Centre for Scientific and Technological Research, Bamako, Mali

⁶Paediatrics Department, Mohamed VI Perinatal Clinic, Bamako, Mali

⁷Department of Paediatrics, Gabriel Touré University Hospital, Bamako, Mali

Email: *kantemamouna@yahoo.fr, Leylamaiga25@gmail.com

How to cite this paper: Kante, M., Traoré, Y., Beydari, B.H., Traoré, M., Koné, I., Sacko, D., Haidara, M., Bamba, K., Farota, A., Kassogué, A., Diarra, M., Touré, D., Diarra, A.S., Maïga, L. and Fatoumata, D. (2024) Epidemiological and Clinical Profile and Immediate Outcome of Neonates Transferred from the Maternity Unit to the Neonatology Unit of the CSREF in Commune V of Bamako District, Mali. *Open Journal of Pediatrics*, 14, 547-557. <https://doi.org/10.4236/ojped.2024.143053>

Received: March 14, 2024

Accepted: May 11, 2024

Published: May 14, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Introduction: Neonatal mortality remains a major public health concern. According to the World Health Organisation (WHO), the number of newborns dying each year has fallen from 5 million in 1990 to 2.4 million in 2019. The aim of our study was to describe the main morbid conditions and their lethality in newborns admitted to the paediatric ward of the CSREF in Commune V. **Methodology:** We conducted a 12-month prospective descriptive and analytical study from August 2020 to July 2021. **Results:** During the 12 months of the study, out of 2654 neonates admitted to hospital, 216 met our inclusion criteria, *i.e.* 8%. Newborns admitted in the first few hours of life represented 99.54% of cases. Full-term newborns accounted for 65.74% of the total. Forty-eight percent of newborns had hypothermia on admission. The most common diagnosis was asphyxia in 55.56% of cases, followed by neonatal infection in 27.78% and prematurity in 10.65%. Death was recorded in 22.2% of cases. Asphyxia was the main cause of neonatal death, followed by prematurity in our context. **Conclusion:** Improving the prognosis of newborn babies will require a thorough understanding of neo-

natal pathologies and the implementation of a pre- and perinatal prevention policy.

Keywords

Newborns, Morbidity, Mortality

1. Introduction

According to the World Health Organisation (WHO), a newborn baby is a child less than 28 days old. The neonatal period, particularly the first 8 days of life, is an important time in a child's life. Birth marks the transition from mother-dependent foetal life to that of an independent newborn [1]. Neonatal mortality was defined as the death of a child between 0 and 28 days of life. Early neonatal mortality refers to deaths occurring within 7 days of birth, and late neonatal mortality refers to deaths occurring between 8 and 28 days after birth [2]. According to the World Health Organisation (WHO), the number of newborns who have died has fallen from 5 million in 1990 to 2.4 million in 2019. Children are at greater risk of dying in the first 28 days of life, and the vast majority of these deaths (98%) occur in developing countries [3]. However, despite this downward trend, the statistics on neonatal morbidity and mortality remain alarming in developing countries in general and in Mali in particular (neonatal mortality rate of 33 per thousand live births) [4]. Then in 2019, sub-Saharan Africa had the highest neonatal mortality rate, with 27 deaths per 1000 live births, followed by Central and South Asia with 24 deaths per 1000 live births [5]. In Mali, 1 in 30 newborn babies do not survive their first month of life. The causes of neonatal mortality include prematurity, asphyxia and neonatal infections [6].

Neonatal deaths, the majority of which occur in the first week of life, account for a third of infant mortality in Mali, with premature and low-birth-weight babies being the most vulnerable. The main causes of neonatal death in Mali are neonatal asphyxia (28%), prematurity (30%) and septicemia/tetanus (21%) [7]. Most of these deaths are the result of the mother's poor health and nutritional status, combined with inadequate care before, during and after childbirth [8]. In Mali, alongside policies aimed at reducing maternal and neonatal mortality, the authorities have implemented a number of strategies, including standards and procedures policies; the referral/evacuation system; and free caesarean sections. Despite these strategies, neonatal mortality and morbidity remain a major public health problem. It is in this perspective that this study aims to answer these different questions in order to contribute to the reduction of neonatal mortality in the services whose objective was to study the profile of newborns transferred from the maternity unit to the neonatology unit of the Reference Health Centre of Commune V of the District of Bamako.

2. Methodology

This was a prospective descriptive and analytical study in the paediatric department of the Reference Health Center (CSREF) in Commune V of the Bamako district. It took place from 1 August 2020 to 31 July 2021, a period of one year. All neonates referred to the neonatology department of the CSREF in Commune V of the Bamako district were included. All neonates referred from the maternity ward of the CSREF of the CV and hospitalised in the neonatology unit during the study period with a usable medical record were included in this study.

The following were not included:

- Neonates referred from other health facilities;
- Newborns referred outside the study period;
- Newborns referred but not hospitalized;
- Newborns with no usable medical record.

The sample was exhaustive, consisting of all newborns referred from the CV maternity unit and whose condition required hospitalisation in the neonatology unit. To collect the data, we drew up an individual survey form. After obtaining informed consent from the parents, we drew up a survey form for each newborn, using hospital records, ANC notebooks and reference sheets. A unique anonymity number was assigned to each form to ensure confidentiality. After a clear explanation of the benefits of the study, the consent of the respondents (parents) was obtained before the questionnaire was used. The confidentiality of the information gathered was guaranteed. Dignity and freedom were respected throughout the survey. The data were entered into Word 2013 and the analysis was carried out on Epi Info™ version 7.2.1.0. Descriptive statistics were calculated as a mean for quantitative variables and as a proportion for qualitative variables. Chi-square and Fischer statistical tests will be used as appropriate to assess associations. The association was considered significant when the p-value < 5%.

3. Results

During the 12 months of the study, 216 of the 2654 neonates admitted to hospital met our inclusion criteria, *i.e.* 8%.

- **Socio-demographic characteristics of newborn babies parents admitted to hospital.**

The age group of mothers under 20 years was the most represented, accounting for 74.54% of cases (**Figure 1**). In our series, 40.28% of mothers had attended primary school. The vast majority of mothers were married, *i.e.* 91.20% of cases. Housewives accounted for 68.98% of cases.

In our series, 40.28% of the mothers had attended primary school (**Table 1**). The vast majority of mothers were married, *i.e.* 91.20% of cases. Housewives accounted for 68.98% of cases.

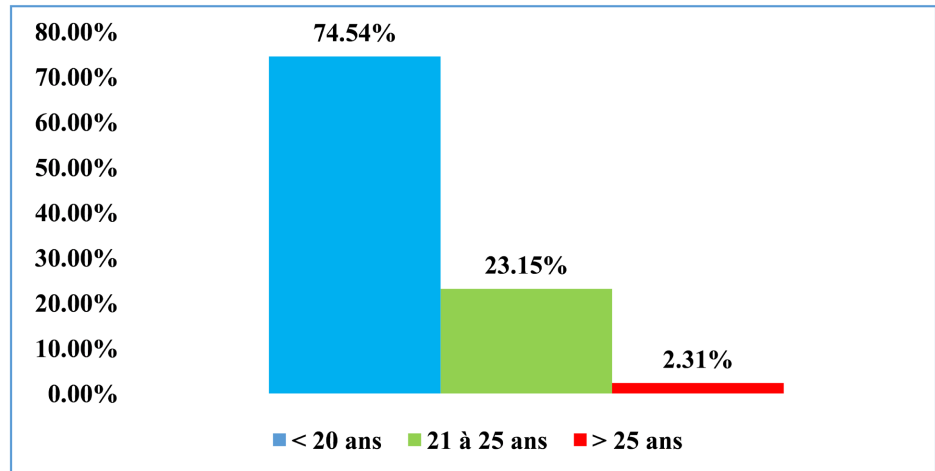


Figure 1. Breakdown by age of mother.

Table 1. Distribution of newborns by mother's level of education.

Mother's level of education	Number	Percentage (%)
Primary school	87	40.28
Out of school	71	32.87
Secondary school	42	19.44
Higher level	16	7.41
Total	216	100

4. Obstetrical History

In our study, 55.56% of mothers had attended four or more antenatal clinics. At least one antenatal check-up had been carried out in 6.02% of cases. More than half of the women had undergone fewer than three (3) obstetric ultrasounds (Table 2).

Of the 15 cases with at least one ultrasound abnormality, placenta previa, cord circular and breech presentation predominated with 20% each. Oligohydramnios was observed in 13.33% of cases. Mothers with at least one pathology during pregnancy accounted for 25.5% of cases. The majority of mothers were diabetic in 50.91% of cases. Premature rupture of the membrane was found in 34.38% of cases, followed by pre-eclampsia in 31.25%. Spontaneous vaginal delivery was the mode of delivery in 64.81% of cases, followed by caesarean section in 31.02%. Among the 63 cases with at least one indication for caesarean section, dystocic presentation was noted in 25.40% of cases, followed by foetal asphyxia in 12.70% and pre-eclampsia in 12.70%. Full-term pregnancies accounted for 65.74% of cases, followed by prematurity in 31.94% of cases.

Characteristics of Newborn Babies

Almost all newborns were admitted between H0 and H24 of life, *i.e.* 99.54%. Newborns weighing between 2500 - 4000 g accounted for 70.37% of cases. Males

predominated in 53.70% of cases. The sex ratio was 1.2. Hypothermia was found in 104 newborns (48.15%). The most common diagnosis was asphyxia in 55.56% of cases, followed by neonatal infection in 27.78% and prematurity in 10.65%. Almost half of the newborns (50.93%) had spent at least four (4) days in hospital. The average length of stay was 4 ± 2 days. The APGAR score at the 5th minute was less than seven (7) in 18.52% of cases (**Table 3**).

5. Fate of Newborn Babies

We recorded 22.2% of deaths. Asphyxia was the main cause of neonatal death, followed by prematurity. In our study, prematurity was the major cause of neonatal mortality. Half of the newborns were referred for hypertrophic pyloric stenosis, *i.e.* 50% of cases. In our series, 90.74 of newborns were managed within 30 minutes. Neonates receiving antibiotic therapy accounted for 43.98% of cases, followed by oxygen therapy in 25.93% of cases (**Figure 2**).

Table 2. Distribution of newborns according to the number of contacts.

Numberof CPN	N = 216	Percentage (%)
≥4	120	55.56
1 to 3	86	39.81
0	10	4.63
Number of ultrasounds	N = 216	Percentage (%)
<3	170	78.70
≥3	36	16.67
0	10	0.63

Table 3. Distribution of newborns according to clinical signs and diagnosis.

Clinical signs	N = 216	Percentage (%)
Hypothermia	104	48.15
Respiratory distress	78	36.11
Seizure	29	13.43
Hyperthermia	3	1.39
Ather	2	0.93
Diagnosis	N = 216	Percentage (%)
Neonatal asphyxia	120	55.56
Prematurity	23	10.65
Neonatal infection	60	27.78
Macrosomia	6	2.77
Deformity	4	1.85
Other	3	1.39

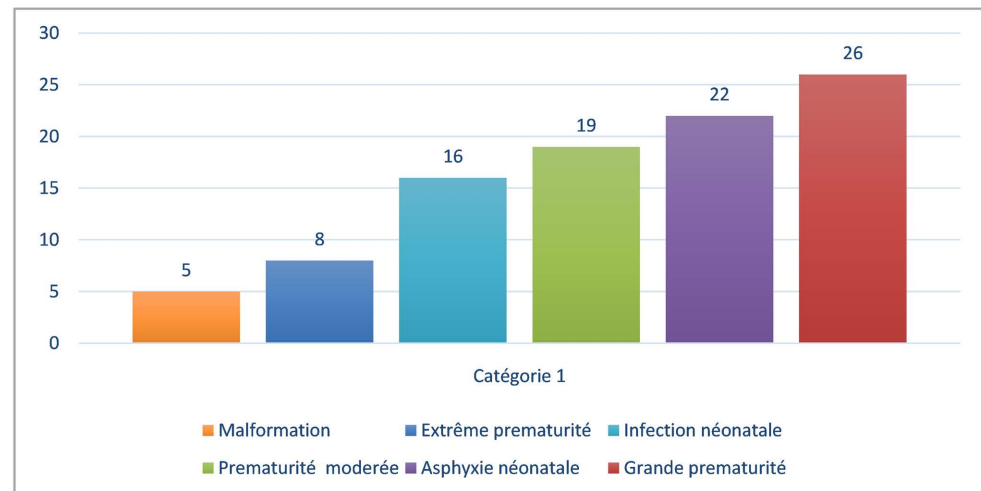


Figure 2. Breakdown of newborns by case fatality rate.

Table 4. Distribution according to death and indication for caesarean section.

Caesarean section indications	Death		Total
	No	Yes	
Dystocic presentation	15	10	25
Fetal asphyxia	30	4	34
Pre-eclampsia	48	12	60
Scarred uterus	21	2	23
Placenta Prævia	40	8	48
Macrosomia	3	2	5
Prophylactic caesarean	1	1	2
Pre-rupture syndrome	4	8	12
Retroplacental haematoma	1	1	2
Uterine rupture	1	2	3
Exceeding term	1	0	1
Multiple pregnancy	1	0	1
Total	168	48	216

Analytical results: We used statistical tests which showed that there was a statistically significant association between neonatal death and neonatal resuscitation, respiratory distress, length of hospital stay, indication for caesarean section and clinical signs on admission (with a $P < 0.05$) (**Table 4**).

6. Comments and Discussions

6.1. Socio-Demographic Characteristics of Parents

Almost 2/3 of the mothers were under 20 years of age, *i.e.* 74.54% of cases. This predominance seems to correspond to the longest period of sexual activity or

procreation and early marriage. In the study by Coulibaly O *et al.* [9], the 18 to 30 age group was the most represented, with 69.5% of cases. At Sikasso Hospital, Cissouma A *et al.* [10] in 2021 reported 72.95% of mothers in the 18 - 35 age group, with an average age of 27.11% and extremes of 16 and 41 years. At Gabriel Touré Hospital, Konaté D *et al.* [11] in their study of early neonatal infections, found that the 15 to 25 age group accounted for 57.7% of cases. In the Congo, at Talangai Hospital, in the study by Clauvel N *et al.* [2] in 2024, the 20 to 35 age group accounted for 68.7%, with an average age of 26.9 ± 6.9 years. In our study, 40.28% of mothers had primary education and 32.87% had no schooling. This result is lower than those of Coulibaly O [9] *et al.* and Konaté D *et al.* [11], who found respectively 52.9% and 63.5% of mothers with no schooling. At the hospital of Sikasso Cissouma A *et al.* [10] reported 63.52% of mothers who did not attend school in their study on the immediate outcome of premature babies in Sikasso. The training enables women to better understand good hygiene practices, to protect themselves against certain illnesses, to better comply with the treatments they are prescribed and to have recourse to a health professional to monitor their pregnancy. According to the EDS-VI [12], 66% of women of childbearing age have no level of education, and assistance at birth by a trained provider increases with the mother's level of education. In the present study, 68.98% of mothers were housewives. Cissouma A *et al.* [10] and Coulibaly O *et al.* [9] found 71.31% and 76.66% housewives respectively in their studies. This could be explained by the low school enrolment rate and early marriage of girls.

6.2. Pregnancy Progress

6.2.1. Prenatal Consultations

In our study, 55.56% of mothers had attended more than 4 antenatal visits. In contrast to Coulibaly O *et al.* [9] in their study of perinatal asphyxia, mothers had attended fewer than 4 antenatal visits in 66.7% of cases. The WHO recommends a minimum of 4 antenatal visits for adequate monitoring of pregnancies [13]. Poor quality ANC is a risk factor for neonatal mortality in premature babies.

6.2.2. Additional Examinations

In our series, 78.70% of women had performed fewer than three (3) obstetric ultrasounds. This result is similar to that of Cissouma A *et al.* [10] at Sikasso Hospital, who reported that 72.54% of mothers had not performed any ultrasound in 2022. The lack of ultrasound examinations during pregnancy could be explained by the lack of financial resources of pregnant women and their low level of schooling.

6.3. Delivery Procedure

Spontaneous vaginal delivery was the mode of delivery in 64.81% of cases, followed by caesarean section in 31.01% of cases. This result is lower than that of

Cissouma A *et al.* [10] and Coulibaly O *et al.* [9], who found that 89.75% and 84.3% of mothers respectively would give birth by vaginal delivery in 2022 and 2021. In this study, 65.74% of pregnancies were full term, 31.94% were preterm and 2.31% were postterm. Cissouma A *et al.* [10] reported a prematurity rate of 37.18% in their study at Sikasso Hospital. Doukkali L [14] found 37.5% of births before 37th weeks' gestation in her study in Morocco, which was associated with neonatal complications. This result suggests that the mortality rate for newborns born by vaginal delivery is much higher than for those born by caesarean section. The vaginal route would seem to expose a greater risk of infection and perinatal anoxia.

6.4. Clinical Characteristics of Hospitalized Newborns

In the present study, 70.37% of newborns weighed between 2500 - 4000 g and 27.78% weighed less than 2500 g. Our rate is higher than that of Clauvel *et al.* [2] in their study, who found 54.4% of newborns with a normal birth weight, and 38.5% with a low birth weight. The Apgar score at 5 minutes was less than seven (7) in 18.52% of cases. In the study by Doukkali L [14] in 2018 in Morocco, an Apgar score of less than 7 was associated with neonatal complications ($p = 0.001$). Clauvel N *et al.* [2] in 2024 found that the majority of newborns had an Apgar score of less than 7, *i.e.* 55.3% of cases.

The Apgar score is a good parameter for assessing a newborn's adaptation to extra-uterine life. In the series by Coulibaly O *et al.* [9], the Apgar score at 5 minutes was less than 7 in 45.71% of cases. Newborns with an Apgar score ≥ 7 at 5 minutes after birth are well adjusted. Given these advantages, care providers should not neglect Apgar score assessment [15]. It should be noted that low Apgar scores (<7) at 5 minutes are associated with the child's immediate neurological future (risk of encephalopathy). Hypothermia was found in 48.15% of newborns and respiratory distress in 36.11% of cases. Konaté D *et al.* [11] found hypothermia in 36.5%, respiratory distress in 36.5% and neurological disorders in 9.6%. As with all newborns lacking energy reserves, the majority of sick newborns are particularly exposed to the three complications of hypothermia, hypoglycaemia and hypocalcaemia. Fetal asphyxia was the main reason for hospitalisation, accounting for 55.56% of cases. It is a major problem in the neonatal period because of its frequency, severity and possible consequences for the child's neuropsychological development. It is linked to poor monitoring of the pregnancy (inadequate or absence of ANC) and to the circumstances of delivery (dystocic delivery). Monitoring of the infection, which in most cases was essentially clinical. In most cases, additional examinations were not carried out due to a lack of financial resources, and as a result we were unable to identify the various germs responsible for the infections. Coulibaly O *et al.* [9] found 6.38% of fetal anoxia in new hospitalisations in their study in 2018. In our study, prematurity and its complications were found in 10.64% of cases, malformative syndrome was found in 1.85% of cases. Cissouma A *et al.* [10] found neonatal infec-

tion with a rate of 43.20% followed by perinatal anoxia 25.20% and malformative syndrome 0.7% in their study. In the study by Doukkali L [14] in Morocco in 2018, 50% of newborns referred in their series to the Fès University Hospital had a congenital anomaly. Some authors have shown that the three main direct causes of neonatal mortality in Africa are, in order of magnitude, prematurity, neonatal infection and neonatal asphyxia [16]. The majority were hospitalised for less than 4 days in 50.92% of cases. The average length of stay was 4 ± 2 days. The length of hospitalisation depends on the type of pathology suffered by the newborn, and early treatment can improve the vital prognosis.

6.5. Become

We recorded 48 cases of death, *i.e.* 22.22%, and 4 (1.85%) newborns were referred to the Gabriel Touré University Hospital. This death rate is lower than that of Cissouma A *et al.* [10] at Sikasso hospital and Clauvel N *et al.* in Congo, *i.e.* 43.20% and 36.26% of cases respectively. The high rate of early neonatal mortality is due partly to the immature immunity of newborns and their low resistance to infection during this period, and partly to the lack of appropriate care [17]. Therefore basic emergency obstetric and neonatal care (SONEU) and the kangaroo mother method validated by the World Health Organisation must be promoted at all levels of the health pyramid to reduce the morbidity and mortality of newborns, particularly low-birth-weight newborns [18]. Generally speaking, in Africa, the three main causes of neonatal mortality are, in order of importance: prematurity, neonatal infections and neonatal asphyxia [2].

6.6. Mortality-Lethality

The rate of recovery was 66.2% compared with 22.2% of deaths and 9.72% of discharges against medical advice. Yameogo W *et al.* [18] in their study at the Tengando University Hospital in Ouagadougou found a neonatal mortality rate of 24.5%. Although in our results there is a difference between the case-fatality rates from the point of view of proportion, these results have the same significance in terms of the importance of neonatal mortality in our country. However, the results of the EDMS-VI 2018 [12] showed an improvement with a neonatal mortality rate of 33 per 1000 live births and 54% of neonatal deaths among infant mortality. The most lethal pathologies were perinatal anoxia, prematurity and neonatal infection in 54.2%, 25.0% and 18.8% respectively. In Congo, the main recognised causes of neonatal death were prematurity (39.72%), asphyxia and/or respiratory distress (28.88%) and neonatal infection (24.35%) [2].

7. Conclusions

Despite enormous progress in neonatal and infant protection through the SONU and Soins Mères (Mother Care) Kangourous (SMK) programmes, neonatal mortality remains high.

The vulnerability of newborn babies and the frequency of admissions for

neonatal distress, prematurity and infections, all of which are relatively preventable through good quality antenatal care, improved technical facilities and an inclusive programme of continuing education in obstetric and neonatal care.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] UVMaF Educational Editorial Committee (2011-1012) The Newborn; French-Speaking Virtual Medical University. P. 53.
https://archives.uness.fr/sites/campus-unf3s-2014/maeutique/UE-puericulture/examen_nne/site/html/cours.pdf
- [2] Niama, C., *et al.* (2024) Analysis of Survival in Newborns at the Talangai Referral Hospital. *Health Sciences and Disease*, **25**, 98.
- [3] WHO (2020) Newborn Babies: Improving Their Survival and Well-Being.
<https://www.who.int/fr/news-room/fact-sheets/detail/newborns-reducing-mortality>
- [4] World Health Organization (WHO) (2023) Mali Annual Report 2018. Health Context of the Country. <https://www.afro.who.int>
- [5] WHO (2019) UNICEF Child Mortality 2019 (The World Is Failing Its Newborns).
<https://www.unicef.org/fr>
- [6] UNICEF (2020) New Year's Day Babies: More than 2,800 Children Were Born in Mali on 1 January 2020. <https://www.unicef.org/mali>
- [7] (2021) Improving the Health of Mothers and Newborn Babies in Mali through Integrated Approaches. Save the Children International, Save the Children US.
<https://resourcecentre.savethechildren.net/fr>
- [8] Makoura, B., Bintou, S., AngEle, K., *et al.* (2019) Neonatal Morbidity and Mortality at the Centre Hospitalier Universitaire Sourô Sanou Bobo-Dioulasso (Burkina Faso). *Sciences de la Santé*, **2**, 82-89.
- [9] Coulibaly, O., *et al.* (2021) Clinical Aspects of Perinatal Asphyxia of the Newborn and Immediate Fate at the Commune V Reference Health Centre in Bamako. *Health Sciences and Disease*, **22**, 32-36.
- [10] Cissouma, A., *et al.* (2022) Immediate Fate of Premature Infants in the Paediatrics Department of Sikasso Hospital. *Health Sciences and Disease*, **23**, 1-5.
- [11] Konaté, D., *et al.* (2019) Early Bacterial Neonatal Infection in 2016 at the Gabriel Touré University Hospital in Bamako. *Revue Malienne d'Infectiologie et de Microbiologie*, **14**, 62-67. <https://doi.org/10.53597/remim.v14i2.1373>
- [12] (2018) Republic of Mali, Demographic and Health Survey 2018 (EDSVI).
- [13] Aslam, H.M., Saleem, S., Afzal, R., Iqbal, U., Saleem, M.S., Shaikh, M.W., *et al.* (2014) Risk Factors of Birth Asphyxia. *Italian Journal of Pediatrics*, **40**, Article No. 94. <https://doi.org/10.1186/s13052-014-0094-2>
- [14] Doukkali, L. (2018) Etude de la prise en charge du Nouveau-né dans un Centre Hospitalier Provincial: Recherche et Action. Master's Thesis, Université Mohamed, Marocco.
- [15] Ouédraogo, Y.S., Coulibaly, G., Koueta, F., Yao, S., Savadogo, H., Dao, L., *et al.* (2015) Profil à risque et pronostic néonatal de l'asphyxie périnatale en milieu

hospitalier pédiatrique à Ouagadougou. *Journal de Pédiatrie et de Puériculture*, **28**, 64-70. <https://doi.org/10.1016/j.jpp.2015.02.003>

- [16] World health Organization (2006) Neonatal and Perinatal Mortality Country, Regional and Global Estimates 2006.
- [17] Sylla, M., Folquet-Amorissani, M., Oumar, A.A., *et al.* (2009) Neonatal Morbidity and Mortality in the Paediatric Intensive Care Unit at Gabriel Touré Hospital. *Louvain Médical*, **128**, 141-144.
- [18] Yameogo, W., Dahourou, D., Diallo, A., Sangho, O., Nikiema, E., Tougouma, S., *et al.* (2021) Etude sur la mortalité néonatale au CHU de Tengando, Ouagadougou, Burkina Faso : Une étude de cohorte rétrospective. *Journal of Interventional Epidemiology and Public Health*, **4**, 11. <https://doi.org/10.37432/jieph.suppl.2021.4.3.03.4>