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Clinical Profile and Management of Preterm Newborns in a Resource-Limited Setting: A Multicenter Study in Kisangani, Democratic Republic of the Congo

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Abstract **Original Research Article**

Introduction: Prematurity is a major cause of neonatal morbidity and mortality, particularly in low-resource countries. Multicenter data on the clinical profile and management practices remain limited in the Democratic Republic of the Congo. ***Objective:*** To describe the clinical profile, management modalities, and identify factors associated with mortality among preterm newborns in Kisangani. ***Methods:*** This was a prospective multicenter study conducted in four health facilities in Kisangani from March 1, 2025, to February 28, 2026. All admitted preterm newborns (<37 weeks of gestation) were consecutively included. Clinical, paraclinical, and therapeutic data were collected using a standardized form. Univariate and multivariate logistic regression analyses were performed to identify factors independently associated with mortality. Results are expressed as Odds Ratios (OR) with 95% confidence intervals. ***Results:*** A total of 120 preterm newborns were included (24.9% of neonatal admissions). Overall mortality was 33.3%. Antibiotic therapy was administered in 98.3% of patients and 70.8% received resuscitation measures. In multivariate analysis, birth weight <1000 g (adjusted OR = 9.8; 95% CI: 1.8–52.6; p = 0.008) and gestational age <32 weeks (adjusted OR = 5.6; 95% CI: 1.7–18.2; p = 0.002) were associated with mortality. ***Conclusion:*** Prematurity is associated with high morbidity and mortality in this setting. Strengthening essential neonatal care and improving the management of high-risk preterm newborns are priorities.

Keywords: prematurity, preterm newborns, neonatal mortality, clinical profile, risk factors, Kisangani.

INTRODUCTION

According to the World Health Organization (WHO), prematurity is defined as any birth occurring before 37 completed weeks of gestation [1]. It constitutes a major global public health problem, with approximately 15 million preterm births each year, representing nearly 11% of all live births [2,3].

Prematurity is one of the leading causes of neonatal mortality and contributes to approximately 30–40% of neonatal deaths, particularly in low- and middle-income countries [4,5]. This disproportionate burden is mainly explained by limitations in human, material, and technical resources.

The preterm newborn is particularly vulnerable because of the functional immaturity of its organs, exposing it to complications such as respiratory distress, hypothermia, infections, and hematological disorders [6]. Survival mainly depends on gestational age, birth weight, and the quality of neonatal care [3,7].

In high-income countries, advances in neonatology have enabled survival rates exceeding 90% among some extremely preterm newborns [4,7]. In contrast, mortality remains high in resource-limited settings [2,5].

In the Democratic Republic of the Congo, available data, often from single-center studies, report high neonatal mortality rates, particularly among preterm newborns [8–10]. However, multicenter studies simultaneously describing the clinical profile, management practices, and mortality factors remain scarce.

This study aims to fill this gap by describing the clinical profile, management modalities, and factors associated with mortality among preterm newborns in Kisangani.

METHODS

Study design and setting

This was a prospective multicenter cohort study conducted in four health facilities in the city of Kisangani (CUKis, HCKis, HGR Kabondo, and Rekapi Polyclinic).

Study period

From March 1, 2025, to February 28, 2026.

Study population

All preterm newborns (<37 weeks of gestation) admitted during the study period.

Inclusion criteria

- Preterm newborns <37 weeks of gestation
- Admission to the neonatal unit
- Parental consent obtained

Exclusion criteria

- Lethal congenital malformations
- Incomplete records

Sampling

Consecutive non-probability sampling including all eligible cases.

Data collection

Data were prospectively collected using a standardized form:

- Clinical data
- Therapeutic data
- Outcome (survival/death)

Statistical analysis

The analysis was performed using R software (version 3.5.3).

- Qualitative variables: frequencies and percentages
- Univariate analysis: Chi-square or Fisher's exact test
- Multivariate analysis: logistic regression

Multivariate modeling

Variables with $p < 0.20$ in univariate analysis were introduced into the multivariate model. A backward selection procedure was used to obtain the final model.

The results are expressed as:

- Adjusted Odds Ratio (aOR)
- 95% confidence interval
- Significance threshold: $p < 0.05$

RESULTS

General characteristics of the population

A total of 120 preterm newborns were included, representing 24.9% of neonatal admissions.

Table 1: Sociodemographic and neonatal characteristics

Variable	Frequency (n)	Percentage (%)
Male sex	81	67.5
Gestational age 34–36 weeks	51	42.5
32–33 weeks	48	40.0
28–31 weeks	21	17.5
Birth weight >1500 g	44	36.7
1000–1500 g	69	57.5
<1000 g	7	5.8
Growth restriction	66	55.0

The study population was predominantly composed of moderate preterm newborns and intermediate birth weight infants, whereas extremely preterm newborns remained underrepresented. This distribution suggests that the most severe cases are either less frequent or possibly less frequently admitted to the study facilities.

3. Management modalities

Table 2: Therapeutic interventions

Intervention	Frequency (n)	Percentage (%)
Antibiotic therapy	118	98.3
Resuscitation	85	70.8
Oxygen therapy	71	59.2

Management was characterized by near-systematic use of antibiotic therapy and a high frequency of resuscitation measures, reflecting a strong suspicion of neonatal infection and the severity of clinical presentations at admission.

4. Outcomes of preterm newborns

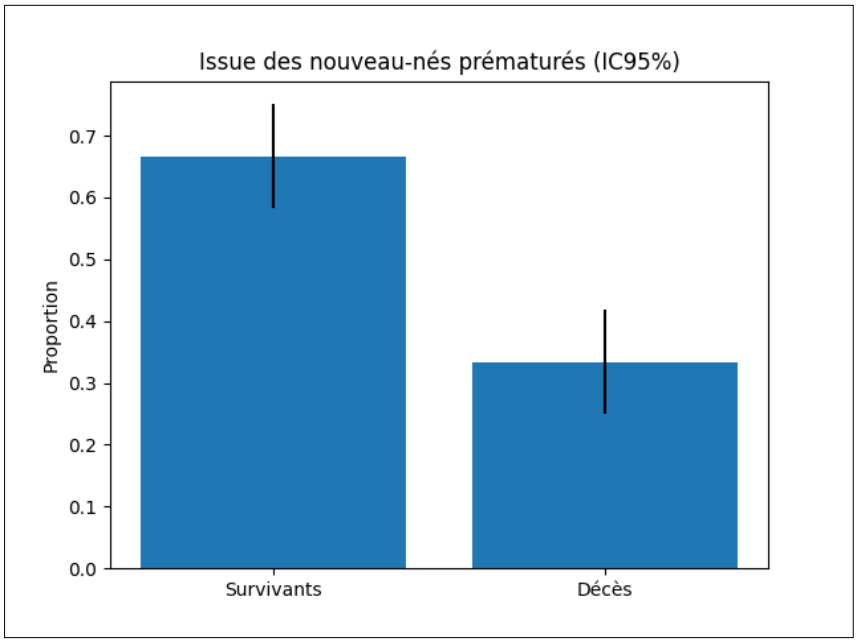

Figure I: Outcomes of preterm newborns

The majority of preterm newborns showed clinical improvement and were discharged alive (66.7%), whereas 33.3% died.

5. Analysis of factors associated with mortality

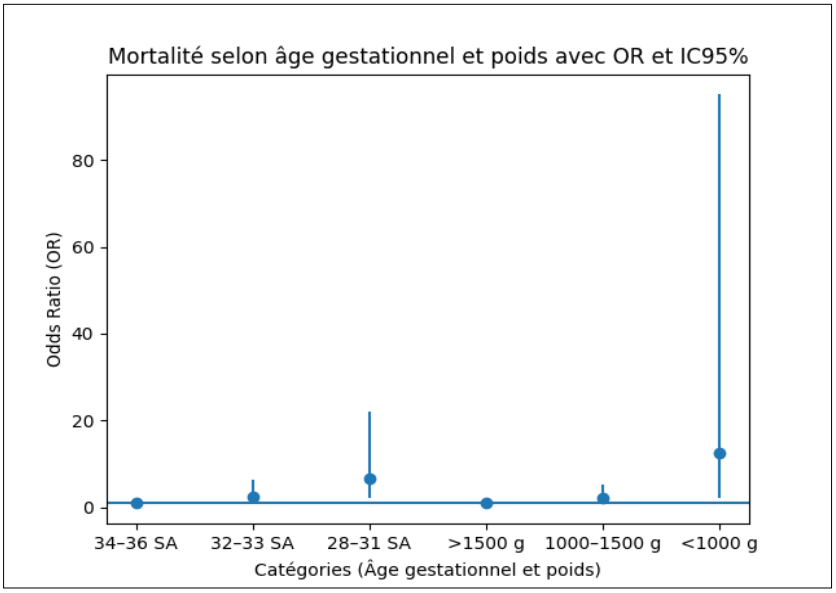

Figure II: Univariate analysis

The risk of mortality increased significantly with decreasing birth weight and gestational age, with a particularly high risk among newborns weighing less than 1000 g and those born before 32 weeks of gestation.

Table 3: Multivariate analysis (logistic regression)

Factor	Adjusted OR	95% CI	p
Weight <1000 g	9.8	1.8–52.6	0.008
Weight 1000–1500 g	2.1	1.0–4.8	0.04
Gestational age <32 weeks	5.6	1.7–18.2	0.002

After adjustment, very low birth weight and low gestational age appeared to be the main independent factors associated with mortality, with a marked increase in risk among the most immature newborns.

DISCUSSION

This prospective multicenter study conducted in Kisangani highlights a high neonatal mortality rate among preterm newborns, with an overall mortality rate of 33.3%. This frequency remains particularly concerning and confirms that prematurity still represents a major public health problem in resource-limited settings [1–5]. Our findings are consistent with data reported in several sub-Saharan African countries, where mortality among preterm newborns generally ranges from 25% to 40% depending on the level of care available [8–11]. In contrast, these rates remain substantially higher than those observed in high-income countries, where advances in modern neonatology have achieved survival rates exceeding 90% among some extremely preterm newborns [4,7,13].

The high mortality observed in our study could be explained by several structural and organizational factors specific to resource-limited settings. In many African neonatal units, constraints related to shortages of qualified personnel, insufficient specialized equipment, and limited access to neonatal intensive care significantly compromise the survival of preterm newborns [5,12,15,19,23]. Difficulties in accessing incubators, assisted ventilation, exogenous surfactant, and continuous monitoring constitute major barriers to the optimal management of these vulnerable newborns [15,24]. Similar observations have been reported in several African hospital studies where the lack of neonatal intensive care resources considerably affected survival outcomes among very low birth weight infants [8,9,17].

Our results also show that preterm newborns represented nearly one quarter of neonatal admissions (24.9%), reflecting the importance of this pathology in neonatal hospital activity in Kisangani. Similar proportions have been reported in several African studies, particularly in the Democratic Republic of the Congo, Cameroon, and Tanzania [8,10,11,17]. This high frequency could be related to the high prevalence of maternal risk factors such as infections, malaria during pregnancy, hypertension, multiple pregnancies, poor maternal nutritional status, and inadequate prenatal care [3,5,21,22]. In low-resource countries, insufficient antenatal monitoring and delayed obstetrical referral remain major contributors to prematurity [5,21].

The analysis of the neonatal profile showed a predominance of moderate preterm newborns (32–36 weeks) as well as a high frequency of neonatal growth restriction (55%). The association between prematurity and intrauterine growth restriction is well documented in the literature, particularly in low-income countries where maternal nutritional conditions often remain precarious [3,13,20]. Intrauterine growth restriction constitutes an important aggravating factor by increasing the metabolic and immunological vulnerability of preterm newborns [6,22]. Several studies have demonstrated that growth-restricted preterm infants present a significantly higher risk of hypothermia, hypoglycemia, neonatal sepsis, and long-term neurodevelopmental impairment [6,20].

Our study also revealed a very high use of antibiotic therapy (98.3%) and neonatal resuscitation measures (70.8%). This extensive use reflects both the severity of the clinical presentations observed and the high frequency of infectious and respiratory complications among preterm newborns. In resource-limited settings, neonatal infections remain one of the leading causes of mortality among preterm newborns because of immune immaturity and sometimes inadequate hospital aseptic conditions [16,20,23]. The almost systematic administration of antibiotics in our series may also reflect clinicians' concerns regarding neonatal sepsis in a context where microbiological diagnostic capacities remain limited.

The high frequency of oxygen therapy observed in our study (59.2%) confirms the major role of respiratory complications in the morbidity of preterm newborns. Respiratory distress syndrome remains one of the most common complications because of pulmonary immaturity and surfactant deficiency [6,15]. Sweet et al., in the European Consensus Guidelines on the management of neonatal respiratory distress syndrome, emphasized that survival of preterm newborns strongly depends on early access to adequate respiratory support and exogenous surfactant [15]. Unfortunately, these interventions often remain difficult to access in several African healthcare facilities because of financial and technical constraints [12,19]. Similar findings have been reported in studies conducted in sub-Saharan Africa where respiratory complications were identified as major contributors to neonatal mortality among premature infants [9,17].

The multivariate analysis identified very low birth weight (<1000 g) and gestational age below 32 weeks as the main independent factors associated with mortality. These findings are consistent with international data showing that neonatal survival mainly depends on the degree of physiological maturity at birth [3,4,13,21]. Very low birth weight preterm newborns are at increased risk of respiratory, infectious, neurological, metabolic, and cardiovascular complications, explaining their high mortality [6,15,16]. The immaturity of pulmonary, neurological, gastrointestinal, and immune functions considerably increases the vulnerability of extremely premature infants during the neonatal period [6].

Our findings are consistent with those reported by Blencowe et al., who demonstrated an exponential increase in the risk of death among newborns born before 32 weeks of gestation [13]. Similarly, Mmbaga *et al.,* in Tanzania observed a strong association between very low birth weight and neonatal mortality [17]. In the Democratic Republic of the Congo, Mukuku *et al.,* And Ilunga Mbayo *et al.,* also identified low birth weight as one of the main determinants of neonatal mortality [8,11]. Comparable observations have been described in several multicenter African studies highlighting the critical prognostic importance of gestational age and birth weight [9,10].

The univariate analysis figure in our study clearly illustrates the progressive increase in mortality risk as gestational age and birth weight decrease. This dose-response relationship between neonatal immaturity and mortality has been widely described in the international neonatal literature [3,13,20]. Extremely preterm newborns present multisystem immaturity exposing them to severe early and late complications including intraventricular hemorrhage, necrotizing enterocolitis, chronic lung disease, retinopathy of prematurity, and severe neonatal infections [6,15].

The absence of significant differences between the different hospital facilities suggests a relative homogeneity in neonatal care practices across Kisangani. However, this homogeneity may also reflect similar constraints related to insufficient technical infrastructure, shortages of specialized healthcare personnel, and limited availability of neonatal intensive care equipment [12,17,19]. In many low-resource settings, neonatal units face chronic shortages of incubators, oxygen concentrators, monitoring systems, and adequately trained personnel, which substantially limit the quality of neonatal care [12,23].

From a public health perspective, our results highlight the urgent need to strengthen essential neonatal care in Congolese healthcare facilities [12,18]. Several simple and low-cost interventions have demonstrated their effectiveness in reducing mortality among preterm newborns, including Kangaroo Mother Care, early breastfeeding, prevention of hypothermia, infection prevention strategies, antenatal corticosteroid therapy, and improvement of aseptic practices [14,18,23–25]. WHO particularly recommends the implementation of Kangaroo Mother Care in resource-limited countries because of its significant impact on thermoregulation, breastfeeding, infection prevention, and overall survival of preterm newborns [18,25].

Improving the quality of obstetric and prenatal care also constitutes an important priority. Better prevention of maternal infections, malaria during pregnancy, hypertensive disorders, anemia, and preterm deliveries could significantly reduce the incidence of prematurity [3,5,21,22]. Strengthening antenatal consultations and improving referral systems for high-risk pregnancies could contribute to earlier identification and management of maternal and fetal complications.

Another important issue concerns long-term neurodevelopmental outcomes among survivors. Advances in neonatal care have improved survival rates worldwide; however, many extremely premature newborns remain exposed to chronic neurological, respiratory, visual, hearing, and developmental complications [4,7]. In resource-limited settings, the absence of specialized long-term follow-up programs may further worsen the prognosis of surviving premature infants.

Our study presents several important methodological strengths. It is a prospective multicenter study including several referral healthcare facilities in Kisangani, thereby improving the representativeness of the findings. The use of standardized prospective data collection as well as multivariate analysis also constitute important methodological strengths [11,17]. Furthermore, the inclusion of several neonatal units provides a broader overview of prematurity management practices in this urban Congolese setting.

However, some limitations should be considered. First, the relatively small sample size may reduce statistical power for certaine analyse. Second, some important variables such as Apgar score, antenatal corticosteroid exposure, surfactant administration, microbiological data, and duration of mechanical ventilation could not be analyzed [15]. Third, the absence of long-term follow-up does not allow assessment of late neurological or developmental complications among surviving preterm newborns [4,7]. Fourth, the hospital-based nature of the study may limit the generalizability of the findings to the overall neonatal population of Kisangani. Finally, socioeconomic determinants and maternal educational level were not extensively explored despite their recognized influence on neonatal outcomes.

Despite these limitations, our study provides important recent multicenter data on prematurity in a Congolese resource-limited setting, where scientific data remain scarce.

These findings may contribute to improving neonatal healthcare policies, strengthening essential neonatal care programs, and guiding future multicenter neonatal research in the Democratic Republic of the Congo and similar African settings.

LIMITATIONS

- Relatively small sample size
- Absence of certain important variables (Apgar score, surfactant use)
- Absence of long-term follow-up

CONCLUSION

Preterm neonates in Kisangani experience a high mortality rate. Low birth weight and low gestational age constitute the main factors associated with death. Strengthening essential neonatal care is crucial to improve survival in this setting.

Conflicts of Interest

The authors declare no conflicts of interest.

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Authors' Contributions

All authors participated in the study design, data collection, results analysis, and manuscript writing. All authors read and approved the final version of the manuscript.

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