

Factors Associated with Perinatal Asphyxia at the National Children's Hospital Albert Royer

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How to cite this paper: Ndiaye, S.T., Mbodj, M., Gueye, R. and Faye, P.M. (2026) Factors Associated with Perinatal Asphyxia at the National Children's Hospital Albert Royer. *Open Journal of Pediatrics*, 16, 123-129.

<https://doi.org/10.4236/ojped.2026.161013>

Received: November 10, 2025

Accepted: January 18, 2026

Published: January 21, 2026

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Abstract

Introduction: Perinatal asphyxia remains a major cause of neonatal mortality, particularly in low- and middle-income countries. The objective of this study was to assess the factors associated with perinatal asphyxia at the National Children's Hospital Albert Royer (CHNEAR). **Methods:** This was a retrospective descriptive study conducted over a two-year period (January 1, 2020 - December 31, 2021) in the neonatology department of CHNEAR. All neonates hospitalized for perinatal asphyxia were included. **Results:** During the study period, 1715 neonates were admitted, among whom 112 cases of perinatal asphyxia were identified, corresponding to a hospital prevalence of 6.5%. The male-to-female ratio was 1.6. The mean maternal age was 26 years; 53% of mothers were primigravida and 75% had attended at least four antenatal care visits. The main obstetric complications were maternal infections (25.89%), gestational diabetes (23.2%), dystocia (17.8%), and preeclampsia (10.7%). Cesarean section was performed in 28 neonates (25%). According to the Sarnat classification, 58% of neonates had stage II encephalopathy and 11% had stage III. The most frequent neonatal complications were respiratory distress (59.8%), seizures (52.7%), and renal failure (11.6%). Hospital mortality was 29.5%, with 12.1% of deaths occurring within the first 24 hours. At 12 months of age, 36.7% of survivors had neurological sequelae. **Conclusion:** Perinatal asphyxia remains a frequent and severe condition in Senegal. Improving prognosis requires strengthening obstetric monitoring, training healthcare staff in neonatal resuscitation, and ensuring the availability of neuroprotective equipment.

Keywords

Asphyxia, Newborn, Neonatal Mortality

1. Introduction

Perinatal asphyxia is the third leading cause of neonatal mortality worldwide, after prematurity and severe neonatal infections [1]. It remains a major public health problem, particularly in low-resource countries, where access to quality obstetric and neonatal care is limited, accounting for approximately 23% of global neonatal deaths according to some estimates [2].

In Senegal, perinatal asphyxia contributes significantly to neonatal mortality. Data from health surveys indicate that birth-related complications, including asphyxia, account for nearly 25% of neonatal deaths in certain national contexts [3]. Beyond its lethality, perinatal asphyxia is responsible for irreversible neurological sequelae among survivors, such as cerebral palsy, epilepsy, and psychomotor delay, related to hypoxic-ischemic brain injury [4].

The objective of this study was to analyze the etiological and prognostic factors of perinatal asphyxia at the National Children's Hospital Albert Royer, the main pediatric referral center in Senegal.

2. Methods

A retrospective descriptive study was conducted in the neonatology unit of the National Children's Hospital Albert Royer in Dakar over a 24-month period, from January 2020 to December 2021.

All term neonates admitted for confirmed perinatal asphyxia were included. Diagnosis was based on anamnestic and clinical criteria. Preterm infants, neonates with lethal congenital malformations, and incomplete medical records were excluded.

Data were collected and analyzed using SPSS Statistics version 25. Statistical significance was set at $p < 0.05$.

3. Results

During the study period, 1715 neonates were admitted, including 112 cases of perinatal asphyxia, corresponding to a hospital prevalence of 6.5%. The male-to-female ratio was 1.6.

The mean maternal age was 26 years; 53% of mothers were primigravida and 75% had attended at least four antenatal care visits.

The main obstetric complications observed were maternal infections (25.89%), gestational diabetes (23.5%), dystocia (17.5%), preeclampsia (10.7%), fetal heart rate abnormalities (9.8%), placenta previa (7.8%), placental abruption (2.7%), and post-term pregnancy (1.78%) (**Table 1**).

Cesarean delivery was performed in 28 neonates (25%), and instrumental vaginal delivery occurred in 28% of cases. Amniotic fluid was pathological in 42% of cases. Most neonates were eutrophic (79%).

According to the Sarnat classification, 58% had stage II hypoxic-ischemic encephalopathy and 11% had stage III. The most frequent neonatal complications were respiratory distress (59.8%), seizures (52.7%), and renal failure (11.6%). All

neonates were referred from other maternity units, and only 30% were admitted before 6 hours of life (**Table 2**).

Table 1. Distribution of obstetric complications associated with perinatal asphyxia.

Obstetric complications	Frequency (n)	Percentage (%)
Maternal infection	29	25.89
Gestational diabetes	26	23.20
Dystocia	20	17.80
Preeclampsia	12	10.70
Fetal heart rate abnormalities	11	9.80
Placenta previa	9	8.03
Retroplacental hematoma	3	2.70
Post-term pregnancy	2	1.78

Table 2. Distribution of newborns according to transfer time to chnear.

Transfer time	Frequency (n)	Percentage (%)
Before 1 hour	0	0.00
Between 1 and 6 hours	34	30.36
After 6 hours	78	69.64
Not specified	0	0.00
Total	112	100.00

Table 3. Factors associated with neonatal mortality.

Variables	Survivors n (%)	Deaths n (%)	<i>p</i> -value
Neurological status (Sarnat stage)			<0.001
Sarnat I	31 (39.24)	4 (12.12)	
Sarnat II	45 (56.96)	20 (60.61)	
Sarnat III	3 (3.80)	9 (27.27)	
Respiratory distress			<0.001
No	41 (51.90)	4 (12.12)	
Yes	38 (48.10)	29 (87.88)	
Seizures			0.05
No	42 (53.16)	11 (33.33)	
Yes	37 (46.84)	22 (66.67)	
Persistent pulmonary hypertension of the newborn (PPHN)			0.08
Yes	55 (69.62)	24 (72.73)	
No	24 (30.38)	9 (27.27)	

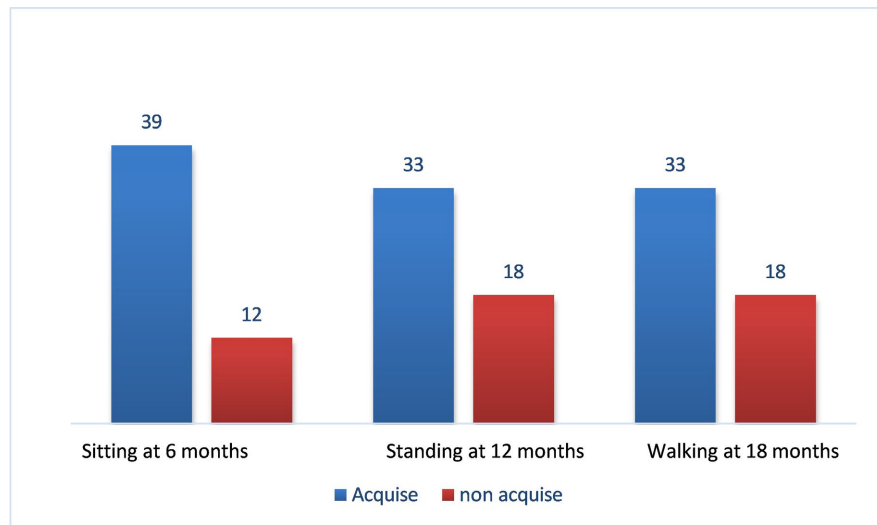


Figure 1. Distribution of psychomotor developmental milestones at 12 months.

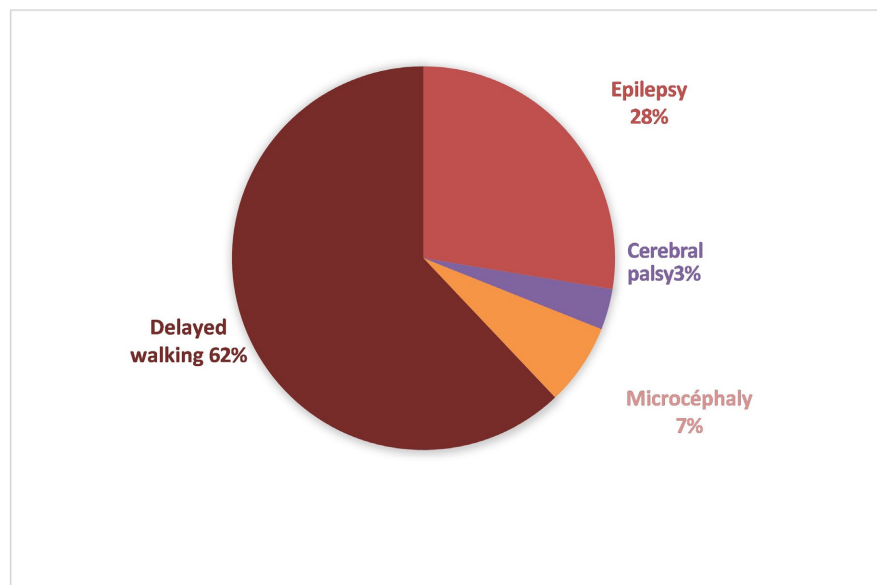


Figure 2. Distribution of long-term neurological sequelae among survivors.

Regarding management, 44% of patients received passive hypothermia between 35°C and 36°C. Most neonates (64) received anticonvulsant therapy. The mean length of hospital stay was 13.53 days (range: 1 - 75 days).

Hospital mortality was 29.5%, with 12.1% of deaths occurring within the first 24 hours. Factors significantly associated with mortality were Sarnat stage II and III encephalopathy ($p = 0.001$) and respiratory distress ($p = 0.001$) (**Table 3**).

Among the 79 survivors discharged home, 49.37% achieved sitting in 6 months, 41.77% achieved standing at 9 months, and walking at 12 months (**Figure 1**). At 12 months, 36.7% had neurological sequelae, including epilepsy (10.1%), cerebral palsy (1.26%), and microcephaly (2.53%) (**Figure 2**).

4. Discussion

In our study, the hospital prevalence of perinatal asphyxia was 6.5%, close to values previously reported in Senegal by Diallo, Tala, and Gueye, with rates of 8.9% [5], 7.99% [6], and 7.46% [7], respectively.

Multicenter studies in sub-Saharan Africa report wide variations in prevalence, ranging from 15.6% to 23.45% [8]-[10].

Hospital prevalence in our setting remains significantly higher than in high-income countries, where reported rates range from 0.5 to 6 per 1000 live births [11]. This difference is largely explained by limited access to adequate antenatal care, intrapartum monitoring, and neonatal resuscitation resources.

Perinatal asphyxia in our study was associated with several obstetric complications, including premature rupture of membranes, urogenital infections, gestational diabetes, dystocia, preeclampsia, fetal heart rate abnormalities, placenta previa, placental abruption, and post-term pregnancy. In contrast, in high-income countries, the incidence of severe intrapartum complications is much lower, generally estimated between 0.5 and 3 cases per 1000 live births, reflecting high-quality prenatal and obstetric care [12].

Although therapeutic hypothermia was not available, 44% of neonates received passive hypothermia, reflecting efforts to implement neuroprotective strategies in low-resource settings. In contrast, in high-income countries, therapeutic hypothermia is standard of care for moderate to severe hypoxic-ischemic encephalopathy and has been shown to significantly reduce mortality and long-term neurological impairment [13].

The hospital mortality rate of 29.5% observed in our study is consistent with the high mortality reported in sub-Saharan Africa, where rates frequently exceed 20% [14]-[16].

Furthermore, 36.7% of survivors developed neurological sequelae at 12 months, similar to findings from other African studies, highlighting the persistent burden of long-term disability in resource-limited settings due to delayed diagnosis, limited neuroprotective interventions, and inadequate follow-up care [17]-[19].

5. Conclusion

Perinatal asphyxia remains a major cause of neonatal mortality worldwide. In low-resource settings such as ours, prevention relies on improved obstetric surveillance, training of healthcare personnel in neonatal resuscitation, and the generalization of basic neonatal care. Strengthening neonatal referral systems, improving access to therapeutic hypothermia, and implementing regular neurodevelopmental follow-up are essential to reduce mortality and long-term sequelae.

Conflicts of Interest

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

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