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Care of Newborns in the Intensive Care Unit of the Neonatology Department at the Issaka Gazoby Referral Maternity Hospital

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ABSTRACT

Introduction: *Neonatal resuscitation is a critical medical emergency procedure for saving newborns experiencing respiratory or circulatory distress at birth. In Niger, neonatal mortality remains a cause for concern, despite the government's efforts.*

Objective: *To evaluate neonatal resuscitation practices at the Issaka Gazoby Maternity Hospital (MIG), a national referral center.*

Methodology: *This was a prospective, descriptive, and analytical study conducted over a six (6)-month period from March 30, 2025, to August 30, 2025, in the neonatal unit at MIG in Niamey.*

Results: *There was a total of 288 admissions to neonatal intensive care out of 3,776 births, representing a rate of 7.63% of cases.*

The mean age of the mothers was 27.97 ± 7.77, with the largest age group is 25–34 years, accounting for 40.63%. In 72.92% of cases, the mothers had no formal education, and in 74.65% of cases, they were homemakers. Regarding prenatal care, 18.75% of women had attended between 0 and 2 prenatal visits, and the number of ultrasounds ranged from 1 to 2 in 56.60% of cases. Newborns had an Apgar score below 7 at one minute of life in 96.18% of cases. Among the resuscitation measures performed, 37.15% of newborns received mask ventilation, 11.81% received chest compressions, of these, 35.29% were given epinephrine. Following treatment, 52 % were admitted to a neonatal unit, 11.11 % died early, and 88.89% were discharged alive and in stable condition. Regarding infrastructure, only 48% of delivery rooms were fully equipped for resuscitation.

Conclusion: *The provision of neonatal resuscitation remains limited by a lack of equipment, the incomplete implementation of protocols and a low rate of antenatal care. Efforts must be made to ensure effective care and thereby reduce mortality.*

Keywords
Neonatal resuscitation, Prognosis, Issaka Gazoby Referral Maternity Hospital, Niger.

Introduction
Neonatal resuscitation is an emergency medical procedure aimed at restoring the vital functions of a newborn in distress at birth. It involves a series of interventions ranging from simple stimulation to external chest compressions, as well as mask ventilation or intubation. Nearly 10% of newborns worldwide require respiratory support at birth, and about 1% require advanced resuscitation, underscoring the importance of having trained personnel and adequate equipment available right in the delivery room [1].

Patients and Methods

This is a prospective, descriptive, and analytical study covering a 6-month period from March 30 to August 30, 2025. All newborns who required neonatal resuscitation immediately after birth were included.

Maternal variables (age, prenatal care), obstetric variables (mode of delivery, perinatal complications), and neonatal variables (sex, birth weight, Apgar score, type of resuscitation, immediate outcome, prognosis) were examined. The data were entered and analyzed using EPI INFO 7.2.3 software. the descriptive analysis was used to calculate the frequencies, proportions, means, medians, and standard deviations of the various variables studied. For the bivariate analysis, associations were assessed using the chi-square test of independence when the conditions for its application were met. In situations where the expected sample sizes were insufficient, Fisher's exact test was used. The level of statistical significance was set at 5%.

Results

During our study period, there were 3,776 births, of which 288 resulted in admissions to the Neonatal Intensive Care Unit, representing 7.63% of cases. The mothers had a mean age of 27.97 ± 7.17, ranging from 15 to 50 years. The largest age group is 25–34 years, accounting for 40.63%.

In 72.92% (n=210) of cases, the mothers had no formal education, and in 74.65% (n=215) of cases, they were homemakers.

The average number of prenatal visits was 3.79 ± 1.52, ranging from 0 to 7; at least 5 visits were recorded in 35.76% (n = 103) of cases. The parturients had undergone between 1 and 2 ultrasounds in 56.60% (n = 163) of cases.

Table 1: Breakdown of Mothers by Reason for Referral.

Reference motif	Effective	Percentage (%)
PES	32	22,70
HRP	19	13,48
Dystocic presentation	17	12,06
APP	11	7,80
DFP	11	7,80
Syndrome de pré rupture	11	7,80
Travail prolongé	9	6,38
RPM	7	4,96
Procidence du cordon	5	3,55
Dépassement de terme	4	2,84
Oligoamnios/Anamnios	4	2,84
Chorioamniotite	3	2,13
Macrosomia	3	2,13
Placenta prævia	3	2,13
BGR	1	0,71
Drépanocytose	1	0,71

Severe preeclampsia was the most common reason for referral in 22.70% (n=32) of cases, followed by retroplacental hematoma and dystocic presentation in 13.48% (n=19) and 12.06% (n=17), respectively (Table 1). Cesarean section was the mode of delivery in 86.46% (n=249) of cases and was performed as an emergency procedure in 98.80% (n=246) of cases.

The APGAR score indicated severe distress in 21.19% (n=61) of cases and moderate distress in 75.00% (n=216) of cases (Table 2).

Table 2: Breakdown of newborns by APGAR score.

APGAR score	Effective (n)	Percentage (%)
moderate distress	216	75,00
severe distress	61	21,19
normal	11	3,81
Total	**288**	**100**

The pediatrician was called to the operating room before delivery in 48.61% (n=140) of cases, and resuscitation equipment was incomplete in 77.78% (n=224) of cases.

The primary indication for neonatal resuscitation was neonatal asphyxia in 96.19% (277) of patients (Table 3).

Table 3: Breakdown by indications for neonatal resuscitation.

Indications	Effective (n)	Percentage (%)
Neonatal asphyxia	277	96,19
Bradycardia	8	2,77
Severe hypotonia	3	1,04
Total	**288**	**100**

During neonatal resuscitation, The resuscitation table was preheated in 95.84% (n=276) of cases, the stopwatch was started in 90.62% (n=261) of cases, and measures to prevent hypothermia were implemented in 95.14% (n=274) of cases.

Airway clearance was performed in 60.07% (n=173) of cases and consisted of oral and nasal suctioning and administration of oxygen via oxygen goggles; mask ventilation was performed in 37.15% (n=107) of cases.

SpO_2 and heart rate were monitored every 30 minutes in 42.71% (n=123) of cases.
Cardiac massage was performed in 34 patients, or 11.81% of cases; no newborn was intubated, and epinephrine was administered to 12 patients, or 35.29% of those treated.

The average length of hospital stay was 4.93 ± 8.22 days, with a range of 1 to 72 days. In 51.73% of cases (n=149), the newborns stayed in the unit for between 3 and 5 days.

The newborns were in good condition at discharge in 87.15% (n=251) of cases; unfortunately, we recorded 32 deaths, representing 11.11% of cases.

The mortality rate was 30% among newborns with an APGAR score of 0 to 3. The results highlight a significant association ($p = 7.53 \times 10^{-6}$) (Table 4).

Table 4: Relationship between APGAR score and discharge status.

Output mode					P-value
APGAR Score	Deceased		Alive		
	N	%	N	%	
0 à 3	18	(30)	42	(70)	
4 à 6	10	(4,67)	204	(95,33)	
7 à 10	4	(28,57)	10	(71,43)	
Total	32	(11,11)	256	(88,89)	$7{,}53 \times 10^{-6}$

The mortality rate was 53.84% among newborns with a birth weight <1,000 g. The χ^2 test confirms the significance of this association, with a p-value of 1.423×10^{-4} (Table 5).

Table 5: Relationship between mode of delivery and birth weight.

Output mode					P-value
Birth weight	Deceased		Alive		
	N	%	N	%	
<1000	7	(53,84)	6	(46,16)	
1000–1499	6	(42,86)	8	(57,14)	
1500–2499	8	(10,52)	68	(89,48)	
2500–3999	11	(6,08)	170	(93,92)	
≥4000	0	(0,0)	4	(100,0)	
Total	32	(11,113)	256	(88,89)	$1{,}423 \times 10^{-4}$

The mortality rate when the pediatrician was called after birth was 37.5%. This observation does not translate into a significant association, as evidenced by the p-value of 0.454.

Discussion

In our study, 40.6% of the mothers were between the ages of 25 and 34, and 72.9% had no formal education. In addition, 74.6% were homemakers. These characteristics point to a disadvantaged socioeconomic profile, which is likely to limit access to prenatal care and health autonomy. These findings are consistent with those reported by Afolabi et al. in Nigeria, where a large proportion of uneducated women were involved in cases of neonatal resuscitation [2].

Similarly, Desta et al. in Ethiopia demonstrated that a high percentage of mothers without formal education was associated with adverse perinatal outcomes [3].

These data demonstrate that our population is not unique among low-resource settings, but that educational deprivation is particularly pronounced here. These sociodemographic factors can influence the quality of prenatal care.

Only 35.7% of women received at least five prenatal visits, and 22.2% did not undergo an ultrasound during their pregnancy. This gap in care is significantly lower than the rates observed in some African studies: for example, Okeke et al. in Nigeria reported that approximately 55% of women had at least four prenatal visits, and only 10% did not undergo an ultrasound [4].

Similarly, Boamah et al. in Ghana observed that nearly 60% of women had at least four prenatal visits, and a majority had received obstetric imaging [5]. The contrast with our results indicates significant gaps in access to or adherence to prenatal care in our setting.

This low rate of prenatal care appears to be correlated with our very high cesarean section rate: 86.5% of deliveries, 98.8% of which were emergency cesareans. Indeed, a failure to anticipate obstetric complications can lead to emergency interventions. For example, Shikuku et al. in Kenya reported a cesarean section rate of 41% in cases of neonatal asphyxia observed at their referral hospital [6]. Furthermore, Mutesu-Kapembwa et al. in Zambia found that in cases of fetal distress, up to 45% of deliveries resulted in a cesarean section [7]. Our rate is therefore significantly higher, which may be explained by the fact that our facility is a referral center receiving the most complex cases, or by a more systematic tendency to opt for surgery in situations of fetal distress. Thus, the link between inadequate prenatal care and a high proportion of emergency cesarean sections in our series underscores the importance of strengthening prenatal care to anticipate obstetric complications.

Regarding 1-minute Apgar scores, only 3.8% of the newborns in our study had a normal score, while 75% exhibited moderate distress and 21.2% severe distress. In comparison, Shikuku et al. reported that 70% of asphyxiated newborns had an Apgar score of ≤ 3 at 1 minute, indicating predominantly severe distress [6]. Our proportion of severe distress is lower than that reported by Shikuku, which could be explained by a less extreme case population or by Apgar scoring practices that were timed differently relative to the start of care.

The pediatrician was called before birth in 48.6% of cases, and resuscitation equipment was incomplete in 77.8% of cases. These structural constraints are, unfortunately, common in resource-limited settings. For example, Shikuku et al. noted that even in a referral hospital in Kenya, the actual availability of equipment including functionality, available supplies, and maintenance was problematic [6]. Furthermore, in a review of neonatal resuscitation in resource-limited settings, Wall et al. frequently highlighted shortages of supplies or non-functional equipment as major obstacles to effective resuscitation [8].

Basic procedures such as preventing hypothermia and using a preheated table were performed in more than 94% of cases. This indicates good application of basic principles. However, advanced procedures were severely underutilized: airway clearance (60%), mask ventilation (37%), chest compressions (11.8%), and no intubation. By comparison, Shikuku et al. reported the use of mask ventilation in 55% of asphyxia cases and chest compressions in 25% of cases [6]. Thus, although basic procedures are correctly applied, the low use of critical interventions compromises the quality of neonatal care and limits the potential for survival.

Early neonatal mortality was 11.11% in our study. Although this rate is high, it remains lower than that reported in some studies on

neonatal asphyxia. For example, Ketema et al. in Ethiopia reported a mortality rate of 42.29% among asphyxiated newborns [9]. Furthermore, Holm-Hansen et al. observed a neonatal mortality rate of 23.6 per 1,000 births (i.e., 2.36%) in their cohort; however, in cases requiring intensive care, several deaths occurred despite ventilation attempts [10].

A statistically significant association was observed between the Apgar score and neonatal mortality ($p = 7.53 \times 10^{-6}$). Low Apgar scores (0–3) were associated with significantly higher mortality. This finding is consistent with international data showing that low 5-minute Apgar scores are a robust predictor of neonatal mortality, regardless of gestational age [11-13]. African studies also confirm that scores <7 are associated with an increased risk of hypoxic-ischemic encephalopathy and death [14,15]. However, in accordance with the recommendations of the American College of Obstetricians and Gynecologists, the Apgar score should not be used in isolation to predict individual outcomes [16].

Birth weight was significantly associated with death ($p = 1.423 \times 10^{-4}$). Very low birth weight infants (<1,500 g) had the highest mortality rates. This trend is consistent with global and regional estimates that identify prematurity and low birth weight as the main determinants of neonatal mortality, particularly in sub-Saharan Africa [17-21]. Physiological immaturity, susceptibility to infection, and respiratory difficulties largely account for this excess mortality.

Although mortality was higher when the pediatrician was called to the delivery room, this difference was not statistically significant ($p = 0.454$). This result may reflect a severity bias: late calls generally occur in situations that are already critical. The literature emphasizes that the early presence of a team trained in resuscitation improves the management of neonatal distress, particularly in high-risk deliveries [22-24].

Conclusion

Neonatal resuscitation remains a critical factor in reducing infant mortality, particularly in resource-limited settings.

Analysis of the data highlighted several risk factors related to both maternal characteristics and delivery conditions. Although certain steps in basic resuscitation were followed properly, other essential practices, such as airway clearance or mask ventilation, were not fully performed.

Limited availability of equipment and gaps in the rigorous application of protocols were significant barriers to optimal care. These findings underscore the need to strengthen ongoing staff training, ensure adequate equipment, and further standardize resuscitation protocols.

Authors Contribution

All authors participated in the development of this study, read, and approved the final version of the manuscript.

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