

*Original article*

## Risk factors for death in low-birth-weight newborns at the Issaka Gazobi Maternity Hospital in Niamey, Niger

Facteurs de risques de décès des nouveau-nés de faible poids de naissance à la Maternité Issaka Gazobi de Niamey (Niger)

Z Ali Labo\*<sup>1</sup>, Z Oumarou<sup>2</sup>, A Sayo Djibo<sup>1</sup>, S Moussa Saley<sup>3</sup>, A Soumana<sup>4</sup>, B Salissou Labo<sup>2</sup>, M Nayama<sup>5</sup>

**Résumé**

**Introduction :** Le Faible Poids de Naissance est un problème complexe ayant des conséquences importantes en termes de santé publique puisqu'il impacte sur la mortalité néonatale. Le but de cette étude était d'identifier les facteurs de risques de décès des nouveau-nés de faible poids de naissance au service de néonatalogie de la Maternité Issaka Gazobi.

**Méthodologie :** Une étude transversale, descriptive et analytique portant sur les nouveau-nés de poids de naissance < 2500g a été menée de Janvier à décembre 2018. Les données ont été recueillies à travers les dossiers des nouveau-nés. Les facteurs de risques de décès ont été déterminés par régression logistique binaire. Une p inférieure à 0,05 a été considérée comme significative.

**Résultats :** Ont été inclus dans l'étude 392 sujets au total. La prévalence de Nouveau-nés de faible poids de naissance était 9,30%, 46% étaient de sexe masculin. L'âge des mères variait de 15 à 45 ans, 13,5% des mères avaient plus de 35 ans. Sur les 392 nouveau-nés de faible poids de naissance, 29,6% étaient

décédés. Les facteurs suivants étaient liés au décès : le poids de naissance < 1500g (OR : 10,56), le score d'Apgar à la 5ème minute de vie < 7 (OR : 5,11) et l'âge gestationnel < 37 Semaines d'aménorrhée (OR : 2,22).

**Conclusion :** Notre travail a permis d'identifier les facteurs de risques qui influençaient le décès des nouveau-nés de faible poids de naissance.

**Mots-clés :** nouveau-né, Faible poids, risque, décès, Niamey.

**Abstract**

**Introduction:** Low birth weight is a complex problem with important public health consequences, since it has an impact on neonatal mortality. The aim of this study was to identify risk factors for the death of low-birth-weight newborns in the neonatology department of the Issaka Gazobi Maternity Hospital.

**Methodology:** A cross-sectional, descriptive and analytical study of newborns with birth weight < 2500g was conducted from January to December 2018. Data were collected through newborn records. Risk factors for death were determined by binary

logistic regression. A p less than 0.05 was considered significant.

Results: A total of 392 subjects were included in the study. The prevalence of low-birth-weight newborns was 9.30%, 46% were male. Mothers' ages ranged from 15 to 45 years, with 13.5% over 35. Of the 392 low-birth-weight babies, 29.6% died. The following factors were associated with death: birth weight < 1500g (OR: 10.56), Apgar score at 5<sup>ème</sup> minutes of life < 7 (OR: 5.11) and gestational age < 37 Weeks of amenorrhea (OR: 2.22).

Conclusion: Our work has enabled us to identify the risk factors influencing death in low-birth-weight newborns.

Keywords: newborn, low weight, risk, death, Niamey.

## Introduction

Low Birth Weight (LBW), defined by the World Health Organization (WHO) as any live birth weighing less than 2500 g, is a key indicator of newborn health [1]. Low birth weight remains a major public health problem. Particularly in South Asia, where the prevalence of LBW is the highest in the world at 74% [2]. Numerous studies have shown a strong association between low birth weight and neonatal and perinatal morbidity and mortality. Low-birth-weight neonates are a daily concern for neonatology departments in developing countries, due to the difficulties involved in managing them. The major consequence is the high rate of early neonatal mortality. Of the 11.6 million deaths of children under 5 in developing countries, 6.3 million (53%) were associated with low birth weight [3], compared with 41.3% in Bangui [4]. Neonatal mortality remains a major concern for Niger's health authorities, with the neonatal mortality rate ranging from 26.8‰ in 2015 to 25.2‰ in 2018 [5]. According to the Niger Demographic Health Survey EDSN IV in 2012, very low or low birthweight babies run a much higher risk of dying before one year of age than "medium" or "large" birthweight babies (108‰ vs. 64‰). Mortality during the first 30 days is 2.5 times higher [6].

Low birth weight is a complex problem with major public health implications, as it has a direct impact on infant mortality. The aim of this study was therefore to identify the risk factors for the death of low-birth-weight infants at the Issaka Gazobi Maternity Hospital (MIG) in Niamey.

## Methodology

This was a retrospective descriptive study with analytical aims carried out from February to March 2019. The study exploited the hospitalization records of newborns during the period from January to December 2018. Included in our work were all newborns aged 0 to 28 days, birth weight <2500 g, admitted to the Neonatology Department of the Issaka Gazobi Maternity Hospital in Niamey during the study period. We carried out an exhaustive consecutive recruitment of low-birth-weight neonates. A total of 392 neonates meeting our inclusion criteria were enrolled.

The dependent variable studied was the death of low-birth-weight infants. Two modalities were chosen for this variable: death yes or no. The independent variables related to the characteristics of low-birth-weight newborns (sex, mode of delivery, birth weight, Apgar score at 5 minutes), the socio-demographic characteristics of mothers (age, marital status, education, income-generating activities), the obstetrical and medical history of mothers (gestational age, parity, prenatal consultation, type of pregnancy, maternal pathologies observed during pregnancy, HIV serology, etc.) and the outcome of newborns (hospital outcome, maternal mortality, etc.) and the evolution of newborns (hospital outcome, length of stay and causes of death).

Data were entered and processed using SPSS version 21 software. Quantitative variables were expressed as means with standard deviations. Univariate analysis was performed using the Chi-Square statistical test at a significance level of 5%.

For the multivariate analysis, all variables that had a p < 0.05 were entered into the binary logistic regression

model to identify the risk factors that were associated with the death of low- birth-weight neonates.

#### *Ethical aspects*

We obtained permission from the Maternity Ward Manager Issaka Gazobi and the Head of the Neonatology Department before accessing the newborns' records. The data collected was treated in the strictest confidence. We ensured that medical confidentiality was respected.

### **Results**

During the period of our study, 4215 newborns were admitted to the neonatology department of the Issaka Gazobi Maternity Hospital, including 392 with low birth weight according to our inclusion criteria, i.e. an estimated prevalence of 9.30%. Of these, 116 (29.6%) died.

#### *Characteristics of low-birth-weight infants*

Males accounted for 46%, i.e. a sex ratio of 0.86. The place of delivery was the Issaka Gazobi Maternity Hospital in 87.5% of cases, 16.6% had a birth weight between 1000-1499g and 3.6% had a birth weight below 1000g. Caesarean section was the mode of delivery for 86%. The Apgar score was specified for 383 newborns, and was between 4-6 at 5ème minutes for 25.6%. The Apgar score at 5ème minutes of life is shown in figure 1 below.

#### *Socio-demographic characteristics of mothers*

The age of the mothers of the newborns ranged from 15 to 45 years, with an average of 27.02 years; 6.6% of mothers were under 18, and those over 35 represented 13.5%. In terms of marital status, 96.4% were married, 30.4% were educated and 32.6% had an income-generating activity.

#### *Mothers' obstetrical and medical history*

Gestational age was less than 28 weeks' amenorrhea (SA) in 2.8% of cases in our study. Of the 363 mothers who had attended antenatal clinics, 26.4% had attended at least 4. Primiparous mothers accounted for 26%, and 9.4% of mothers were grand multiparous (more than 4 children). In 19.4% of cases, pregnancies were twin.

During pregnancy, 29.8% of mothers had presented with pathologies; HIV serology was carried out in 329 mothers and was positive in 3%. Severe pre-eclampsia accounted for 32.4% of maternal pathologies observed in our study.

The maternal pathologies observed in our study are shown in figure 2 below.

#### *Evolution of low-birth-weight babies*

Of the 392 low-birth-weight babies, 116 (29.6%) died, with hospital stays of between 0 and 3 days in 78.1% of cases, and 4 days or more in 21.9%. The period of death of newborns was 0-7 days in 102 cases, i.e. 87.9%. Figure 3 below shows the causes of death of low-birth-weight babies.

#### *Uni-varied analysis*

Place of delivery (OR: 3.50; p=0.000), mode of delivery (OR: 3.20; p=0.000), birth weight (OR: 15.89; p=0.000) and Apgar at 5ème minutes (OR: 5.74; p=0.000) were statistically associated with death in low-birth-weight neonates in our series.

For maternal characteristics, variables such as maternal age (OR: 4.18; p= 0.031), gestational age (OR: 4.18; p=0.000), maternal pathologies observed during pregnancy (OR: 0.54; p=0.02) were statistically associated with the death of low-birth-weight neonates in our work. There was also a statistically significant association between length of hospital stay (OR: 0.52; p= 0.01) and the death of low-birth-weight newborns.

#### *Multivariate analysis*

In multivariate analysis, birth weight less than 1500g (OR: 10.56; p= 0.000), Apgar less than 7 at 5ème minutes (OR: 5.11; p= 0.000) and gestational age less than 37 weeks of amenorrhea (OR: 2.22; p= 0.014) were the risk factors for death in low-birth-weight newborns in our study.

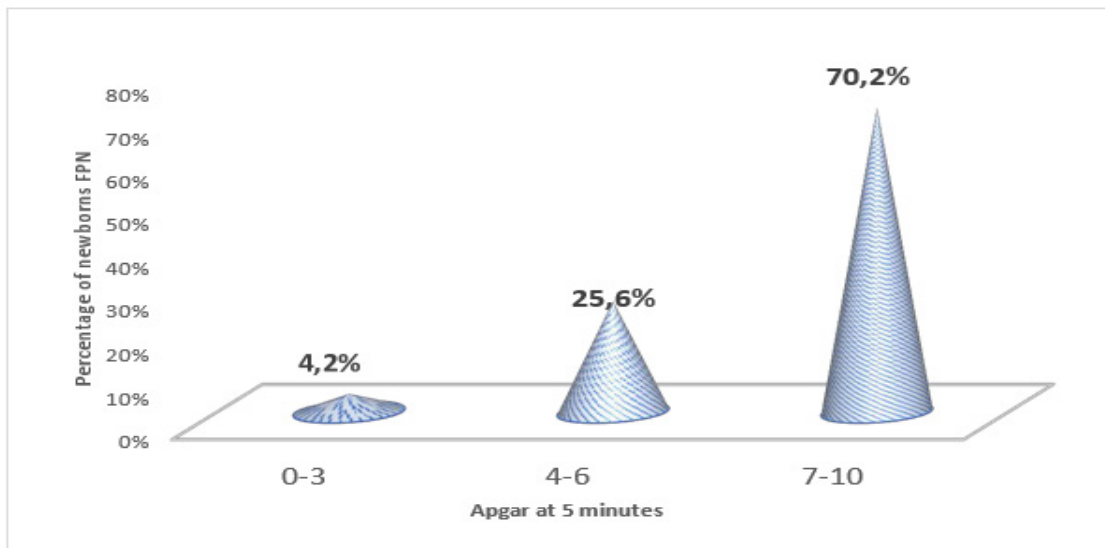


Figure 1: Apgar scores of low-birth-weight newborns at 5 minutes of life (n=383).

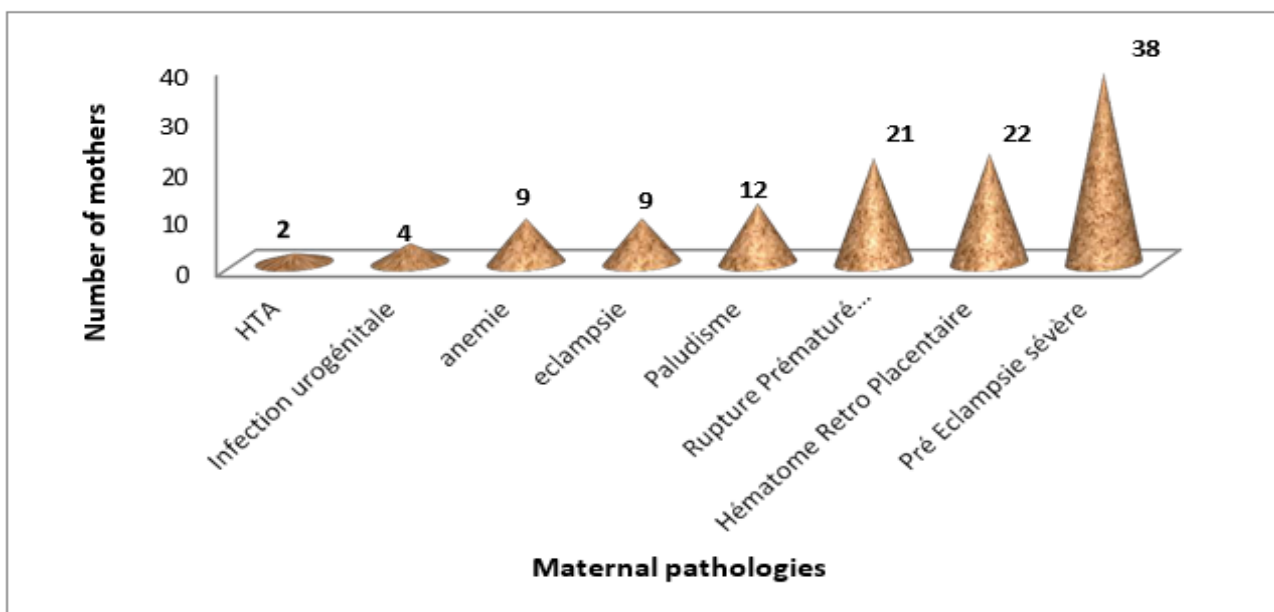


Figure 2: Maternal pathologies observed during pregnancy (n=117)

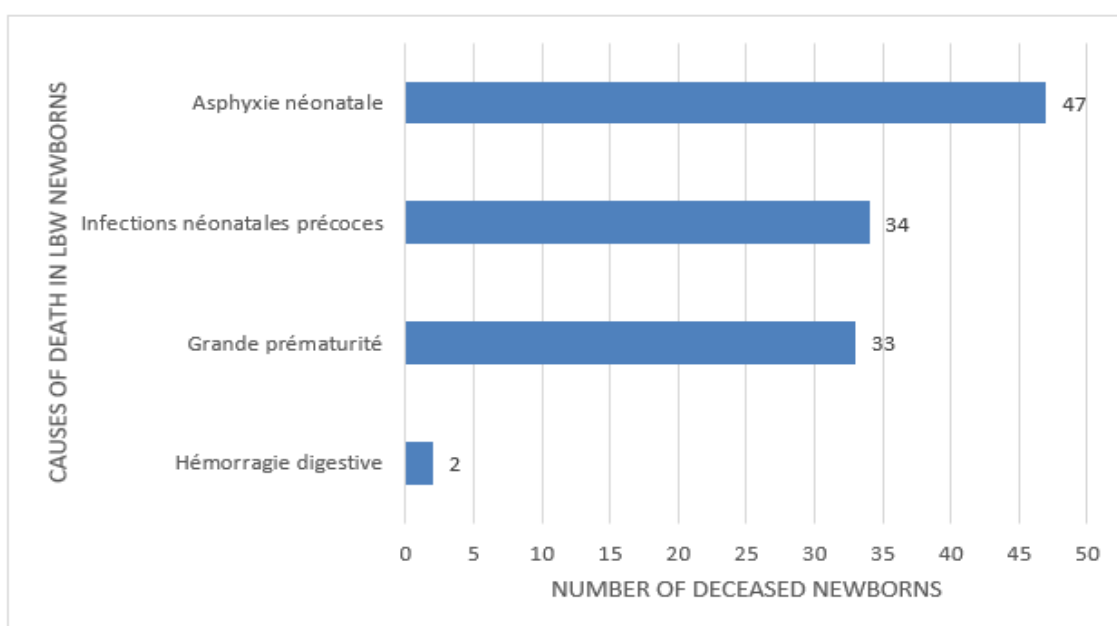


Figure 3: Causes of death in low-birth-weight newborns (n=116).

Table I: Obstetrical and medical history of mothers of LBW newborns (n=392)

<b>Obstetrical history</b>	<b>Absolute frequency n</b>	<b>Relative frequency %</b>
<b>Gestational age</b>		
< 28 SA	11	2,8
28 - < 32 SA	42	10,7
32 – 36 SA	171	43,6
≥ 37 SA	168	42,9
<b>Parity</b>		
Primipare	102	26,0
Multipare	253	64,5
Grande ultipare	37	9,4
<b>Prenatal consultation</b>		
Yes	363	92,6
No	29	7,4
<b>Type of pregnancy</b>		
Triplet	8	2,0
Twin	76	19,4
Monofetal	308	78,6
<b>Maternal pathologies</b>		
Yes	117	29,8
No	275	70,2

Table II: Characteristics of low-birth-weight infants associated with death

<b>Neonatal characteristics</b>	<b>Deaths of FPN newborns</b>			<b>P</b>
	<b>Yes n (%)</b>	<b>No n (%)</b>	<b>Odds Ratio [IC].</b>	
<b>Gender</b>				
Male	59 (32,41)	123 (67,59)	1,28	0,25
Female	57 (27,14)	153 (72,86)	[0,83-1,98]	
<b>Place of delivery</b>				
Other health training	27 (55,10)	22 (44,90)	3,50	0,000
Issaka Gazobi Maternity Hospital	89 (25,94)	254 (74,06)	[1,89-6,46]	
<b>Delivery mode</b>				
Voie Basse	29 (52,72)	26 (47,28)	3,20	0,000
Cesarean section	87 (25,81)	250 (74,19)	[1,78-5,74]	
<b>Birth weight</b>				
< 1500g	61 (77,21)	18 (22,79)	15,89	0,000
1500-2499 g	55 (17,57)	258 (82,43)	[8,71-28,99]	
<b>Apgar at 5<sup>ème</sup> minutes</b>				
< 7	64 (56,14)	50 (43,86)	5,74	0,000
7-10	49 (18,21)	220 (81,79)	[3,54-9,31]	

Table III: Sociodemographic characteristics, obstetrical/medical history of mothers and length of hospital stay of LBW newborns associated with death

<b>Deaths of FPN newborns</b>				
	<b>Yes n (%)</b>	<b>No n (%)</b>	<b>Odds Ratio [IC]</b>	<b>P</b>
<b>Socio-demographic characteristics of mothers</b>				
<b>Maternal age</b>				
15-35years	107 (31,56)	232 (68,43)	2,25	<b>0,031</b>
> 35 years	9 (17)	44 (83)	[1,06-4,78]	
<b>Marital status</b>				
Single	4 (28,57)	10 (71,42)	0,95	0,93
Bride	112 (29,62)	266 (70,37)	[0,29-3,09]	
<b>Instruction</b>				
Yes	33 (27,73)	86 (72,26)	0,87	0,59
No	83 (30,40)	190 (69,60)	[0,54-1,41]	
<b>Obstetrical and medical history</b>				
<b>Gestational age</b>				
<37 SA	92 (41,07)	132 (58,92)	4,18	<b>0,000</b>
≥ 37 SA	24 (14,28)	144 (85,71)	[2,51-6,98]	
<b>Parity</b>				
Primipare	27 (26,47)	75 (73,53)	0,81	0,42
Multipare	89 (30,68)	201 (69,32)	[0,49-1,34]	
<b>Pre-natal consultation</b>				
Yes	110 (30,30)	253 (69,70)	1,66	0,27
No	6 (29,68)	23 (79,32)	[0,66-4,22]	
<b>Type of pregnancy</b>				
Multiple	25 (29,76)	59 (70,24)	1,01	0,96
Monofetal	91 (29,54)	217 (70,46)	[0,59-1,73]	
<b>HIV serology</b>				
Positive	2 (20)	8 (80)	0,58	0,50
Negative	95 (29,78)	224 (70,22)	[0,12-2,82]	
<b>Maternal pathologies</b>				
Yes	25 (21,36)	92 (78,64)	0,54	<b>0,02</b>
No	91 (33,10)	184 (66,90)	[0,33-0,91]	
<b>Hospital stay for LBW newborns</b>				
<b>Length of hospital stay</b>				
0-3days	81 (26,47)	225 (73,53)	0,52	<b>0,01</b>
4 days and more	35 (40,69)	51 (59,31)	[0,31-0,86]	

Table IV: Factors associated with death in low-birth-weight infants (binary logistic regression)

<b>Deaths of FPN newborns</b>		
	<b>Odds Ratio [OR</b>	<b>P</b>
<b>Neonatal characteristics</b>		
<b>Place of delivery</b>		
Other health training	1	ns
Issaka Gazobi Maternity Hospital	3,19 [0,35-28,66]	
<b>Delivery mode</b>		
Voie Basse	1	ns
Cesarean section	1,79 [0,230-14,06]	
<b>Birth weight</b>		
< 1500g	1	0,000
1500-2499 g	10,56 [5,13-21,75]	
<b>Apgar at 5 minutes</b>		
< 7	1	0,000
7-10	5,11 [2,79-9,34]	
<b>Characteristics of mothers</b>		
<b>Maternal age</b>		
15-35years	1	
> 35 years	1,42 [0,54- 3,70]	ns
<b>Gestational age</b>		
<37 weeks of amenorrhea	1	
≥ 37 weeks of amenorrhea	2,22 [1,17-4,19]	0,014
<b>Maternal pathologies</b>		
Yes	1	
No	0,77 [0,38-1,53]	ns
<b>Hospital stay for LBW newborns</b>		
<b>Length of hospital stay</b>		
1-3 days	1	
4 days and more	1,25 [0,61-2,55]	ns

ns: not significant

## Discussion

Analysis of the results, in line with the objective of our work, identified the risk factors influencing the death of low-birth-weight newborns at the Issaka Gazobi Maternity Hospital. However, this study had a number of limitations. We conducted a retrospective survey. We were faced with certain difficulties that are inherent in most retrospective studies, namely:

incomplete anamnestic data and unusable records (157 unusable records during our study).

The prevalence of low-birth-weight newborns was estimated at 9.30% similar to that reported by Setondji in Benin in 2014, which was 9.1% [7]. Our proportion was lower than those reported respectively by Awoleke's study [8] in Nigeria, Zeleke et al. [9] in Ethiopia, with 14.1% and 17.1% respectively. The high proportion of low-birth-weight children



in developing countries is considered an important determinant of infant mortality [3].

The outcome of low-birth-weight newborns was dominated by hospital mortality, which remains high at 29.6%, as it is in most African countries with a neonatal unit: Tietche et al. [10] at Yaoundé Central Hospital, Keita et al. [11] in Bamako and Bobossi et al. [4] in Bangui, reported higher rates, at 36.1%, 35.9% and 41.3% respectively. Newborn deaths occurred within 7 days of birth in 87.9% of cases in our study, while a lower rate of 53.8% was found in the series by Segbedji et al. [12] in Benin. Tchagbele et al. [13] found a higher rate than ours, where mortality within 7 days of birth was 84.4%. Analysis of neonatal mortality shows that the first few days of life are more critical for newborns, and this could be explained by delays in care or the absence of adequate technical facilities.

Neonatal asphyxia was the leading cause of death in our work 40.51%, followed by early neonatal infection 29.31%. Edmond et al. [14] in Ghana also reported neonatal asphyxia as the leading cause of death (42%), followed by early neonatal infection (24%). In the series by Bobossi et al. [4], early neonatal infections accounted for 39% of deaths.

There was no statistically significant relationship between the sex of the newborn and death. In our series, male neonates accounted for 32.41% of deaths, compared with 27.14% for female neonates. More rapid lung maturation in female newborns is thought to be a protective factor against neonatal death, as it reduces respiratory complications, especially in premature infants [15].

In our series, 12.5% of FPN newborns came from other health facilities (peripheral maternity units). Our proportion is lower than that of Danielle et al. [16], 57% in 2015 in Douala.

Monebenimp et al. [17] had shown that a newborn referred from a peripheral center to a specialized care unit has a higher mortality risk. The risk of death was 3.5 times higher in newborns whose delivery had taken place in health facilities (55.10%) other than the Maternité Issaka Gazobi (25.94%) in our series.

Indeed, the Maternité Issaka Gazobi is the reference maternity hospital with a neonatology unit for better care of newborns. Mortality was also higher among newborns from other health centers (25.3%) compared with newborns from the reference maternity hospital (13.4%), in the series by Danielle et al. [16]

The risk of death was 52.72% for vaginal delivery, compared with 25.21% for Caesarean delivery. And the risk of newborn death was multiplied by 3.2 for vaginal delivery in our study. Our results are similar to those reported by Nagalo et al. [18] in Ouagadougou, where vaginal delivery was identified as a factor favoring neonatal mortality. In the series by Danielle et al. [16], there was no statistically significant association between mode of delivery and death.

Among those with a birth weight of less than 1500g, 77.21% died, compared with 17.57% of those between 1500g and 2499g. Birth weights below 1500g increased the risk of newborn death in our study by a factor of 16. Indeed, the lower the birth weight, the higher the mortality. The impact of low birth weight on neonatal death has been demonstrated by several authors [4 ;11 ; 19 ; 20].

Newborns who died had an Apgar score below 7 in 56.14%, our result is higher than that of Bobossi et al. [4], 44,92 %. Harir et al. [21] reported 84.28% of neonates who died with an Apgar score < 6. In our study, the risk of death in low-birth-weight newborns is multiplied by

5.7 if the Apgar score was < 7 at 5ème minutes of life. There was a statistically significant relationship between maternal age and death in low-birth-weight infants; 31.56% of infants born to mothers aged between 15 and 35 died, compared with 17% of those born to mothers aged over 35. Our result is lower than that of Segbedji et al. [12], with 62.3% of deaths among newborns born to mothers aged 18-35. The younger the mothers, the higher the risk of death for newborns, which was 2.25 times higher in our study. Young maternal age rhymes with lack of experience and non-compliance with newborn care recommendations.



Gestational age below 37 weeks' amenorrhea increased the risk of death in low-birth-weight newborns by a factor of 4. In fact, 41% of deaths were observed for gestational age below 37 Weeks' Amenorrhea versus 14.28% (gestational age  $\geq$  37 SA). Analysis of our results confirms the hypothesis that low birth weight is mainly observed in cases of prematurity (age < 37 SA) and in pathological pregnancies.

Mothers were primiparous in 26.47% of cases and multiparous in 30.68%. Segbedji et al. [12] reported a higher rate of 31.5% of newborn deaths among primiparous mothers.

Among newborns born in singleton pregnancies, 29.54% died, compared with 29.76% of those born in multiple pregnancies (twins and triplets). In the series by Bobossi et al. [4], a higher rate of death was reported, with 42% of LBW newborns in twin pregnancies.

Severe pre-eclampsia (32.4%) followed by premature rupture of membranes (18.80%) were the most common maternal pathologies observed during pregnancy. Danielle et al. [16] reported 20.4% prolonged rupture of membranes. The absence of pathologies during pregnancy protected LBW newborns from death by 1.8 times in our series.

Mothers' HIV-positive status was not statistically significantly associated with death. In fact, 20% of newborns born to HIV-positive mothers died, compared with 29.75% of those whose mothers' serology was negative.

There was a statistically significant relationship between length of hospital stay and newborn death. The longer the length of stay, the greater the chance of survival. A hospital stay of more than 3 days increased the chance of survival of LBW newborns in our study by almost 2-fold. In multivariate analysis after binary logistic regression, only birth weight below 1500g, gestational age < 37 SA and Apgar score < 7 at 5ème minutes of life were risk factors for death in LBW neonates. The risk of death in LBW newborns was multiplied by 10.5 for a birth weight below 1500g after logistic regression. Low birth weight was predominantly observed in premature

newborns (gestational age < 37 SA). Prematurity is synonymous with immaturity of several functions, including the respiratory system. It has also been shown that immaturity is responsible for a number of complications in newborns, especially when resuscitation resources are inadequate. This could explain why pulmonary immaturity as a consequence of prematurity had led to neonatal asphyxia, which was the leading cause of death in our series, as well as in the series by Edmond et al, in Ghana [14].

Poor Apgar scores increased the risk of death in LBW infants by a factor of 5. In fact, in addition to the immaturity of premature babies' organs, resuscitation in peripheral maternity units is not properly carried out due to a lack of technical facilities and qualified personnel.

## Conclusion

Factors associated with death in low-birth-weight neonates were identified. Our results showed that, among low-birth-weight newborns, premature babies with a birth weight of less than 1500 g and an Apgar score of less than 7 at 5ème minutes of life had a lower chance of survival than those with a gestational age of over 37 SA, a birth weight of over 1500 g and an Apgar score of at least 7. Neonatal asphyxia was the leading cause of death, while the absence of maternal pathologies during pregnancy was a protective factor for LBW infants. Hence the suggestion to improve the technical platform of newborn resuscitation services, build the capacity of healthcare staff in resuscitation techniques and offer quality prenatal consultation in order to reduce neonatal mortality.

---

## \*Correspondence

Zaratou Ali Labo

[zarata\\_ali2@yahoo.fr](mailto:zarata_ali2@yahoo.fr)

Available online : July 31, 2023

- 1 : Department of Public Health, Faculty of Health Sciences, Abdou Moumouni University, Niamey.
- 2 : Neonatology Department, Issaka Gazobi Maternity Hospital, Niamey, Niger
- 3 : Infectiology Department, Niamey National Hospital, Niger
- 4 : Ministère de la Santé Publique et des Affaires Sociales, Programme de lutte contre les maladies non transmissibles, Niger.
- 5 : Department of Surgery and Surgical Specialties, Faculty of Health Sciences (Abdou Moumouni University, Niamey). Issaka Gazobi Maternity Hospital, Niamey.

© Journal of African Clinical Cases and Reviews 2023

**Conflict interest :** None

## References

- [1] UNICEF. Fonds des Nations Unis pour l'Enfance. Un bilan de la nutrition numéro 4, Mai 2006. [http://www.unicef.org/french/progressforchildren/2006n4/index\\_indicators.html](http://www.unicef.org/french/progressforchildren/2006n4/index_indicators.html), consulté le 03 mars 2019.
- [2] UNICEF. Fonds des Nations Unis pour l'Enfance et OMS. Organisation mondiale de la Santé. Low birth weight: country, regional and global estimates, New York et Genève, 2004. P.9.
- [3] International Food Policy Research Institute. Fourth report on the world nutrition situation. Nutrition throughout the life cycle. GENEVA.2000. P.121.
- [4] Bobossi G, Mbongo ZA, Diemer H, Nadji AF, Siopathisr M. Les nouveau-nés de faible poids de naissance à l'Unité de Néonatalogie du Complexe Pédiatrique de Bangui (RCA) : Devenir immédiat et pronostic. *Pub Méd. Afr* 2000, 192-5.
- [5] Niger : taux de mortalité néonatale, 1960-2018. <https://www.knoema.fr/Etat-de-Santé> consulté le 15 Mars 2019.
- [6] Institut National et de la Statistique (INS). INS et ICF International. Rapport final. Enquête Démographique et de Santé du Niger EDSN IV 2012. Calverton, Maryland, USA, 2013, P.486.
- [7] Setondji P. Faible poids de naissance, prématurité et retard de croissance intra utérin : facteurs de risque et conséquences sur la croissance de la naissance a 18 mois de vie chez des nouveau-nés béninois. Université Pierre et Marie Curie - Paris VI, 2014. P.228
- [8] Awoleke JO. Maternal risk factors for low-birth-weight babies in Lagos, Nigeria. *Arch Gynecology Obstet.*, 2012, 285, 1–6.
- [9] Zeleke BM, Zelalem M, Mohammed N. Incidence and correlates of low birth weight at a referral hospital in Northwest Ethiopia. *Pan Afr Med J.* 2012, 12 :4
- [10] Tietche F, Koki NP, Kago I, Angaye, Yap Y, Ndoumbe P, et al. Facteurs de mortalité des nouveau-nés de petit poids de naissance à l'hôpital central de Yaoundé. *Ann Pédiatr* 1994, 41,253-9.
- [11] Keita M, Samake M, Dao A. Les nouveau-nés de petit poids de naissance à Bamako : devenir immédiat. *Pub Méd Afr* 1992 ;11-6.
- [12] Segbedji K.A.R, Tchagbele O-B, Takassi O.E, Agbéko F, Talbousouma SM, Kombieni K et al. Mortalité Néonatale dans le Service de Pédiatrie du Centre Hospitalier Universitaire de Kara de 2016 à 2020. *European Scientific Journal, ESJ*, 2022, 18 (11), 39.
- [13] Tchagbele OB, Azoumah KD, Segbedji KAR, Kpegouni MT, Djadou KE, Balaka B, et al. Evaluation des compétences des prestataires de soins exerçant dans les maternités en matière de réanimation néonatale au Togo. *Rev Méd Perinat* 2015; 7: 245-53.
- [14] Edmond KM, Quigley MA, Zandoh C, Danso S, Hurt C, Agyei SO et al. An etiology of stillbirths and neonatal deaths in rural Ghana: implication for health programming in developing countries. *Paediatr Perinat Epidemiol* 2008; 22: 430-437.

- [15] Ulizzi L, Zonta LA. Sex differential patterns in perinatal deaths in Italy. *Hum Biol* 2002 ; 74 : 879–88.
- [16] Danielle CKK., Noel Emmanuel E., Guy Pascal N. Morbidité et facteurs de risque de mortalité néonatale dans un hôpital de référence de Douala. *Pan African Medical Journal*. 2015; 20 :258.
- [17] Monebenimp F, Tchio R, Nana AD. Morbidité et mortalité des naissances intra-hospitalières du Centre Hospitalier Universitaire de Yaoundé, Cameroun. *Clin Mother Child Health* 2005 ; 2 : 355-358.
- [18] Nagalo K, Dao F, Housséini Tall F, Yé D. Morbidité et mortalité des nouveau-nés hospitalisés sur 10 années à la Clinique El Fateh-Suka (Ouagadougou, Burkina Faso). *PAMJ* 2013 ; 14 : 153.
- [19] Lenclen R., Paupe A., Carraja L.R., Blanc P., Olivier-Martin M. Devenir des grands prématurés : mortalité, morbidité et suivi à 2 ans dans une population de 96 grands prématurés. *Rev. Fr. Gyn. Obst.*, 1992, 87, 11, 533-539.
- [20] Senga P., Mayanda H.F., Djouob S., Malonga H. Faible poids de naissance à Brazzaville : facteurs déterminants, pronostic immédiat. *Pub. Méd. Afr.* 1989, 102, 20-23.
- [21] Harir N., Ourrad S., Ourrad A. Facteurs de risques de mortalité néonatale dans l'hôpital de gynécologie-obstétrique de la wilaya de Sidi Bel Abbes, Algérie.
- [22] *Pan African Medical Journal*. 2015; 20:387 doi:10.11604/pamj.2015.20.387.5032.

**To cite this article :**

Z Ali Labo, Z Oumarou, A Sayo Djibo, S Moussa Saley, A Soumana, B Salissou Labo et al. Risk factors for death in low-birth-weight newborns at the Issaka Gazobi Maternity Hospital in Niamey, Niger. *Jaccr Africa* 2023; 7(3): 217-227