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Assessment of the risk factors for low birth weight at Kitenge Hospital, Mbujimayi City, Democratic Republic of the Congo: 2018 - 2022

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ABSTRACT

Introduction

Low birth weight (LBW) is defined as a birth weight of less than 2500 grams (5.5 pounds) and is associated with various health risks. Factors contributing to LBW include premature birth (before 37 weeks gestation), poor maternal nutrition, maternal health issues such as hypertension or infections, teenage pregnancy, multiple pregnancies, substance abuse during pregnancy, lack of prenatal care, and socioeconomic factors such as poverty and limited access to healthcare.

Purpose

This study was aimed at assessing the risk factors of low birth weight at Kitenge Hospital Mbujimayi City, Democratic Republic of the Congo.

Methods

The study is a retrospective cross-sectional study conducted on the different risk factors for low birth weight in the gynaecology-obstetrics departments of the Kitenge Hospital in Mbuji-Mayi among women who gave birth and newborns who were well-registered from 1 January 2018 to 31 December 2022.

Results

The incidence of LBW was 9.13%. LBW affects more newborns born to young mothers (≤19 years) at 41.73%, primiparous at 36.69%, and non-alcoholic at 73.38%. The sex ratio of newborns was 1.72 in favour of girls, and their birth weight was between 1,000 and 2,000 grams (58.99%). Most newborns (50.36%) had attended PNC<4 sessions and 13.67% had not attended PNC (Prenatal consultation) at all. Prematurity dominated the series at 66.19%, and the mother's young age (≤19 years: OR=3.48), primiparity (OR: 1.48), multiparity (OR: 2.30), alcohol during pregnancy (OR: 2.26) and pregnancy toxaemia (OR: 11.14) were the risk factors statistically associated with LBW in our study setting.

Conclusion

Low birth weight is a major health problem in our environment. It is highly prevalent, with fatal complications. Low birth weight babies are mainly born to young mothers without proper antenatal care. The integration of the results found into maternal and child health is an important pillar for the well-being of hypotrophic newborns.

INTRODUCTION

The World Health Organization (WHO) defines low birth weight (LBW) as a weight of less than 2,500 grams, regardless of gestational age. Low birth weight is a major public health problem worldwide due to its frequency and complications (OMS, 1990; Mohamed et al. 2014). LBW has long been used as an indicator of perinatal health because of its association with newborn survival, health, and development (UNICEF & WHO, 2004; Meda et al., 1995). Globally, LBW is the leading cause of perinatal and infant mortality, and around 24% of the 4 million neonatal deaths recorded each year worldwide are due to complications associated with hypotrophy (Lawn et al., 2005; Setondji & Romeo, 2014). Prevention is possible through interventions targeted at modifiable risk factors, which are effective in several countries around the world (Tshizombe & Kwango, 2021).

LBW is an important predictor of child survival and later development (Mohamed et al. 2014; UNICEF & WHO, 2004), since it predisposes children in the short and medium term to numerous pathologies such as respiratory distress syndrome, infections, necrotic enterocolitis, hydrocephalus, and mental retardation (Meda et al., 1995). Low birth weight also increases the risk of certain conditions in adulthood, such as coronary heart disease, hypertension, type 2 diabetes, and depression (Lawn et al., 2005; Setondji & Romeo, 2014). The two main causes of low birth weight are premature delivery and intrauterine growth retardation, or a combination of the two. In developing countries, where malnutrition is common, around 80% of low birth weight is attributable to intrauterine growth retardation, largely due to maternal malnutrition. In developed countries, preterm birth is the leading cause of LBW (around 70%) (Alihonou & Augueh, 2000; WHO, 1992).

Today, thanks to medical and technological advances, the care and outcome of children born with LBW have improved considerably. Screening is often carried out during pregnancy using foetal biometry. However, it has to be said that this improvement has mainly occurred in industrialised countries. In developing countries, on the other hand, LBW is often diagnosed at the time of delivery, due to the lack of effective means of in utero screening, and to the unreliability of gestational age. In the absence of antenatal diagnosis, knowledge of the risk factors for LBW in a given population is essential to enable more appropriate management of mother and child (Setondji & Romeo, 2014).

The WHO estimates that LBW babies account for 17% of all live births. This frequency varies from country to country, ranging from 7% in developed countries (WHO, 1992) to 19% in developing countries. It was 5.53% in Algeria (Fatima & Abbassia, 2013), 7.1% in Togo (Djadou et al., 2018), 52.5% in Bangui (Bobossi et al., 2000), and 5.6% in Tunisia (Letaief et al., 2001). In 2008, in Lubumbashi in the Democratic Republic of the Congo (DRC), a study carried out at the maternity unit of the General Reference Jason Sendwe Hospital described a risk of perinatal death nearly 16 times higher among LBW (Ntambue et al., 2012). Added to this is the reduction in the socio-economic costs associated with caring for children of low birth weight and those associated with caring for children who survive but remain disabled. These programmes could lead to a reduction in the infant mortality rate (Mohamed et al., 2014). The general objective of this study was to assess the risk factors of low birth weight at Kitenge Hospital Mbujimayi City, Democratic Republic of the Congo.

METHODS

Study Design and Setting

This study is a retrospective cohort analysis conducted at Kitenge Hospital in Mbujimayi City, Democratic Republic of the Congo, covering the period from January 1, 2018, to December 31, 2022.

Data Collection Methods

Data Sources:

- Medical records of mothers who delivered at Kitenge Hospital between January 1, 2018, and December 31, 2022 (A total of 139 LBW newborns were collected).
- Birth registers and prenatal care records.

Data Extraction:

- Trained data collectors reviewed medical records and birth registers to extract relevant information.
- A structured data extraction form was used to ensure consistency in data collection.

Variables Collected:

- Maternal age, parity, prenatal care attendance, socioeconomic status, maternal health conditions

(e.g., hypertension, diabetes), and lifestyle factors (e.g., smoking, alcohol use).
- Infant birth weight, gestational age at birth, and sex of the newborn.
- Term of pregnancy, treatment, length of hospitalisation, and outcome.

Inclusion Criteria
- All pregnant women who delivered a hypotrophic newborn at the Bonzola Maternity Hospital during the study period.
- Availability of complete maternal and infant medical records.

Exclusion Criteria
- Stillbirths or neonatal deaths within the first 24 hours.
- Incomplete medical records or missing data on key variables.

Diagnostic Criteria for Low Birth Weight (LBW)
- LBW is defined as a birth weight of less than 2500 grams (5.5 pounds) irrespective of gestational age.
- Birth weights were measured using calibrated electronic scales immediately after delivery.

Statistical Analysis

Data cleaning and preparation involved entering data into a secure electronic database and cleaning for inconsistencies and missing values. Descriptive statistics summarized the demographic and clinical characteristics of the study population, with frequency distributions and percentages for categorical variables and mean, median, and standard deviation for continuous variables. Univariate analysis included frequency distributions and percentages for categorical variables and mean, median, and standard deviation for continuous variables. Bivariate analysis utilized chi-square tests for associations between categorical variables and low birth weight (LBW) and independent t-tests for differences in continuous variables between LBW and normal birth weight groups. Multivariate analysis employed logistic regression models to identify independent risk factors for LBW, calculating odds ratios (OR) with 95% confidence intervals (CI). The software packages Microsoft EXCEL, IBM SPSS Statistics 20, and ORIGIN PRO 8.5 were used in this study.

RESULTS

Figure 1:
Birth weight (%)

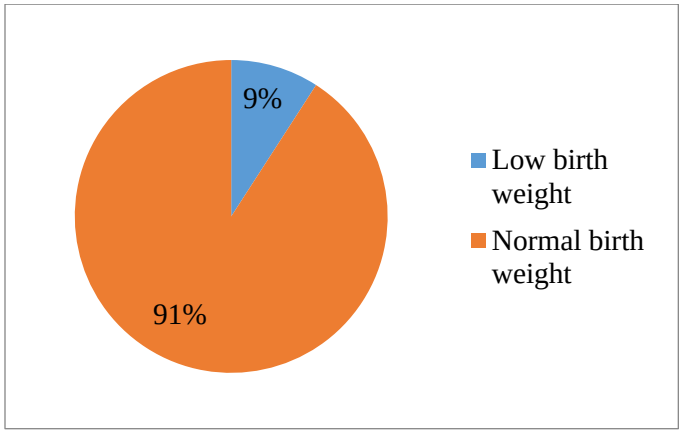

Figure 1 shows the birth weight of children at the CHK maternity hospital. The majority (90.87%) of children are born with a normal birth weight at the CHK maternity hospital whereas the incidence of low birth weight is 9.13% in the CHK maternity unit.

Table 1:
LBW by maternal age

Maternal age	Frequency	%
≤ 19 years	58	41.73
20 à 35 years	32	23.02
> 35 years	49	35.25
Total	**139**	**100.00**

The majority (41.73%) of LBW babies were born to mothers aged ≤19 years (Table 1).

Table 2:
LBW according to NPC follow-up

NPC	Frequency	%
NPC< 4	70	50.36
NPC≥4	50	35.97
No CPN	19	13.67
Total	**139**	**100.00**

The majority (50.36%) of deliveries had undergone less than four NPC and 13.67% had not undergone any NPC (Table 2).

https://dx.doi.org/10.4314/orapj.v5i3.25

Figure 2:
Parity frequency

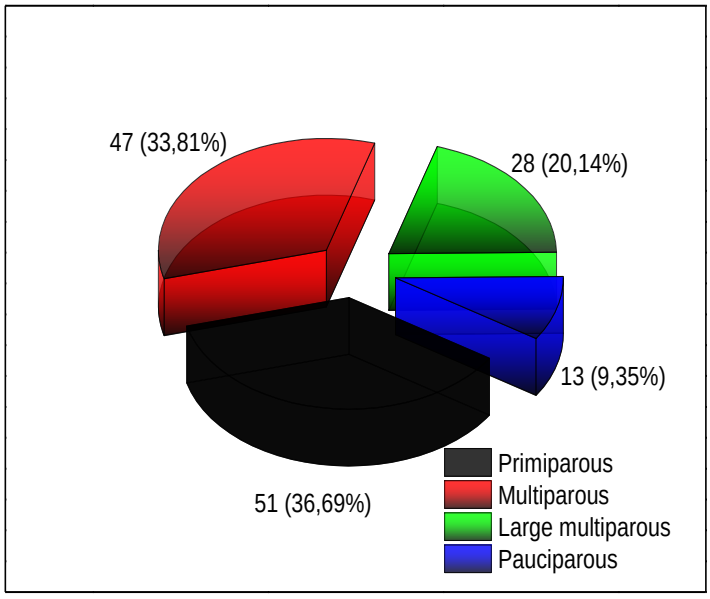

Figure 2 gives NPF by parity. Primiparous cows were the most affected by LBW at 36.69%. On the other hand, pauciparous cows accounted for only 9% of cases (Figure 2). Table 3 shows LBW by sex of newborns.

Table 3:
LBW by APGAR and sex ratio

APGAR	Frequency	%
<3	12	8.63
3 to 6	78	56.12
7 to 10	49	35.25
Sex ratio		1.72
Total	**139**	**100.0**

The majority of hypotrophic newborns had a depressed APGAR (3 and 6) at 56.12%, apparent death represented 8.65% of cases and the sex ratio was 1.72 in favour of girls (Table 3).

Table 4:
Birth weight of hypotrophs and sex ratio

Birthweight	Frequency	%
< 1000 gr	5	3.60
1000 to 2000 gr	82	58.99
> 2000gr/<2500gr	52	37.41
Average ± Standard deviation	1802.9±408.8	
Total	**139**	**100.00**

Birth weights of between 1000 and 2000 grams accounted for 58.99%, with an average of 1802.9±408.08 grams.

Figure 3:
Alcohol consumption in pregnancy

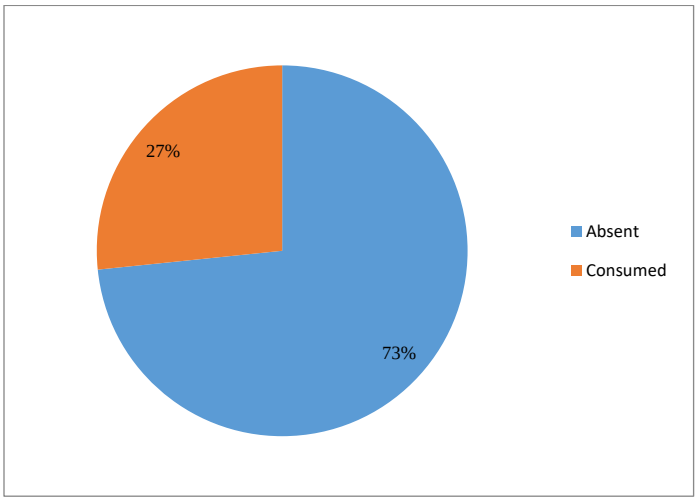

Figure 4:
Frequency of pathology among mothers during pregnancy

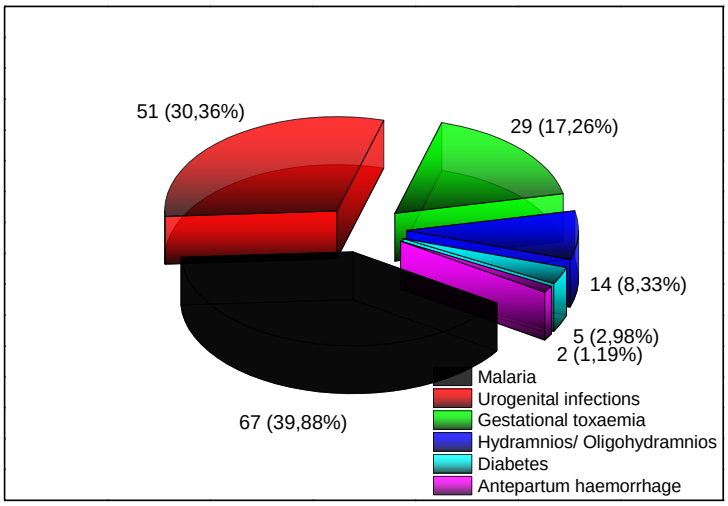

Figure 4 revealed that Malaria was the dominant pathology among mothers who had given birth to an LBW infant who had suffered from urogenital infections (48.20%) and malaria (36.69%) during pregnancy.

Table 5:
LBW according to pathologies associated with pregnancy

Pathologies associated with LBW	Frequency	%
No associated pathologies	61	43.88
Associated pathologies present	78	56.12

Table 5 gives LBW according to pathology during pregnancy. Most LBWs were born to mothers who had suffered from an associated infection (56.12%). Premature newborns dominated the series with 92 cases (66.19%) as revealed by Figure 5.

Figure 5:
LBW according to pregnancy term

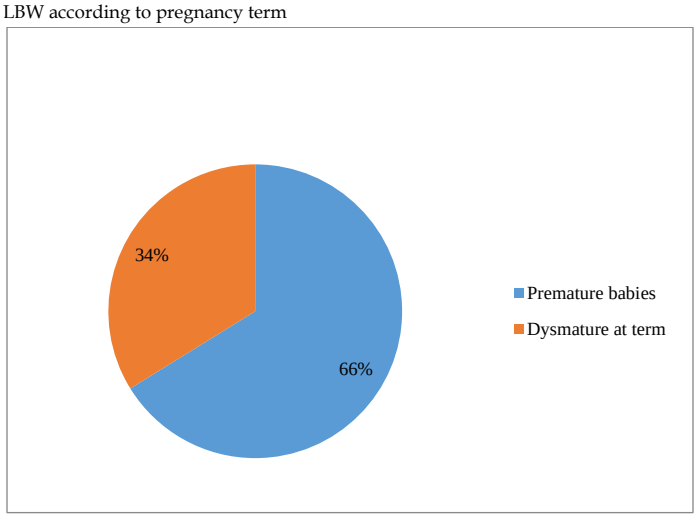

Table 6:
Association of different LBW risk factors

Determining factors	Birthweight		OR	[CI95%]
	< 2500 g (n=139)	≥ 2500 g (n=1384)		
Age/mother ≤ 19 years old	58	236	3.48	[2.42-5.02]
Age/mother> 19 years old	81	1148		
Primiparous	51	390	1.48	[1.03-2.13]
Pauciparous	13	221	0.54	[0.30-0.98]
Multiparous	47	636	0.60	[0.42-0.87]
Large multiparous	28	137	2.30	[1.46-3.60]
NPC< 4	70	440	2.18	[1.53-3.09]
NPC≥4	50	720	0.52	[0.36-0.74]
Non-NPC	19	224	0.82	[0.50-1.36]
Mother alcoholic	37	191	2.26	[1.51-3.40]
Non-alcoholic mother	102	1193	0.44	[0.29-0.66]

The mother's young age ≤19 years: OR=3.48 and CI95% [2.42-5.02], primiparity OR =1.48, CI95% [1.03-2.13], high multiparity OR = 2.30, CI95% [1.51-3.40] alcoholism during pregnancy OR: 2.26, CI95% [6.50-19.09] and CPN≥4 OR: 2.18, CI95% [1.53-3.09] were the determinants statistically associated with LBW.

DISCUSSION

LBW frequency

In this study, the incidence of LBW was 9.13%. This is lower than the average of 19% in developing countries (WHO, 1992), in the maternity unit of the Vélingara Health Centre in Senegal (23.78%), and in most hospitals in Tanzania (12-18%) (Kangulu et al., 2014; Lamine, 2013) and Bangui (52.5%) (Bobossi et al., 2000). The frequency we found is higher than the 5.53% observed in Algeria (Fatima & Abbassia, 2013), 7.1% in Togo (Djadou et al., 2018), and 5.6% in Tunisia (Letaief et al., 2001). A study carried out on the prevalence of LBW in Africa, Asia, and Latin America, through a literature review between 1982 and 2010, described that in Southern Africa, the prevalence was 8% in South Africa, whereas 7 years earlier in 1997, it was 14% in Zimbabwe. In South America and Chile in 2000 there was a 6% prevalence of LBW, while in Brazil in 2004 the prevalence of LBW was 11%. In Asia, these results confirm that the most serious situation is in Asia. In Bangladesh in 2005, the prevalence of LBW was 30%, compared with 33% in India in 2000 (Singh et al., 2023).

Maternal age

Our results show that most mothers were less than 19 years of age (41.73%). These results differ from those of Fatima B. in Algeria who reported in her series 74.05% of mothers aged between 20 and 34 years. This is in line with the observation made by Fatima (Fatima & Abbassia, 2013) and several other authors (Katz & Lee, 2013, Camara et al., 1995) that the younger the mother, the lower the birth weight. On the other hand, Sanou et al. (1998) found that LBW was dominated by premature newborns of adolescent mothers at 22.3%.

Prenatal consultation (PNC)

More than half of the deliveries (50.36%) had undergone less than four PNC and 13.67% had not undergone any PNC. In our study, the OR=2.18 CI95% [1.53-3.09] but other authors found OR=5.50; CI95 [2.00-15.03]. This difference can be explained by the fact that our study was carried out in an urban setting and theirs in a rural setting and their study was a case-control (Kangulu et al., 2014).

Parity among mothers

Primiparous women were the most affected by LBW at 36.69%, followed by multiparous women at 33.81%. According to the literature, primiparity is a protective factor against unfavourable foetal outcomes, especially LBW, and increasing parity is a factor favouring unfavourable pregnancy outcomes for both mother and foetus. In multiparous women, or even those who are very multiparous, numerous pregnancies, usually close together, "exhaust" the woman; moreover, the risk of foetal malformation could be associated with this picture, especially if the woman is older. Our results are lower than those obtained by Cissé in Dakar, with a proportion of 42% occupied by primiparous women and 30.5% by multiparous women (Sanogo, 2005).

Birthweight and sex of LBW

Birth weights between 1000 and 2000 grams dominated at 58.99%, with a mean of 1802.9±408.08 grams. Many cases of LBW were born to non-alcoholic mothers (73.38%). The sex ratio was 1.72 in favour of girls. The predominance of females is consistent with data from other authors such as Letaief et al. (2001), Lamine (2013) in Senegal. On the other hand, other studies have reported a male predominance in newborns. This is the case of Djadou (50.20%) and Apetsianyi in Togo (Djadou et al., 2018).

The notion of alcohol consumption during pregnancy.

Table 8 shows that 26.62% of cases of LBW were the offspring of alcohol-dependent mothers.

Diseases during pregnancy

Most mothers giving birth to hypotrophs had presented with either urogenital infections (36.69%) or malaria (48.20%) during pregnancy. In the literature, it has been shown that isolated hypertension or toxaemia gravidarum are known causes of PNF (Setondji & Romeo, 2014). Our results explain that 48.20% of parturients presented with a urogenital infection, which led to LBW. However, multiple pregnancies, placenta previa, and malaria were found in considerable proportions (15.9%, 13.4% and 10.8% respectively). These factors are classically found in most studies (OMS, 1990; WHO, 1992; Bobossi et al., 2000; Kangulu et al., 2014).

Termination of pregnancy

Premature newborns dominated our series at 66.19%. This result is like that of Sanogo (2005), who reported 63.9% of premature babies between 28- and 32 weeks' gestation in his study. However, it is higher than those of Garba (40.9%) and Fatima & Abbassia (2013) (50.9%). The risk of delivering a hypotrophic baby was 3.48 times higher in mothers aged fewer than 19, 1.48 times higher in primiparous women, 2.30 times higher in multiparous women, 2.26 times higher in alcohol-dependent mothers and 11.14 times higher in women with pregnancy toxaemia. In addition, the risk of death was 6.66 times greater in LBW babies than in normal-weight babies. These factors were statistically significant. Fatima & Abbassia (2013) identified the following risk factors: maternal age between 20 and 34 years, primiparity, as well as primigravida, gestational age below 37 years, hypertension, and gestational diabetes as being significantly associated with low birth weight.

The study on the assessment of risk factors for low birth weight (LBW) at Kitenge Hospital, Mbujimayi City, Democratic Republic of the Congo, from 2018 to 2022 reveals several significant associations and corroborates findings from existing literature. Maternal age is associated with an increased risk of LBW, aligning with studies conducted in similar settings (Goisis et al., 2017). Additionally, higher parity appears to have a protective effect against LBW, consistent with literature suggesting that experienced mothers may adopt better health practices during pregnancy (Hall et al., 2017). Regular prenatal care attendance was observed to reduce LBW incidence, supporting previous research on the importance of early and consistent antenatal visits (Engdaw et al., 2023).

The correlation between low socioeconomic status and higher LBW prevalence is well-documented, underscoring the need for targeted interventions to address underlying socioeconomic determinants (Green et al., 2020). These findings emphasize the critical role of strengthening prenatal care services and implementing socioeconomic interventions to mitigate LBW risk. This study on risk factors for low birth weight at Kitenge Hospital has limitations. Selection bias may favor women with complete records or delivering at Kitenge Hospital. Results are specific to this population and may not be generalizable. The retrospective nature introduces recall and information biases. Despite these limitations, retrospective studies are useful for generating hypotheses. Further research, including prospective studies, is recommended to validate these findings.

CONCLUSION AND RECOMMANDATIONS

The results of this study highlight the main risk factors for low birth weight (LBW) at Kitenge Hospital, including maternal age, parity, attendance of prenatal care, and socioeconomic status. To reduce the incidence of LBW, it is essential to strengthen prenatal care services and address socioeconomic determinants through targeted interventions. Further research, including prospective and multicenter studies, is recommended to validate these results and explore their applicability to other contexts. Improving prenatal care by targeting high-risk groups and providing education on nutrition, cessation of harmful substances, and management of chronic diseases is also recommended. Additionally, implementing policies to

improve the socioeconomic conditions of pregnant women, such as financial support programs and community health initiatives, is crucial. Lastly, continuing studies to assess the impact of specific interventions, such as nutritional supplements and targeted health education, on LBW outcomes is crucial.

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