

Full Length Research Paper

Factors associated with low birth weight at Tchamba District Hospital, Togo: 2014 to 2016

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In 2013, in Togo, the Demographic and Health Survey III estimated the proportion of low birth weight at 10%. The objective of this study was to determine the factors associated with low birth weight in Togo. We conducted a case-control study on newborn records from Tchamba Hospital from 2014 to 2016. Cases were newborns with birth weight strictly below 2500 g whereas controls were those with a weight greater than or equal to 2500 g. There was one case for every two controls. Odd ratios were estimated using a multivariate logistic regression analysis. The sample consisted of 305 cases and 610 controls. Factors associated with low birth weight were gestational age less than 37 weeks (OR = 62.60, 95%CI [24.51 - 159.87], $p \leq 0.0001$), maternal age below 18 years (OR = 2.41, 95%CI [1.11 - 5.22], $p = 0.026$), non-use of long-lasting treated mosquito nets (OR = 5.3, 95%CI [3.42 - 8.18], $p \leq 0.0001$), and severe malaria during pregnancy (OR = 3.7, 95%CI [1.24 - 11.04], $p = 0.019$). Almost all factors associated with low birth weight identified could be modified. We recommend raising awareness about the risk factors of low birth weight and malaria prevention.

Key words: Associated factors, low birth weight, newborn, Tchamba, Togo

INTRODUCTION

Low birth weight (LBW) is a major public health problem in both developing and developed countries. In Africa,

between 1998 and 2008, the prevalence of LBW varied from 7 to 17% depending on the study areas and periods

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(Malaba et al., 2005; Roberfroid et al., 2008; Schmiegelow et al., 2012). In Togo, LBW in 2008 represented 6.8% of all live births, with a neonatal mortality rate of 4.5 times higher than the average rate (Ministère de la Santé du Togo, 2012). According to the Togo Demographic Health Survey (DHS III) of 2013, infant/child mortality and neonatal mortality were 8.9 and 2.7%, respectively. Newborns accounted for 32.3% of deaths of children under five; 11.6% of these deaths were due to premature births and low birth weight has consequences on the physical and mental growth of the child (Meda et al., 1995). LBW newborns are exposed to homeostasis disorders and complications such as hypothermia, hypoglycemia and hypocalcemia.

Low birth weight is a multifactorial health problem affecting a vulnerable population and can be prevented through targeted interventions that focus on modifiable factors that have been proven effective in several countries around the world (Rajaratnam et al., 2010; Oestergaard et al., 2011).

In rural Burkina Faso, the prevalence of LBW remained stable between 2004 and 2006 at between 17 and 16%. In Tanzania, prevalence increased from 10% in 1998 to 11% in 2008. Low age of mother, premature birth, and a history of severe malaria during pregnancy are found to be associated with LBW (Institute of Medicine, 1985; Letaief et al., 2001; Balaka et al., 2002; March of Dimes, 2004; Mabilia-Babela et al., 2007; Beddek and Demmouche, 2013; Kangulu et al., 2014; Feresu et al., 2015). Togo DHS III report found a prevalence of LBW of 10% (Ministère de la Planification, du Développement et de l'Aménagement du Territoire du Togo, 2014). These figures were certainly underestimated, considering the fact that in many developing countries, there are still large numbers of home births that are not covered by national statistics.

Some studies have been conducted in Togo on this topic, but they have been essentially descriptive, carried out at the University Hospital Centers of Lomé and Kara (unpublished data).

In view of these observations, it appeared necessary to conduct an analytical study in the periphery of a district hospital to deepen and document the factors associated with LBW, in order to strengthen and better target health interventions based on the country context and to determine the factors associated with low birth weight at the Tchamba District Hospital (DH) in Togo from 2014 to 2016.

METHODS

Study area and design

The study area includes all live births registered at the maternity ward of the Tchamba District Hospital from January 1st, 2014 to December 31st, 2016 while the case-control study conducted

comprised from February 1st to April 30th, 2017.

Sample size determination

One case was considered for two unmatched controls. The size of our sample was calculated using Open Epi software. For a bilateral confidence level of 95%, a power of 80% and a risk ratio of 1.5 were used according to Fleiss with continuity correction. The sample consisted of 305 cases and 610 controls.

Sampling techniques

Cases were recruited using systematic sampling at the MU of Tchamba DH by reviewing birth records that took place from January 1st, 2014 to December 31st, 2016 from a list of 337 cases. Controls were recruited from the same Tchamba DH birth register as the cases. These were the two newborns according to the case identified on the list in the birth register. In situation where two cases followed each other in the register, it was considered among the normal newborns according to the second case, the controls of these cases by taking them consecutively 2 by 2 for the first and second cases respectively.

Technical tools and data collection

The data collected included characteristics of the newborn and the socio-demographic, clinical and obstetrical characteristics of the child's mother. A literature review was conducted using birth registers, prenatal consultation registers, prenatal consultation cards and parturient files. An extraction sheet was developed and completed using data recorded in the case and control data sources.

Statistical analysis

In descriptive analysis, the proportions were estimated and tested using a chi-squared (χ^2) test. Means and standard deviations were calculated to describe the sociodemographic characteristics of babies and the obstetric history of their mothers. A univariate logistic regression was used to select variables with a p-value of <0.20 for inclusion in the baseline model in multivariate analysis. In a top-down multivariate logistic regression model, we calculated the adjusted ORs (ORa) that were tested by the χ^2 test to identify factors associated with LBW at a 95% confidence interval (CI). We used the $p < 0.05$ as the significance threshold.

RESULTS

Socio-demographic and clinical characteristics of the sample

From January 2014 to December 2016, Tchamba District Hospital recorded a total of 337 LBW newborns out of 3151 deliveries. Female to Male (F/M) ratio for the entire sample was 0.9; this sex ratio was 1 for cases and 0.8 for controls ($p = 0.02$). For all newborns, the mean gestational age (GA) was 39.17 ± 2.26 weeks of Last Menstrual Period (WLMP) ranging from 25 to 40 WLMP,

Table 1. Factors associated with the occurrence of low birth weight at the Tchamba District Hospital, Togo, 2014 – 2016 in univariate analysis.

Factor	Response	Cases	Controls	OR	95% CI	p-value
Newborn babies						
Female gender	Yes	170	271	1.57	[1.2 – 2.07]	0.0015
	No	135	339			
Gestational age <37 weeks of LMP	Yes	114	5	72.2	[29.06 – 179.45]	0.0000
	No	191	605			
Mothers						
Age < 18 years (Yes/No)	Yes	25	20	2.63	[1.43 – 4.8]	0.0009
	No	280	590			
Status « learner »	Yes	24	22	2.28	[1.35 – 3.58]	0.0008
	No	281	588			
Parity > 8	Yes	7	4	3.55	[1.03 – 12.25]	0.0377
	No	298	606			
Did not have an ANC	Yes	29	25	2.46	[1.41 – 4.27]	0.0008
	No	276	585			
Did less than 4 ANC	Yes	189	316	1.84	[1.36 – 2.5]	0.0000
	No	87	269			
Non-compliance with ANC schedule	Yes	34	37	4.0224	[2.31 – 6.99]	0.0000
	No	53	232			
Does not use LLINs	Yes	134	72	5.85	[4.19 – 8.17]	0.0000
	No	171	538			
Has not taken sulfadoxine-pyrimethamine	Yes	79	63	3.035	[2.10 – 4.37]	0.0000

with 13% having had a GA strictly below 37 weeks. The mean gestational age was statistically different between cases and controls [37.6 ± 3.3 WLMP and 40 ± 0.5 WLMP ($p=0.001$)], respectively.

Factors associated with LBW at Tchamba District Hospital, Togo, 2014 - 2016 in bivariate analysis

In bivariate analysis (Table 1), statistically significant factors associated with LBW were gestational age < 37 weeks (OR = 72.2, 95%CI [29.06-179.45], $p \leq 0.000$), female sex with (OR = 1.57, 95%CI [1.2-2.07], $P = 0.001$), non-use of long-lasting treated mosquito nets (LLINs) (OR=5.85, 95%CI [4.19 - 8.17], $p \leq 0.001$), non-compliance with the antenatal care (ANC) schedule (OR=4.02, 95%CI [2.31 - 6.99], $p \leq 0.001$), parity > 8 (OR=3.55, 95%CI [1.03 - 12.25], $p=0.03$), failure to take sulfadoxine-pyrimethamine during pregnancy (OR=3.035, 95%CI [2.10 - 4.37] and $p \leq 0.001$), age < 18 years with OR=2.63, 95%CI [1.43 - 4.8], $p \leq 0.001$, failure to use ANC with OR= 2.46, 95%CI [1.41 - 4.27], $p = 0.0008$, the "learner" status with OR=2.28, 95%CI [1.35 - 3.58], $p=0.0008$, the achievement of less than 4 CPN with OR = 1.84, 95%CI [1.36 - 2.5], $p \leq 0.001$.

Factors associated with LBW at Tchamba District Hospital, Togo, 2014 - 2016 in multivariate analysis

In multivariate analysis (Table 2), statistically significant factors associated with LBW were gestational age < 37 weeks with OR= 62.6, 95%CI [24.51 - 159.87], $p \leq 0.001$, female sex of the newborn with OR=1.79, 95%CI [1.25 - 2.56], $p=0.0015$, non-use of LLINs with OR=5.29, 95%CI [3.41 - 8.18], $p \leq 0.001$, occurrence of severe malaria during pregnancy with OR=3.7, 95%CI [1.24 - 11.03], $p=0.0188$, age of mother < 18 years with OR=2.4, 95%CI [1.11 - 5.22], $p=0.026$, non-compliance with the ANC schedule with OR=2.21, 95%CI [1.42 - 3.44], $p=0.0005$

DISCUSSION

Gestational age < 37 weeks of LMP was associated with LBW. Similar observations had already been made in descriptive studies. Indeed, in Algeria, Fatima et al. (Beddek and Demmouche, 2013) found that the proportion of LBW infants is higher (50.90%) among mothers who had pregnancies with a gestational age of less than 37 weeks of LMP. While in the DRC, in Katanga, Ignace (Kangulu et al., 2014) found that 100%

Table 2. Factors associated with low birth weight at the Tchamba District Hospital, Togo, 2014-2016, in multivariate analysis.

Risk factor	Odds ratios	95%	C.I.	P-value
Gestational age < 37 weeks of LMP	62.6023	24.5141	159.869	0
No use of LLINs	5.2885	3.4167	8.1859	0
Severe malaria during pregnancy	3.7039	1.2428	11.0394	0.0188
Maternal age < 18 years	2.4087	1.1109	5.2226	0.026
Non-compliance with the ANC schedule	2.2109	1.4182	3.4467	0.0005
Female gender of the newborn child	1.7877	1.249	2.5586	0.0015
Anemia during pregnancy	2.1856	0.7895	6.05	0.1323
Not taking sulfadoxine-pyrimethamine during pregnancy	1.3949	0.7896	2.4641	0.2516
Mother's learning status	1.0847	0.5521	2.1313	0.8135
Age of mother \geq 35 years	0.8543	0.4785	1.5252	0.5944
Achievement of less than 4 ANC	0.7983	0.5167	1.2335	0.3103
No ANC during pregnancy	0.7699	0.259	2.2888	0.638
Not taking iron tablets during pregnancy	0.5078	0.1907	1.3521	0.175
High multiparity	0.3906	0.0769	1.9846	0.257

of the newborns born during pregnancy < 37 weeks of LMP were LBW. Therefore, low birth weight is thought to result either from premature birth (delivery before the 37th week of LMP) or from delayed fetal growth in children born at term (March of Dimes, 2004).

In our study, it was observed that LBW was associated with a mother age under 18 years during pregnancy. Similarly, in Togo, Balakahad already observed in 2002 that 26.5% of mothers of premature infants were under 20 years of age (Balaka et al., 2002). This result is comparable to that of Mabilia-Babela et al. (2007) in Congo Brazzaville, who concluded that the mother's age < 18 years was a factor in LBW. Similar factor was identified in Tunisia in the Monastir region with a relatively weaker association (OR=1.14) (Letaief et al., 2001); whereas it was 7.62 in Katanga in the DRC (Kangulu et al., 2014). These differences could be related to the difference in sampling technique, as the Tunisian study only considered newborns from single and normal pregnancies with matching of gestational age and date of birth.

Mothers under 18 years of age are still teenagers who have not yet completed their own growth, and are therefore more likely to give birth to low birth weight children than older mothers with the same nutritional status (Kurz and Johnson-Welch, 1994). Competition between pregnancy and growth has a particularly negative effect on the micronutrient status of adolescent girls (Scholl et al., 1990). These teenage mothers often have other factors that increase the risk of childbirth for low birth weight, black race, low socio-economic status, small height, low education, lack of or inadequate prenatal health care (Institute of Medicine, 1985). It seems increasingly clear that age is a social risk factor and not a biological factor, except in very young

adolescent girls (Hediger et al., 1997).

According to our results, LBW was observed almost twice as much in female newborns. This finding is consistent with (Letaief et al., 2001) who found that female gender was significantly associated with the occurrence of low birth weight (Letaief et al., 2001). A history of mother severe malaria during pregnancy was associated with LBW. This observation was seen in Zimbabwe that malaria increased the risk of LBW by 1.89 times (Feresu et al., 2015). Malarial infection during pregnancy is a major public health problem occurring in all tropical and subtropical regions (Feresu et al., 2015).

Our results showed that LBW was associated with a non-use of LLINs during pregnancy. Indeed, sleeping under a long-lasting insecticide-treated mosquito net is one of the three recommended approaches to prevent malaria and reduce its incidence in pregnant women; the other two are intermittent preventive treatment and management of malaria cases in pregnant women. A study of a high transmission area in Kenya found that women who sleep under an insecticide-treated mosquito net every night during their first four pregnancies had four times fewer premature or low birth weight children (ter Kuile et al., 2003).

Non-compliance with the ANC schedule was found to be a factor associated with the occurrence of LBW. Twice as many LBW newborns were found among mothers who did not follow the LBW schedule as among those who did. In Togo, lower risk maternity guidelines require that pregnant women be followed for prenatal consultations at least 4 times before giving birth. At each consultation, an appointment is given to the women for the next consultation, in accordance with these different periods, but this schedule is not always respected by pregnant women.

Non-compliance with ANC schedule was also reported by several authors as being associated with the occurrence of LBW (Letaief et al., 2001; Rakotozanany et al., 2004; Kangulu et al., 2014). Letaief et al. (2001).noted the same level of association as our results, but not statistically significant (2.5 with $p= 0.058$). Ignace in the DRC, a stronger association was found (OR twice that measured in our study) (Kangulu et al., 2014). ANC is prenatal surveillance to prevent several diseases responsible for low birth weight (malaria, intestinal helminthiasis, anemia). Women who did not follow the ANC schedule may have insidiously allowed factors that would have caused weight deficit to develop and could have been detected and managed to prevent this weight deficit from occurring. This is true since it is estimated that in Africa, two thirds of low birth weight cases are attributable to intrauterine growth retardation (Ezeaka et al., 2003).

Conclusion

Factors associated with LBW identified are socio-demographic (gestational age < 37 weeks of LMP, maternal age < 18 years and female sex of the newborn), and clinical (non-use of LLINs, non-compliance with the ANC schedule and severe malaria during pregnancy), almost all of which could be modified. We recommend raising awareness about the risk factors of LBW and malaria prevention.

CONFLICTS OF INTERESTS

The authors have not declared any conflict of interests.

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