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Factors Correlated with Low Birth Weight in Ghana

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Authors' contributions

This work was carried out in collaboration among the authors. Author AMTN conceived the study idea, initially drafted the manuscript and sought permission to use MICS data. Authors AMTN and LA analyzed the data. Authors AMTN, LA and EY wrote the final draft. Authors read and approved the final draft.

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ABSTRACT

Aim: The aim of the paper was to assess factors associated with low birth weight in Ghana.
Study Design: The study applied a cross-sectional population-based study design.
Place and Duration of Study: The study used data from the Multiple Indicator Cluster Survey 2011 of Ghana.
Methodology: The dependent variable was birth weight and the independent variables were selected maternal factors (age, ever attended school, currently married or living with a man, wealth quintile, area, region, delivered by caesarean section, times received antenatal care, took medicine to prevent malaria and parity). Binary logistic regression model was generated to assess factors associated with low birth weight among mothers. Statistical Product for Service Solutions (SPSS) version 20 was used for the data processing and analysis.
Results: Mothers who had never attended school (OR = 0.566, 95% C.I. = 0.349 – 0.919) were less likely to have children with low birth weight, and those not in union (OR = 1.698, 95% C.I. = 0.993 – 2.905) had a higher likelihood of giving birth to children with low birth weight.
Conclusion: Maternal factors such as educational status and marital status can influence the birth

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weight of a child in the country. Prenatal programmes, especially on nutrition and counselling, should be designed targeting sub-groups of women who are at risk of delivering babies with low birth weight.

Keywords: Birth; factors; Ghana; maternal; weight.

1. INTRODUCTION

Low birth weight is an important health indicator for assessing general maternal and child health. It is directly linked to infant mortality, especially neonatal mortality (first 28 days after birth) [1]. The World Health Organization (WHO) defines low birth weight as weight at birth of less than 2,500 grams [5.5 pounds] [2]; taken within the first hour of life, before significant postnatal weight loss occurs. This definition is based on epidemiological surveys that indicated that infants weighing less than 2,500 grams have a higher probability of infant death as compared to those with greater weights. And most births in developing countries are characterized with weights below the expected, hence, accounts for poor health effects in infants as they grow and develop [3].

In developing countries, a major challenge to data on low birth weight is that most infants are not weighed at birth. Despite this, studies have revealed a gradual decline in low birth weight globally. In 2001, the global estimate of low birth weighted babies stood at 18 million with 9.3 million of them been found in South Asia and about 3.1 million in sub-Saharan Africa [4]. In 2013, WHO's annual estimate of the number of low birth weighted babies stood at 30 million, representing 23.8% of all births. Although the global prevalence of low birth weights is gradually reducing, it is as high as 30% in many developing countries [5].

The goal of reducing low birth weight incidence by at least one third between 2000 and 2010 was one of the major goals in 'A World Fit for Children'; the Declaration and Plan of Action adopted by the United Nations' General Assembly's Special Session on Children in 2002. The reduction of low birth weight was also an important component of the Millennium Development Goals (MDGs) aimed at reducing child mortality. Still goals set in this regard are yet to be achieved. This has been re-echoed in the Sustainable Development Goals [6]. Low birth weight is, therefore, an important indicator for monitoring progress towards these internationally agreed-upon goals [7]. To support countries in dealing with this major public health matter, WHO has challenged countries to elaborate strategies for promoting optimal fetal development among pregnant women, particularly in developing countries. Hence, findings from the present study can serve as pointers to designing programs that will gear towards the reduction of low birth weight in the country.

In Ghana, the lowest rate of low birth weight was recorded in 1987 (to be 6 percent). In 1988, the country registered the highest rate ever as 17 percent. Again, there was a drop from 17 percent in 1988 to a rate of 8.4 percent in 1997. This was a better improvement to reflect a good health sector in the country. However, the rate of low birth rate in 1998 was 11 percent and this increased to 16 percent in 2003. Further, in 2006 the rate decreased to 9.1 percent. The rate was expected to further decrease since the country was having a better health sector. However, the rate of low birth rate increased from 9.1 percent in 2006 to 13.4 percent as of 2008. In 2014, the rate dropped to 10 percent [8]. The fluctuating rates, from the statistics, indicate that there are still some lingering factors contributing to low birth weight in the country.

Low birth weight is often due to malaria and malnutrition in pregnancy in sub-Saharan Africa [9]; with malaria being one of the major factors causing low birth weight. Other maternal and obstetric factors have been identified as risk factors for low birth weight such as antepartum haemorrhage, hypertensive pregnancy disorders and primiparity [10]. In similar studies conducted in the sub-region, other factors linked to low birth weight are marital status [11], occupation [12], residential accommodation with shared sanitation facilities [13], lack of antenatal care [14], wealth quintile [15] and absence of previous caesarean section [16]. This study sought to assess selected maternal factors associated with low birth weight in Ghana.

2. METHODOLOGY

2.1 Study Design

The study applied a cross-sectional population-based design. It used a Multiple Indicator Cluster

Survey (MICS) dataset [17] to assess maternal factors that are linked with low birth weight in the country.

2.2 Sampling and Data Collection

The MICS 2011 sampled households consisting of children under age five, women and men. In all, 12,150 households were sampled. And with women, 10,627 aged 15-49 years were interviewed across the country. A structured questionnaire was used to collect the survey data. More on the MICS sampling and data collection can found in the 2011 report [17].

2.3 Study Sample

The present study sampled women who had given birth and had records of the birth weight of their children. From the MICS 2011 dataset, the variables that were used to generate the present study's sample size were "CM1 – ever given birth" and "MN22 – weight at birth (kilograms)".

2.4 Variables

2.4.1 Dependent variable

The dependent variable for the study was recorded birth weights of children. The responses were grouped as low birth weight and normal birth weight. Neonates with low birth weight were those weights less than 2.5 kilograms and those with weight of 2.5 kilograms or more were categorized as having normal weights. These data were extracted from the women dataset.

2.4.2 Independent variables

Individual level variables were selected. These mainly consisted of maternal variables that may influence the birth weight of a neonate. The selection, of these variables, was further informed by the review of related literature to enable comparison of findings. The independent variables included: age of mother, ever attended school, currently married or living with a man, wealth quintile, area, region, delivered by caesarean section, times received antenatal care, took medicine to prevent malaria, and parity. Their corresponding responses are displayed in Table 1.

2.5 Statistical Analysis

2.5.1 Descriptive analyses

Maternal variables were presented in a format of frequencies and percentages for each of their corresponding responses. Furthermore, the prevalence of low birth weight of responses for each variable was indicated with numbers and proportions. The proportions were weighted using the recommended weight indicated in the survey. This is to ensure the sample size used for analysis is representative.

2.5.2 Statistical modeling

Binary logistic regression model was generated to assess maternal variables associated with of low birth weight. Maternal variables that were significantly ($P \leq 0.05$) associated with low birth weight were used for the regression modeling. Chi-square test of independence was used to determine the inclusion of variables in the model. Also, the regression analysis was weighted.

2.5.3 Measures of association

Initially, unadjusted odds ratios were reported. Further, adjusted odds ratio, p-values, and 95% confidence interval (CI) were reported for each response of the maternal variables that were considered for the logistic regression modeling. Responses of maternal variables that had p-values less than or equal to 0.05 were deemed as significant variables associated with low birth weight in the country.

2.5.4 Model fitness and precision

Hosmer-Lemeshow test for goodness-of-fit (GOF) was used to assess how the model fit the study data. The GOF test assumption states that if GOF *p*-value is less than 0.05, the model should be rejected. On the other hand, if the GOF *p*-value is more than 0.05, the model should be accepted. Hence, indicating that the model fits the data. All data processing and analyses were done with Statistical Product for Service Solutions (SPSS) version 20.

3. RESULTS

Table 1 shows the distribution of maternal variables. Fifty-two percent of the mothers were aged 24-35 years and more than half (67.7%) of them attended school. Most mothers were currently married (69.0%). In terms of wealth quintile, more mothers were in the poorest quintile (27%), 17% in the middle quintile and about 19% in the richest quintile. In addition, a little over half of mothers (55%) resided in rural areas. Regionally, more mothers were recorded in Upper East Region (15%) and Upper West Region (14%). With mode of delivery, most

mothers (86%) delivered normally, most mothers attended antenatal care more than four times, and most mothers (96%) during pregnancy took medicine to prevent malaria. Also, about 60% of the mothers had between 1 to 3 children.

Table 1. Maternal variables

Variables	Frequency	Percentage
Age of mother (N = 1206)		
15-24	260	21.6
25-34	632	52.4
35-49	314	26.0
Ever attended school (N = 1206)		
Yes	816	67.7
No	390	32.3
Currently married or living with a man (N = 1206)		
Yes, currently married	828	68.7
Yes, living with a man	243	20.1
No, not in union	135	11.2
Wealth quintile (N = 1206)		
Poorest	320	26.5
Poor	233	19.3
Middle	201	16.7
Rich	223	18.5
Richest	229	19.0
Area (N = 1206)		
Urban	547	45.4
Rural	659	54.6
Region (N = 1206)		
Western	84	7.0
Central	164	13.6
Greater Accra	130	10.8
Volta	63	5.2
Eastern	82	6.8
Asante	100	8.3
Brong Ahafo	75	6.2
Northern	158	13.1
Upper East	179	14.8
Upper West	171	14.2
Delivered by caesarean section (N = 1144)		
Yes	158	13.8
No	986	86.2
Times received antenatal care (N = 1191)		
1-3 times	73	6.1
4-6 times	493	41.4
7-9 times	489	41.1
10 or more times	136	11.4
Took medicine to prevent malaria (N = 1202)		
Yes	1155	96.1
No	47	3.9
Parity (N = 1206)		
1-3	717	59.5
4-6	360	29.9
7 or more	129	10.7

**: Less than sample size (N=1206) due to missing values*

Two maternal variables were identified to be associated with low birth weight in the chi-square test of independence. These variables were ever attended school (χ^2 (1) = 6.417, p = 0.011) and currently married or living with a man (χ^2 (2) = 7.467, p = 0.024) (Table 2). However, ever attended school variable had the highest predictive effect of influencing low birth weight.

The unadjusted logistic regression results indicated that mothers who had never attended school (OR = 0.549, 95% C.I. = 0.344 – 0.878) were less likely to have a child with low birth weight compared to mothers who had ever attended school (Table 3). Also, mothers who were not married (OR = 1.964, 95% C.I. = 1.162 – 3.321) were more likely to have a child with low birth weight compare to those mothers who were married.

In the adjusted logistic regression model, the level of association of mothers who had never attended school and those who were not in unions with low birth weight were still relatively consistent (Table 3). Mothers who had never attended school (OR = 0.566, 95% C.I. = 0.349 – 0.919) were less likely to give birth to children with low birth weight as compared to those who had ever attended school. Again, mothers who were not in union (OR = 1.698, 95% C.I. = 0.993 – 2.905) had higher likelihood to give birth to children with low birth weight as compared with their counterparts who were married. The logistic regression model appropriately explained the outcome variable (low birth weight) since the Hosmer-Lemeshow goodness-of-fit p-value was more than 0.05 (χ^2 (2) = 0.137, p = 0.934). Therefore, the model fits the study data.

4. DISCUSSION

International organizations such as World Health Organization and United Nations Children's Fund (UNICEF) have emphasized on low birth weight as an important health measure. Globally, the prevalence of low birth weight is about 15.5%, 14.3% in Africa and about more than 20 million infants are born with low birth weight each year in the world [3]. The MICS measured birth weight using two items in the survey questionnaire. First was the mother's recall of the child's size at birth (very small, smaller than average, average, larger than average, very large), and second was the mother's recall of the child's weight or the information on the health card if the child was weighed at birth. The present study used the second item to examine variables associated with low birth weight in the country. There are varied variables that mostly account for the incidence of low birth weight among populations. In the present study, mothers who had ever attended school and those not in unions (not married) were identified to be associated with low birth weight.

Table 2. Association between birth weight and maternal variables

Variables	X^2 (df), p-value	Birth weight		Number
		Prevalence n(%)		
		1095 (90.8)	111 (9.2)	
		2.5 kg or more n(%)	Less than 2.5 kg n(%)	
Age of mother (N = 1206)	$\chi^2(2)= 4.001$, $P = 0.135$			
15-24		228 (87.7)	32 (12.3)	260
25-34		581 (91.9)	51 (8.1)	632
35-49		286 (91.1)	28 (8.9)	314
Ever attended school (N = 1206)	$\chi^2(1)= 6.417$, $P = 0.011$*			
Yes		729 (89.3)	87 (10.7)	816
No		366 (93.8)	24 (6.2)	390
Currently married or living with a man (N = 1206)	$\chi^2(2)= 7.467$, $P = 0.024$*			
Yes, currently married		757 (91.4)	71 (8.6)	828
Yes, living with a man		224 (92.2)	19 (7.8)	243
No, not in union		114 (84.4)	21 (15.6)	135
Wealth quintile (N = 1206)	$\chi^2(4)= 8.873$, $P = 0.064$			
Poorest		297 (92.8)	23 (7.2)	320
Poor		212 (91.0)	21 (9.0)	233
Middle		174 (86.6)	27 (13.4)	201
Rich		198 (88.8)	25 (11.2)	233
Richest		214 (93.4)	15 (6.6)	229
Area (N = 1206)	$\chi^2(1)= 1.280$, $P = 0.258$			
Urban		491 (89.8)	56 (10.2)	547
Rural		604 (91.7)	55 (8.3)	659
Region (N = 1206)	$\chi^2(9)= 14.593$, $P = 0.103$			
Western		80 (95.2)	4 (4.8)	84
Central		140 (85.4)	24 (14.6)	164
Greater Accra		125 (96.2)	5 (3.8)	130
Volta		59 (93.7)	4 (6.3)	63
Eastern		74 (90.2)	8 (9.8)	82
Asante		88 (88.0)	12 (12.0)	100
Brong Ahafo		66 (88.0)	9 (12.0)	75
Northern		144 (91.1)	14 (8.9)	158
Upper East		163 (91.1)	16 (8.9)	179
Upper West		156 (91.2)	15 (8.8)	171
Delivered by caesarean section (N = 1144)**	$\chi^2(1)= 0.162$, $P = 0.688$			
Yes		142 (89.9)	16 (10.1)	158
No		896 (90.9)	90 (9.1)	986
Times received antenatal care (N = 1191)**	$\chi^2(3)= 3.297$, $P = 0.348$			
1-3 times		62 (84.9)	11 (15.1)	73
4-6 times		448 (90.9)	45 (9.1)	493
7-9 times		446 (91.2)	43 (8.8)	489
10 or more times		125 (91.9)	11 (8.1)	136
Took medicine to prevent malaria (N = 1202)**	$\chi^2(1)= 2.947$, $P = 0.086$			
Yes		1045 (90.5)	110 (9.5)	1155
No		46 (97.9)	1 (2.1)	47
Parity (N = 1206)	$\chi^2(2)= 3.624$, $P = 0.163$			
1-3		642 (89.5)	75 (10.5)	717
4-6		335 (93.1)	25 (6.9)	360
7 or more		118 (91.5)	11 (9.2)	129

*χ^2: Chi-square; df: degree of freedom; P: calculated p-value; *: significant at P ≤ 0.05; **: Less than sample size (N=1206) due to missing values*

Table 3. Logistic regression model for low birth weight

Variables	OR(p-value)	95% C.I.		H-L GOF test χ^2 (4) = 1.610, P = 0.807		
		Lower	Upper	AOR (p-value)	95% C.I.	
					Lower	Upper
Ever attended school						
Yes	1			1		
No	0.549 (0.012)*	0.344	0.878	0.566 (0.021)*	0.349	0.919
Currently married or living with a man						
Yes, currently married	1			1		
Yes, living with a man	0.904 (0.709)	0.534	1.533	0.788 (0.386)	0.460	1.350
No, not in union	1.964 (0.012)*	1.162	3.321	1.698 (0.053)*	0.993	2.905

*H-L GOF: Hosmer-Lemeshow goodness-of-fit; OR: Odds ratio; C.I.: Confidence Interval; *: significant at P ≤ 0.05*

Formal education is essential for expectant mothers to take informed decisions on issues concerning their pregnancy. In the present study, mothers who had never attended school were less likely to have given birth to children with low birth weight compared to those who had ever attended school. This is not in line with the expected theoretical curve where educated mothers are linked with normal birth weight compared to their counterparts who are not educated. As documented in some related literature, mothers who have never attended school are likely to have infants with low birth weight [18-21]. Other studies in Malawi [22] and Kenya [23] have also documented the association between mothers with no education and low birth weight. Notwithstanding the present study's findings not conforming to related studies, the finding can be of public health relevance. This, therefore, calls for further in-depth studies to explain and understand the link between maternal education and birth weight in the country. Probably, mothers who are not educated (formally) with regards to their social and environmental exposures are advantaged at giving birth to normal weight (more than 2.5 kilograms) children.

The marital status of a mother has also been documented in a number of studies to be associated with low birth weight [24,25]. In the present study, marital status was significantly linked to birth weight. Mothers who were not married or not in any union were more likely to have children with low birth weight. This finding conforms to studies [26,27] that established that marriage can be a protective measure against low birth weight, and, hence, unmarried mothers [28; 29] have a higher likelihood of giving birth to infants with low birth weight. The present study's finding is of social importance. A plausible assertion may be the relevance of family support in the country. In Ghana, aside husbands or immediate family members, some married women equally get support from their external family members such as grandparents, uncles and aunties. The roles played by these individuals, perhaps, form a conducive environment for married women to not giving birth to children with low birth weight.

The present study has some limitations. First, the study only used selected maternal variabless to assess low birth weight in the country. Other confounding variables could have altered the results if they were included in the analysis. Second, inferential causalities cannot be drawn from the associations identified between the outcome variable (low birth weight) and the predictor variables (maternal) in the present study; since the data used for analysis in the present study are from a cross-sectional survey (MICS).

5. CONCLUSION

The study revealed that some maternal variables can predispose a mother to giving birth to an infant with low birth weight in the country. Maternal education status and marital status can influence the probability of an infant being born with low birth weight. Therefore, prenatal programmes, on nutrition and counseling, should be designed by the Ministry of Health and health related non-governmental organizations (NGOs) targeting the sub-groups that have higher risks of giving birth to children with low birth weight in the country.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Permission for the use of the data was sort from UNICEF (2015) Multiple Indicator Cluster

Surveys website (http://mics.unicef.org/surveys); where surveys datasets are readily available, but not limited, to individual researchers. Also, analyses were conducted in accordance with the guiding principles set by UNICEF on how the data should be used.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kramer M. Socioeconomic determinants of intrauterine growth retardation. Eur J Clinal Nutr. 1998;52(S1):21-28.
2. World Health Organization (WHO). International statistical classification of diseases and related health problems, tenth revision; 1992. Available:http://www.who.int/classifications/icd/en/ (Accessed 20 December 2015)
3. World Health Organization and United Nations Children's Fund. Low birth weight: Country, regional and global estimates. UNICEF, New York; 2004.
4. United Nations Children's Fund (UNICEF). Low birth weight; 2001. Available:www.unicef.org/.../15_LowBirthweight_D7341Insert_English.pdf (Accessed 21 December 2015)
5. World Health Organization (WHO). Nutrition: Feto-maternal nutrition and low birth weight; 2013. Available:http://www.who.int/nutrition/topics/feto_maternal/en/index.html (Accessed 20 February 2015)
6. United Nations. Sustainable development goals; 2015. Available:http://www.un.org/sustainabledevelopment/sustainable-development-goals/ (Accessed 19 December 2015)
7. United Nations Children's Fund (UNICEF). State of the World's low birth weight. Oxford University Press; 2003.
8. Ghana Statistical Service (GSS). Ministry of Health (MOH) & ICF Macro. Ghana Demographic and Health Survey 2008. Accra: GSS, MOH and ICF Macro; 2009.
9. World Health Organization (WHO). African health observatory: Low birth weight; 2010. Available:http://www.aho.afro.who.int/profiles_information/index.php/AFRO:Low_birth_weight (Accessed 18 December 2015)
10. Jemmeh A, Sundby J, Vangen S. Maternal and obstetric risk factors for low birth weight and preterm birth in rural Gambia: A hospital-based study of 1579 deliveries. OJlOG. 2011;1:94-103.
11. Wasunna A, Mohammed K. Low birth weight babies: Socio-demographic and obstetric characteristics of adolescent mothers at Kenyatta National Hospital, Nairobi. East African Medical Journal. 2002;79(10):543-546.
12. Dahlui M, Azahar N, Oche OC, Aziz NA. Risk factors for low birth weight in Nigeria: Evidence from the 2013 Nigeria demographic and health survey. Global Health Action. 2016;9:28822.
13. Olusanya B, Ofovwe G. Predictors of preterm births and low birth weight in an inner-city hospital in Sub-Saharan Africa. Maternal and Child Health Journal. 2010;14(6):978-986.
14. Saaka M, Rauf AA. Relationship between uptake of antenatal care services and low birth weight in the Gushegu District of Northern Ghana. Lifescience Global. 2013;2(3):1-6.
15. Muula SA, Siziya S, Rudatsikira E. Parity and maternal education are associated with birth weight in Malawi. African Health Sciences. 2011;11(1):65-71.
16. UNICEF. Multiple cluster indicator survey: Ghana (MICS 4); 2011. Available:http://mics.unicef.org/surveys (Accessed: 19 November 2015)
17. GSS. Ghana-multiple indicator cluster survey 2011, fourth round; 2011. Available:http://www.statsghana.gov.gh/nada/index.php/catalog/88 (Accessed: 19 November 2015)
18. Silvestrin S, Silva CH, Hirakata VN, Goldani AA, Silveira PP, Goldani MZ. Maternal education level and low birth weight: A meta-analysis. Jornal de Pediatria. 2013;89(4):339-345.
19. Ko YL, Wu YC, Chang PC. Physical and social predictors for preterm births and low birth weight infants in Taiwan. J Nurs Res. 2002;10:83-89.
20. Silva AA, Silva LM, Barbieri MA, Bettiol H, Carvalho LM, Ribeiro VS, Goldani MZ. The epidemiologic paradox of low birth weight in Brazil. Rev SaúdePública. 2010;44:767-75.
21. Ngwira A, Stanley CC. Determinants of low birth weight in Malawi: Bayesian geo-additive modeling. PLoS ONE. 2015; 10(6):e0130057.

22. Muchemi OM, Echoka E, Makokha A. Factors associated with low birth weight among neonates born at Olkalou District Hospital, Central Region, Kenya. The Pan African Medical Journal. 2015;20:108.
23. Shah PS, Zao J, Ali S. Maternal marital status and birth outcomes: A systematic review and meta-analysis. Matrn Child Health. 2011;15(7):1097-109.
24. Bird ST, Chandra A, Bennett T, Harvey SM. Beyond marital status: Relationship type and buration and the risk of low birth weight. Family Planning Perspectives. 2000;32(6):281-287.
25. Barrington DS. The increasing protection of marriage on infant low birth weight across two generations of African American Women. Journal of Family Issues. 2010;31(8):1041-1064.
26. Phung H, Bauman A, Nguyen TV, Young L, Tran M, Hillman K. Risk factors for low birth weight in a socio-economically disadvantaged population: Parity, marital status, ethnicity and cigarette smoking. European Journal of Epidemiology. 2003;18(3):235-243.
27. Isiugo-Abanihe UC, Oke OA. Maternal and environmental factors influencing infant birth weight in Ibadan, Nigeria. African population Studies. 2011;25(2):251-266.
28. Kehinde OA, Njokanma OF, Olanrewaju DM. Paternal socio-economic status and birth weight distribution of Nigerian term newborn babies. Niger J Paed. 2013;40(3):299-302.
29. Siza JE. Risks factors associated with low birth weight of neonates among pregnant women attending a referral hospital in northern Tanzania. Tanzania Journal of Health Research. 2008;10:1-8.

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