Scientific Research and Essays Vol. 6(2), pp. 236-240, 18 January, 2011
Available online at http://www.academicjournals.org/SRE
DOI: 10.5897/SRE10.327
ISSN 1992-2248 ©2011 Academic Journals

Full Length Research Paper

Retrospective study of some factors influencing delivery of low birth weight babies in Ibadan, Oyo state, Nigeria

A. M. Amosu[1,2]*, N. O. S. Atulomah[3], M. F. Olanrewaju[3], T. I. Akintunde[3], A. O. Babalola[4], A. M. Akinnuga[1] and M. O. Ojezele[1]

[1]Department of Nursing Science, Lead City University, Ibadan, Nigeria.
[2]Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria.
[3]Department of Public and Allied Health, Babcock University, Ilisan-Remo, Nigeria.
[4]Department of Nursing Science, Babcock University, Ilisan-Remo, Nigeria.

Accepted 30 September, 2010

A retrospective and cross-sectional study of low birth weight (LBW) incidence in Ibadan, Nigeria, was conducted covering the period 1995 - 2005. LBW is defined by the World Health Organization (WHO) as birth weight less than 2500 g. It is a serious threat to survival in both perinatal and neonatal periods, and to normal physical and mental development in the post natal period. The study was aimed at gaining understanding on the determinants of LBW in the study area. Data were generated from two randomly selected urban hospitals and three rural maternity centres, where a total of 7,012 cases of LBW deliveries with fairly complete antenatal records were extracted. The data were analyzed using SPSS package. The overall incidence of LBW from the study was 16.8%. LBW incidence was higher among females than male babies (P < 0.005). Mean birth weight for males was 1.74±0.55 kg, and 1.66±0.54 kg for females. A correlation analysis showed that maternal age, parity and height significantly influenced birth weight (P < 0.005). A regression model further showed the percentage contribution of sex of baby (r^2 = 0.43), maternal height (r^2 = 0.41) maternal age (r^2 = 0.27) and parity (r^2 = 0.09) to observed LBW incidence. Adolescent nutrition and reproductive health behaviours, maternal malnutrition for improved pregnancy outcomes and reversal of negative implications of LBW incidence in Nigeria, must be effectively addressed.

Key words: Low birth weight, prematurity, maternal parity, perinatal and neonatal periods.

INTRODUCTION

Low birth weight (LBW) is the single most powerful predictor of mortality in the first few months of life (FAO/WHO, 1992). It is a major health problem in most African countries (FAO, 1997), and indeed in most developing countries, being associated with a high incidence of neonatal mortality in these regions. In India, 85% of neonatal mortality is associated with LBW, 87% in Guatemala and 56% in North Acrot (Asthworth and Feachem, 1985). The phenomenon of LBW is governed by two major processes: prematurity and intra-uterine growth retardation.

*Corresponding author. E-mail: dlivingrock2004@yahoo.com. Tel: 234-803-401-5306, 234-805-302-6584.

Birth weight is crucial to the survival of the infant and it has been estimated that normal infants in industrialized countries have a mortality rate of 2/1000 while LBW infants have a mortality rate of 86/1000 (Wynn et al., 1991).

The incidence of LBW was selected as one of the indicators for monitoring the health goals established at the World Summit for Children (WSC) in 1990. In the year 2000, it was estimated that 10.0% of new born infants in developing countries or 11.7 million infants will have LBW at term (UNICEF, 2000).

Its incidence in Nigeria has throughout the 1990's remained at 16% (Krause and Mahan, 1979), while the recent estimate lies between 6 - 21% (Lawoyin and Oyediran, 1992), which is higher than the mean percent incidence in Sub-Saharan Africa. This has thus become a

Table 1. Maternal age, mean infant BW and LBW incidence.

Mother's age (Years)	Total no. of deliveries	LBW incidence (%)	No. of LBW infants	Mean BW (Kg)	S. D	Range	F	P-value
< 20	18,477	8.5	3,530	1.66	0.57	0.50 - 2.46	9.11	0.00001
20-24	8,634	3.2	1,339	1.73	0,53	0.50 - 2.45		
25-29	6,717	2.1	874	1.77	0.51	0.50 - 2.45		
30-34	5,373	1.8	767	1.76	0.51	0.55 - 2.45		
≥35	2,508	1.2	502	1.75	0.52	0.55 - 2.45		
Total		16.8	7,012					

Table 2. LBW in relation to maternal height.

Height group (cm)	Total no. of deliveries	No. of LBW infants	LBW incidence (%)	P-value
< 150	7,998	6,083	14.6	0.005
150 - 154	13,049	416	1.0	
155 - 159	1,053	155	0.4	
160 - 164	14,005	214	0.5	
165 - 169	4,934	140	0.3	
≥170	670	4	0.01	
Total	41,709	7,012	16.8	

cause for serious concern, as it could serve as an indicator of ineffective intervention and possibly, deteriorating socio-economic conditions.

Given the prevalent poor management of the country's resource, a situation which prompted UNICEF to qualify Nigeria as a rich country with poor citizens, it becomes therefore imperative to carefully understand the LBW incidence and its predisposing factors. Knowledge gained would guide or inform the development of well-articulated interventions that would result in impact maximization and resources utilization efficiency. It is only such empirically based and targeted intervention that can result in the expected reduction in the incidence of LBW in Nigeria.

This study aims at determining those factors responsible for the delivery of low birth weight babies in Ibadan, Nigeria.

MATERIALS AND METHODS

The study was carried out in Ibadan, Oyo State, Nigeria. The specific locations of the study selected by random sampling were: University College Hospital (UCH) and Adeoyo State Hospital representing the urban settings, while Inalende Maternity Centre, Oniyarin, in Ibadan North West Local Government Area, Egbeda Local Government Maternity Centre, Alakia and Akinyele Local Government Maternity Centre, Moniya, represented the rural locations.

All available records of normal and assisted deliveries were used including the associated maternal and infant characteristics for the period 1995 - 2005. These included the BW and sex of each of the LBW infants, maternal age, height, parity, all properly diagnosed illnesses suffered during pregnancy and recorded in the case notes, as well as maternal socio-economic indices (education, occupation, and, annual income). Out of a total of forty-one thousand, seven hundred and nine (41,709) deliveries with fairly complete records at the centres for the study period, seven thousand, and twelve (7,012) cases of LBW infants delivered at 28 - 45 weeks gestation were extracted. However, all cases of stillbirths were excluded from the study. Data collected were analyzed using the SPSS package to generate frequencies, means, standard deviations, chi-square tests, and regression models.

RESULTS

Mothers below the age of 20 years were found to have delivered the largest number of LBW babies (3,530) out of a total number of 7,012. LBW incidence decreases significantly with increase in maternal age, with mothers of age 35 years and above having the lowest incidence of 1.2%. The mean BW of the LBW infants was observed to increase with increase in maternal age, and found to be lowest (1.66 kg) among mothers below 20 years (Table 1).

Maternal height below 150 cm was associated with a high LBW incidence of 14.6%, decreasing with increasing height (Table 2).

Table 3 shows the importance of infant gender as LBW incidence was found to be higher among females (10.3%) than in male babies (6.5%) ($p < 0.005$). Out of a total number of 7,012 LBW infants delivered, 4,317 were females. Mean birth weight for males was higher (1.74±0.55 kg), than for females (1.66±0.54 kg).

The incidence was found to be significantly higher in the primigravidae (5.3%), than in any other parity group

Table 3. Infant gender, mean infant BW and LBW incidence.

Sex	Total no. of deliveries	No. of LBW infants	LBW incidence (%)	Mean BW (kg)	P-value
Female	23,781	4317	10.3	1.660±0.55	
Male	17,928	2695	6.5	1.740.54±0.54	0.0001
Total	41,709	7012	16.8		

Table 4. Maternal parity, mean infant BW and LBW incidence.

Parity	Total no. of deliveries	No. of LBW infants	LBW incidence (%)	Mean infant BW (kg)	Range	F	P-value
0	6,669	2230	5.3	1.64±0.52	0.50 - 2.46		
1	7,872	1643	3.9	1.68±0.57	0.50 - 2.50		
2	10,614	966	2.3	1.69±0.54	0.50 - 2.45		
3	5,991	663	1.6	1.77±0.48	0.50 - 2.45	4.49	0.0001
4	6,435	690	1.7	1.79±0.52	0.55 - 2.45		
≥5	4,128	820	2.0	1.64±0.52	0.55 - 2.45		
Total	41,709	7,012	16.8				

Table 5. Maternal illness in pregnancy and mean infant BW.

Illness in pregnancy	Total no. of deliveries	No. of LBW deliveries	LBW incidence (%)	Mean infant BW (kg)	S. D	Range	F	P-value
Hypertension	1,168	162	0.4	1.55	0.58	0.65 - 2.45		
Malaria	18,460	3,153	7.6	1.70	0.55	0.50 - 2.45		
IDA	10,614	1,422	3.4	1.63	0.60	0.50 - 2.45		
URTI	2,210	584	1.4	1.71	0.51	0.65 - 2.45		
Hepatitis	298	200	0.5	1.72	0.53	0.65 - 2.45	7.60	0.0001
Typhoid	276	155	0.3	1.74	0.57	0.65 - 2.45		
Urinary tract infection	2,364	696	1.7	1.72	0.52	0.65 - 2.45		
None	6,319	6,40	1.5	1.81	0.47	0.50 - 2.46		
Total	41,709	7,012		16.8				

URTI= Upper respiratory tract infection, IDA= Iron deficiency anaemia.

(Table 4). The mean BW of first children (1.64 kg) in this study was significantly lower than those from the third and subsequent pregnancies, showing an increase in BW with rising parity up to Para 4. Mothers in the 5th parity group and above however, also recorded the lowest mean infant BW of 1.64 kg.

Maternal socio-economic status also impacted on birth weight. LBW incidence of 11.5% was recorded for mothers in the very low socio-economic category that is, those who engaged in menial jobs/petty trading, the majority of whom were also illiterates, with very low annual income. Mothers in the low, medium and high socio-economic categories had LBW incidence of 3.2, 2.0 and 0.1% respectively. While malaria (7.6%) and iron deficiency anaemia (3.4%) contributed more to LBW incidence, pregnancy-induced hypertension was significantly associated with the lowest mean BW (1.55 kg) (Table 5). Mothers who reported no illness had the highest mean BW of 1.81 kg. A regression model as seen in Table 6 showed the percentage contribution of sex of baby (r^2 = 0.43), maternal height (r^2 = 0.41) maternal age (r^2 = 0.27) and parity (r^2 = 0.25) to observed LBW incidence, indicating these factors as the major determinants of LBW in the study population.

DISCUSSION

This retrospective and cross-sectional study of LBW records covering the period 1995 - 2005 was carried out using data from five different locations in Ibadan, Nigeria. A total of 7,012 cases of LBW were analyzed. The present study was undertaken to provide information on the various factors influencing the delivery of LBW in the

Table 6. The determinants of LBW (Multiple stepwise regression).

Variables	Regression coefficient (β)	P- value	Percentage contribution to the Model R^2
Sex of the infant	-0.0762	0.00001	0.43
Height of the mother	0.0103	0.0001	0.41
Mothers age	0.0033	0.00001	0.27
Parity	0.0031	0.00001	0.25

study population.

The results indicate that LBW incidence is largely a teenage phenomenon as mothers below 20 years of age were found to be in the majority. Various studies, over the years have consistently associated low maternal age with LBW (Krause and Mahan, 1979; Lawoyin and Oyediran, 1992; Alberman and Evans, 1989). This association has consistently been attributed to the fact that teenage mothers have not yet reached their adult stature or organ size. It has been observed that pregnancy during adolescence carries many health risks (Kurtz, 1994). The risks of maternal and neonatal mortality are much greater for adolescents than for adult women. The low birth weight of babies born to adolescent mothers is more than a case of small babies from small mothers. Young, still growing adolescents, even when matched for nutritional status have smaller newborns than adult mothers (Frisancho, 1981). Apart from the possible competition for nutrients between the adolescent and foetus, one other contributing factor may be that these adolescents make less use of antenatal care and obstetric services.

The height of the mother is a factor found to influence the delivery of babies in this study. Maternal height of 150 cm or less is one of the strongest determinants of LBW, as over 76% of the mothers below 150 cm tall in this study had LBW infants. Further analysis using regression statistics, shows that out of the four determinants with positive effects, maternal height is one of the strongest predictors of LBW. Other studies have also confirmed this (Alberman and Evans, 1989).

Another factor seen to significantly influence LBW incidence is parity. The incidence is highest in the primiparous/Para 0 mothers in comparison to any other parity group, while a marked decrease in the incidence occurs with rising parity. Similar findings were reported by earlier researchers (Lawoyin and Oyediran, 1992). The reason for the above trend can however, only be speculated as there is the possibility that in a woman, the uterine blood supply enlarges progressively with increasing parity, thereby increasing nutrient supply to the growing foetus. All published data from conventional cross-sectional studies of the BW distribution in babies of different birth ranks, show that the proportions of births of low weight and of low gestational age, are high in first births, fall in second and usually third, and begin to rise again with increasing parity (Alberman and Evans, 1989). This pattern was also observed in this study.

The variation in the incidence of LBW across various socio-economic categories is also noteworthy. LBW incidence was found to be highest in those mothers of very low socio-economic status, stressing the fact that LBW is a reflection of poor socio-economic conditions. This finding is in line with previous studies by earlier researchers (Ferraz et al., 1990; Makhija et al., 1989; Randhawa and Kanwar, 1990).

Sex was found to be the strongest factor influencing infant BW. LBW incidence was observed to be significantly higher in females than males and this is also consistent with the findings of other researchers (Rehan and Tafida, 1979; Adelusi and Ladipo, 1976).

Maternal morbidity was also shown to be associated positively with the incidence of LBW. The results showed that healthy mothers had the LBW babies with the highest mean birth weight. Mothers who suffered from malaria attack during pregnancy recorded the highest LBW incidence, followed by those who were diagnosed for iron deficiency anaemia. Pregnancy-induced hypertension was associated with the lowest mean BW of 1.55 kg. There are several mechanisms by which foetal growth may be affected by conditions of maternal morbidity. Firstly, the mother herself may be subjected to a series of infections which influence her own nutrition, making supplies of nutrients less available to the foetus. The placenta may not transfer nutrients satisfactorily and thirdly, the foetus itself may be infected such that growth and development are impaired (Tomkins et al., 1994).

The findings of this study are consistent with a report of two studies in the industrialized world involving over 100,000 pregnancies, which clearly indicated that favourable pregnancy outcomes are less frequent among anaemic mothers (Viteri, 1994). The correlation between high LBW incidence and mortality rates quite describes the Nigerian situation which had an under-five mortality rate of 191 per 1,000 and infant mortality rate of 114 per 1,000 live births (UNICEF, 1997).

Conclusion

The study has demonstrated gross disadvantages of teenage pregnancy and the urgent need to address the nutritional and broader developmental challenge of adolescent reproductive health behaviours. While female sex and maternal height constituted significant influence on birth weight, much redress can be made through interventions designed to address age at which the first

pregnancy occurs, and ensuring good care for women during pregnancy. The emergent understanding on how foetal under nutrition results in conditions of chronic morbidity in later adulthood leaves us with the compelling necessity to forge a wholistic framework for addressing human nutritional need at all stages of the life-cycle.

REFERENCES

Adelusi B, Ladipo OA (1976). Preterm and other Babies with low birth weight in Ibadan. Trop. Geogr. Med., 28: 316-322.

Alberman E, Evans SJW (1989). The Epidemiology of Prematurity: etiology, prevalence and outcome. Annales Nestle. 47(2): 314-322.

Asthworth A, Feachem RG (1985). Intervention for the Control of diarrhea diseases among Young Children: Prevention of Low Birth Weight. Bull. WHO, 63(1): 165-84.

FAO (1997). Agriculture, Food and Nutrition for Africa – A Resource Book for Teachers of Agricu9lture, Rome.

FAO/WHO (1992). International Conference on Nutrition – Major Issues for Nutrition Strategies, Rome.

Ferraz EM, Gray H, Gurhar TM (1990). Determinants of preterm delivery and term low birth weight in Ahmedabad. Int. J. Epidem., 21: 263-272

Frisancho AR (1981). New Norms of Upper Limb Fat Muscle Area for Assessment of Nutritional Status. Am. J. Clin .Nutr. 34: 2540-2543.

Krause MV, Mahan KL (1979). Food, Nutrition and Diet Therapy 6th Ed. W. B. Saunders Company, 7.FMOH. pp. 278-279.

Kurtz MK (1994). Adolescent Growth. SCN News, No. 11.

Lawoyin TO, Oyediran ABO (1992). A Prospective Study on some Factors which Influence the Delivery of Low Birth Weight Babies in a Developing Country. Afr. J. Med. Sci., 21(1): 33-39.

Makhija K, Murthy GVS, Kapoor SK, Lobo J (1989). Socio-biological determinants of birth weight Ind. J. Paed., 56: 639-643.

Randhawa I, Kanwar JS (1990). An epidemiological study of LBW. Obst. Gynae. Ind.. 40: 62-65

Rehan ME, Tafida DS (1979). Birth weight of Hausa Infants in Northern Nigeria. Br. J. Obstet. Gynaecol., 86: 443-449.

Tomkins A, Murray S, Rondo P, Filteau S (1994). Impact of Maternal Infection on Fetal Growth and Nutrition. SCN News. No. 11

UNICEF (1997). The State of the World's Children. United Nations Children's Fund.

UNICEF (2000). The State of the World's Children. United Nations Children's Fund.

Viteri FE (1994). The Consequences of Iron Deficiency and Anaemia in Pregnancy on Maternal Health, the Fetus and the Infant. SCN News: No. 11.

Wynn A, Crawford M, Doyle W, Wynn S (1991). Nutrition of Women in Anticipation of Pregnancy. Nutr. Health., 7: 69-88.