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Trends of Low Birth Weight in Ogun state, Nigeria, 1991-1999: Reference to the World Summit for Children target for the 1990's

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ABSTRACT

This retrospective and cross-sectional study on trends of Low Birth Weight (LBW) as observed in selected health facilities in Ogun state, Nigeria, covered the period 1991 – 1999, with reference to the World Summit for Children (WSC) target for the 1990's. LBW is a serious threat to survival of infants in both perinatal and neonatal periods, and to normal physical and mental development in the post natal period. The study was carried out to determine how far the WSC goal of reducing the LBW incidence to 10% by the year 2000 has been achieved, and also to gain an understanding on the determinants of LBW in the study area. Data were generated from five randomly selected health facilities (three rural and two urban), with a total of 33,321 deliveries having fairly complete antenatal records during the study period. Out of this number, 5,598 cases of LBW deliveries were extracted. The data obtained were analysed using SPSS package version 14.0. The overall incidence of LBW was 16.8%. 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. The findings from this study showed an almost consistent departure from the WSC target and explained why Nigeria did not attain the WSC goal. Adolescent nutrition and reproductive health behaviours, measures for improved pregnancy outcomes and reversal of negative implications of LBW incidence in Nigeria, must be effectively addressed.

Keywords: Low birth weight, World Summit for Children, Survival of infants, Perinatal and Neonatal periods.

INTRODUCTION

Birth weight (BW) is the single most powerful predictor of mortality in the first few months of life [1]. The World Health Organization (WHO) defined low birth weight (LBW) as BW below 2,500gm [2]. It is a major health problem in most African countries [3], and is indeed a major public health problem 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 Acot [4]. BW 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 [5].

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 [6]. Its incidence in Nigeria has throughout the 1990's remained at 16 percent [7], while the recent estimate lies between 6-21% [8], which is higher than the mean percent incidence in Sub- Saharan Africa. This has thus become a cause for serious concern as it could serve as an indicator of ineffective intervention and possibly, the country's deteriorating socio-economic conditions. The prevalent poor management of the country's vast resources has prompted UNICEF to describe Nigeria as a rich country with poor citizens.

The study was carried out to determine the extent to which the WSC goal of reducing the LBW incidence to 10% by the year 2000 was met, and also to gain an understanding on the determinants of LBW in the study area. 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.

MATERIALS AND METHODS

The study was carried out in Ogun state, Nigeria. The specific locations of the study selected by random sampling were: the Oba Ademola Maternity Hospital Abeokuta and State Hospital Ijebu Ode, representing the urban settings, while Ajilete Maternity Centre, Ifo Maternity Centre and Aiyetoro Maternity Centre represented the rural locations.

All available records of normal and assisted deliveries were utilised including the associated maternal and infant characteristics for the period 1991-1999. Out of a total of thirty-three thousand, three hundred and twenty-one (33,321) deliveries with fairly complete records at the centres for the study period, five thousand, five hundred and ninety-eight (5,598) cases of LBW infants delivered at 28-45 weeks gestation were extracted. These included the BW and sex of each of the LBW infants, the maternal age, height, parity as well as all diagnosed illnesses suffered during pregnancy as recorded in the case notes. All cases of stillbirths were however, excluded from the study. Data collected were analyzed using the SPSS package version 14.0 to generate frequencies, means, standard deviations, chi-square tests, and regression models.

RESULTS

The results showed that 55.7% of mothers in the study were below the age of 20 years. LBW incidence decreased significantly with increase in maternal age, with mothers below age 20 years recording 9.4%, while those aged 35 years and above had the lowest incidence of 4.5%.The mean BW was observed to increase with increase in maternal age, and found to be lowest (1.66kg) among mothers below 20 years (Table 1).

Majority of the mothers (89.7%) had heights below 150cm (Table 2). LBW incidence was observed to decrease with increase in maternal height. The incidence was significantly higher in primigravidae (7.2%) than in any other parity group (Table 3). The mean BW of first children (1.64kg) in this study was significantly lower than those from third and subsequent pregnancies showing an increase in BW with rising parity up to Para 4. Mothers in the 5th parity group and above also recorded the lowest mean infant BW of 1.64 kg.

Many of the mothers with LBW babies (29.1%) were junior civil servants, followed by petty traders (26.0%). Artisans were in the minority (4.8%), followed by mothers whose occupation was farming (7.9%), (Table 4).

While malaria (7.1%) and anemia (3.9%) 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 ($r^2 = 0.09$) to observed LBW incidence, indicating these factors as the major determinants of LBW in the study population.

The incidence of LBW for the period 1991-1999 in the five study locations, and the percentage departure from the WSC goal of 10% LBW reduction by the year 2000 are shown in Tables 7 and 8.The mean percentage increase from the set goal was 6.8%.

Table 1: Maternal age, Mean infant BW and LBW incidence

Mother's Age (Yrs)	LBW Incidence %	Sample Size (n)	Mean BW (Kg)	S. D	Range	F	P-value
< 20	9.4	3116 (55.7%)	1.66	0.57	0.50-2.46		
20-24	3.3	1089 (19.5%)	1.73	0,53	0.50-2.45		
25-29	1.9	624 (11.2%)	1.77	0.51	0.50-2.45	9.11	0.00001
30-34	1.6	517 (9.2%)	1.76	0.51	0.55-2.45		
≥35	0.8	252 (4.5%)	1.75	0.52	0.55-2.45		

Table 2: LBW in relation to maternal height

Height Group (cm)	Frequency (n)	Percentage (%)
< 150	5023(89.7%)	15.1
150-154	184(3.3%)	0.6
155-159	87(1.6%)	0.26
160-164	128(2.3%)	0.38
165-169	81(1.5%)	0.24
≥170	95(1.7%)	0.29
Total	5598	16.9

Table 3: Maternal parity, mean infant BW and LBW incidence

Parity	Sample size (n)	LBW Incidence (%)	Mean BW (Kg)	S. D	Range	F	P-value
0	2391	7.2	1.64	0.52	0.50-2.46		
1	1297	3.9	1.68	0.57	0.50-2.50		
2	844	2.5	1.69	0.54	0.50-2.45		
3	541	1.6	1.77	0.48	0.50-2.45	4.49	0.0001
4	348	1.0	1.79	0.52	0.55-2.45		
≥5	177	0.5	1.64	0.52	0.55-2.45		

Table 4: Maternal occupation and LBW incidence

Occupation	Frequency (n)	LBW Incidence (%)
Petty trading	1,455(26.0%)	4.4
Lower cadre civil servants (mainly cleaners and messengers)	1,628(29.1%)	4.9
House –wives/Unemployed	1,117(20.0%)	3.4
Farming	445(7.9%)	1.3
Students/ Apprentice	683(12.2%)	2.5
Artisan	270(4-8%)	0.8
Total	5598	17.3

Table 5: Maternal illness in pregnancy and mean infant BW

Illness in Pregnancy	Sample Size (n)	LBW incidence (%)	Mean infant BW (Kg)	S. D	Range	F	P-value
Hypertension	40	0.1	1.55	0.58	0.65-2.45		
Malaria	2349	7.1	1.70	0.55	0.50-2.45		
Anaemia	1300	3.9	1.63	0.60	0.50-2.45		
Upper respiratory tract infection	462	1.4	1.71	0.51	0.65-2.45		
Hepatitis	78	0.2	1.72	0.53	0.65-2.45		
Typhoid	33	0.1	1.74	0.57	0.65-2.45		
Urinary tract infection	696	2.1	1.72	0.52	0.65-2.45	7.60	0.0001
None	640	1.9	1.81	0.47	0.50-2.46		
Total	5598		16.8				

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	-0.024	0.0276	0.09

Table 7: Incidence of LBW and Percentage Increase from WSC goal

Year	No. of LBW infants	No. of Deliveries	LBW incidence (%)	Percentage increase from WSC goal of LBW reduction to 10% by the year 2000
1991	529	3,223	16.4	6.4
1992	809	4,702	17.2	7,2
1993	558	3,324	16.8	6.8
1994	422	2,568	16.4	7.17
1995	581	3,321	17.5	7.5
1996	603	3,714	16.2	6.2
1997	680	4,023	16.9	6.9
1998	730	4,346	16.8	6.8
1999	686	4,100	16.7	6.7
Total	5,598	33,321	16.8	6.8

Table 8: LBW incidence in each study location for the period 1991-1999

Study Location	1991 LBW Incidence %	1992 LBW Incidence%	1993 LBW Incidence%	1994 LBW Incidence%	1995 LBW Incidence%	1996 LBW Incidence%	1997 LBW Incidence%	1998 LBW Incidence%	1999 LBW Incidence%	Mean 1991-1999
OAMH	16.4	16.8	16.5	17.5	17.4	15.7	16.7	17.6	16.3	16.8
SHIO	16.2	17.3	16.4	15.9	18.8	15.9	16.6	16.8	17.1	16.8
AMC	15.9	16.6	17.8	17.2	16.6	15.7	16.9	16.8	16.9	16.7
IMC	16.8	17.5	16.4	15.7	17.4	16.7	17.6	16.8	16.3	16.8
AYMC	16.6	17.7	16.7	15.8	17.3	17.1	16.6	15.8	16.9	16.7
Mean	16.4	17.2	16.8	16.4	17.5	16.2	16.9	16.8	16.7	16.8

Key: OAMH=Oba Ademola Maternity Hospital, Abeokuta; SHIO=State Hospital, Ijebu Ode; AMC= Ajilete Maternity Centre; IMC= Ifo Maternity Centre and AYMC= Aiyetoro Maternity Centre.

DISCUSSION

This retrospective and cross-sectional study on trends of LBW covering the period 1991-1999, was carried out using data from five different locations in Ogun state, Nigeria. The specific locations of the study selected by random sampling were: the Oba Ademola Maternity Hospital Abeokuta and State Hospital Ijebu Ode, representing the urban settings, while Ajilete Maternity Centre, Ifo Maternity Centre and Aiyetoro Maternity Centre represented the rural locations. A total of 5,598 cases of LBW were analysed. The present study was undertaken to provide information on the incidence of LBW in the 1990's especially in relation to the WSC target, and what constituted the major determinants of this phenomenon.

The results as observed show that LBW is largely a teenage phenomenon as mothers below 20 years of age were found to be in the majority (55.7%).Various studies, over the years have consistently associated low maternal age with LBW[6],8],[9]. 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 [10].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 [11]. 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 relationship between maternal height and LBW as observed in Table 2 strongly indicate that a maternal height of less than 150 cm is one of the strongest determinants of LBW, as over 89% of the mothers with LBW infants were below 150 cm tall. Further analysis using regression statistics (Table 6), shows that out of the four determinants with positive effects, maternal height is one of the strongest predictors of LBW. Previous studies have also confirmed this observation. [9]

Another factor that was found to significantly influence LBW incidence is parity (Table 3). The incidence was significantly higher in primigravidae/Para 0 mothers (7.2%) than in any other parity group and there was a marked decrease in the incidence with rising parity. Similar findings were reported by earlier researchers [8]. The reason for the above observation can only be speculated. There is the possibility that in a woman, the uterine blood supply enlarges progressively with increasing parity. 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 [9]. This pattern was also observed in this study as shown in Table 3.

The variation in the incidence of LBW across various occupational categories is also noteworthy (Table 4). LBW was found to be highest among junior civil servants (4.9%), stressing the fact that LBW is a reflection of poor socio-economic conditions.

The infant's gender was found to be the strongest factor influencing infant BW (Tables 6) and LBW incidence has been observed to be significantly higher in females than males [12], [13].

Maternal morbidity was found to be positively associated with the incidence of LBW ($P<0.005$) (Table 5). The results showed that healthy mothers had babies with the highest mean

BW (1.81kg). The highest percentage of LBW infants were associated with malaria (7.1%), followed by anemia (3.9%). Pregnancy-induced hypertension was associated with the lowest mean BW of 1.55kg. 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 fetus. The placenta may not transfer nutrients satisfactorily and thirdly, the foetus itself may be infected such that growth and development are impaired [14].

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 [15].

Tables 7 and 8 show the year by year incidence across the 1990's with the overall incidence of LBW in the study being 16.8%. The percentage incidence of LBW found in Oba Ademola Maternity Hospital, Abeokuta (Table 8), compares well with the incidence observed in a similar study carried out at the University College Hospital (UCH) Ibadan, in 1977 [16]. It is noteworthy that after a span of about three decades between the two studies, not much difference was found in the incidence of LBW. The overall percentage incidence of 16.8% found in this study compares well with the national average which has been put at 16% throughout the 1990's [5].

At the onset of the 1990's the WSC target of LBW reduction to 10% or less was set. The findings of this study quickly help therefore, in explaining why Nigeria did not attain the WSC target. Table 8 shows the almost consistent departure from the set goal. This target of 10% LBW reduction was supposed to indicate progress made by nations in improving the nutritional and general well being of peoples of the world in various countries, especially the developing ones. This failure and considerable departure from the target therefore has far reaching development implications.

The 16% LBW incidence in Nigeria and the 16.8% recorded in this study for Ogun state vividly portray the poor conditions of human development in the country. This therefore stresses the need to urgently reverse the downward trends in living conditions in Nigeria. WSC recognized that the causes of high infant mortality, especially neonatal mortality, are linked to teenage pregnancies, LBW, pre-term births, unsafe delivery, neonatal tetanus and high fertility rates. 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 in the 1990's [17].

CONCLUSION

The study has demonstrated a consistently high incidence of LBW in the 1990's. The observed incidence of 16.8% which compared with, as well as reflected the national average of 16% for the 1990's strongly indicated what development situations were during that period. One crucial finding is that no substantial progress was made in attaining the WSC target of 10% reduction in LBW by the year 2000. The study also demonstrated the gross disadvantages of teenage pregnancy, and the urgent need to address the nutritional and broader development challenges of adolescent reproductive health behaviours. Going by the analysis of development situations in the 1990's, the consistently high incidence of LBW as found in this study across the years, is thus explainable, while the challenge of addressing the problem remains an urgent imperative for development.

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