

**ORIGINAL ARTICLE****THE EFFECTS OF WEATHERING DEMONSTRATED BY MATERNAL AGE ON LOW BIRTH WEIGHT OUTCOME IN BABIES**

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**ABSTRACT**

**BACKGROUND:** Increasing age has been hypothesized with wear and tear (weathering) in mothers, which may result to low birthweight of their babies. The prevalence of low birthweight could be heightened if maternal weathering is associated with poor maternal socioeconomic variables. In this current study, we analyzed the effects of maternal weathering on babies' birthweights.

**METHODS:** One hundred and twenty four mother-baby pairs were selected using systematic random sampling method. Maternal age formed part of the demographic data that was obtained from the mothers' case notes and from interviews held with them. Maternal socioeconomic variables were assessed using Oyediji's parameters and birthweights of babies were determined using bassinet weighing scale. Associations between maternal socioeconomic variables and birthweight of babies were assessed using univariate analysis. Differences in mean birthweight of babies according to their maternal age were evaluated using one-way analysis of variance ANOVA.

**RESULTS:** Among the 124 babies, 66(53.2%) were males and 58(46.8%) females of whom the majority 104(83.9%, had normal birthweight. The mean birthweight of babies was  $3.05 \pm 0.57$  (95% CI, 2.95–3.15) kg, while the mean maternal age was 23.60 (5.2) 95% CI, (22.68–24.52) years. The difference between mean birthweight of babies and mean maternal age was not significant ( $F=1.35$ ,  $p=0.255$ ). Similarly, the association between birthweight, maternal education and occupation computed using univariate analysis was not significant ( $F=2.163$ ,  $p=0.120$ ) for education and ( $F=1.825$ ,  $p=0.166$ ) for occupation.

**CONCLUSION:** In this study, maternal weathering was not found to be associated with LBW outcome. This implies that an increase in maternal age may not be significantly associated with LBW. However, there is need for further research on this subject from different centers using larger sample size in order to enhance the precision of the study.

**KEYWORDS:** Mother-baby pairs, Maternal Weathering, Low birthweight, Maiduguri, Nigeria

**INTRODUCTION**

The impact of maternal age coupled with poor maternal socioeconomic environment has long been hypothesized to cause cumulative wear and tear (weathering) in mothers (1). The weathering effect, which manifests itself as women advance in age is thought to result from the impacts of cumulative exposure to hardships leading to low birthweight (LBW) of their babies (2). A study has approximated that one million women become

pregnant each year, and that half of them give birth (3). Studies have also shown that women of childbearing age are exposed to a host of negative social, economic and medical consequences that affect mother and child (4, 5). However, whether these consequences are due to advancing maternal age, per se, to explain maternal weathering or whether they are caused by adverse economic and social circumstances in women who become mothers is debatable.

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One study has proven that young mothers in their early reproductive life are at high risk of giving birth to LBW babies (3). A possible explanation for this could be that mothers in their early reproductive life are still growing and may be competing for nutrients with their fetuses, leading to LBW or preterm babies. In another study, psychological factors were found to be causes of LBW in babies whose mothers are in their early reproductive life, since many pregnancies that occur at this age are unplanned, unwanted or discovered late (6). In addition, women who face early pregnancy may lack emotional maturity needed to carry such pregnancies to term (3). Reichman et al (3), New Jersey, in 2007 added the possibility of selection bias, since mothers in their early reproductive life are more likely than others to be poor, to be undereducated or to live in areas with limited access to resources and services.

At the other spectrum of age, La Grew et al (7), in 1996 in the USA, found that women in their late reproductive ages, that is 35 years and above, have fewer socioeconomic disadvantages than adolescents; they nonetheless share with latter increased risks of having babies with LBW. Delayed childbearing poses its own biological risks, which include rising medical conditions such as hypertension and diabetes. Brown and Eisenberg (6), in 1995, argued that older mothers aged 35 and above, like young ones, are susceptible to similar psychological effects that could lead to their babies having LBW. Furthermore, Brown and Eisenberg (6) believed that both categories of mothers have higher rates of unintended pregnancy, which puts their babies at risks for LBW.

The research on the effects of maternal weathering and LBW outcome of babies has left important gaps, because most of the studies were carried in developed countries. In fact, little or no information can be obtained on this subject from developing communities like Maiduguri, Borno state, Nigeria. More so, the conference of Paediatric association of Nigeria (PANCOF) has reported LBW prevalence of 14% in Nigeria in 2009 (8). Whether this is the result of maternal weathering, therefore, needs investigation. Thus, this study assessed the effects of maternal age (weathering) on babies' birthweights at the labor

ward of the University of Maiduguri Teaching Hospital, Maiduguri, (UMTH) in Nigeria.

## SUBJECTS AND METHODS

**Study Area:** The study was carried out at the Department of Pediatrics and Obstetrics unit of the UMTH, Nigeria. The UMTH is a tertiary centre located in North-Eastern Nigeria and apart from being the largest health facility in North-Eastern Nigeria, it serves as a referral centre for the six North-Eastern States and the neighboring countries of Chad, Cameroon and Niger Republics.

**Sampling Technique/Study Population:** The minimum sample size was determined using statistical formula that computes 14% prevalence of LBW for Nigeria at 95 confidence interval and alpha levels of 0.05 (8, 10). This equalled 94; however, 30% of this was added to maximize power. Therefore, the study population was comprised of 124 mother-baby pairs. A pregnant woman was eligible for participation in the study if she delivered at the labor ward of UMTH and met the following study inclusion criteria: (i) had an uncomplicated singleton birth at term based on Eregie (11), estimate of gestational age or Obstetric ultrasound scan, (ii) had no known underlying chronic illness and not on drugs other than the ones used for routine antenatal care. Mothers who smoked cigarette and/or drank alcoholic beverages or coffee were excluded from this study. Mother-baby pairs were enrolled in this study using the systematic random sampling method where the first of every three mother-baby pair was picked at the labour ward. Where the first mother-baby pair did not fulfil the inclusion criteria mentioned above, the immediate next mother-baby pair that qualified for inclusion was selected.

After obtaining informed consent at delivery, data on delivery outcome including baby's sex, and birthweight (kg) were obtained. The birthweight was determined using the bassinet weighing scale. Babies weighing < 2.5 (kg) were considered LBW, those weighing > 3.99 kilograms (kg) were classified as macrosomia and those weighing 2.5 – 3.99 (kg) were taken as normal (12). Demographic and antenatal care data of the participants were

obtained from case files of each mother and from a through interview held with each participant, while maternal socioeconomic variables were obtained based on Oyedeji's model.

**Statistical Analysis:** The data obtained from the study were entered into a computer for analysis using statistical package for social science (SPSS) statistical software version 16, Illinois, Chicago USA. Values were expressed as percentages, means and standard deviations (SD). Associations between maternal socioeconomic variables and birthweight of babies were assessed using univariate analysis. Differences in mean birthweight of babies according to their maternal age were evaluated using one-way analysis of variance ANOVA, and statistical significance was achieved at  $P < 0.05$ . Tables were used for presenting data.

**Ethical Considerations:** The study protocol was reviewed and authorised by the Medical Research and Ethics Committee of the UMTH. The approval was based on the agreement that patient anonymity must be maintained, best clinical practice should be ensured, and that the information obtained from the respondents would be treated with utmost confidentiality and used for the purpose of this research only. All the work was performed according to the

international guidelines for human experimentation in clinical research (9).

## RESULTS

One hundred and twenty four mother-baby pairs were enrolled in this study. There were 66 (53.2%) male and 58 (46.8%) female babies. The male to female ratio was approximately 1.13:1. The majority of the babies, 104 (83.9%), had birthweight within the normal range (Table 1) whilst the mean birthweight of the babies was  $3.05 \pm 0.57$  (95% CI, 2.95 – 3.15) kg.

Table 1: Birth weight profile of the 124 babies

BW (kg)	Frequency	Percentage (%)
LBW	16	12.9
NBW	104	83.9
Macrosomic	4	3.2
Total	124	100

*BW= Birth weight, LBW= Low birth weight, NBW= Normal birth weight*

Fifty-four (43.6%) mothers had secondary school education, while 68 (54.8%) were unemployed (Table 2). The association between birthweight, maternal education and occupation obtained using univariate analysis was not significant ( $F = 2.163$ ,  $p = 0.120$ ) for education and ( $F = 1.825$ ,  $p = 0.166$ ) for occupation.

Table 2: Socioeconomic variables of mothers that formed the study population

Maternal variables	Frequency	Percentage
<b>Education</b>		
Class I: University graduate or equivalent	7	5.7
Class II: School certificate (GCE/SSCE)	54	43.5
Class III: Grade II teachers' certificate	22	17.7
Class IV: Primary education certificates	26	21
Class V: Those without western education	15	12.1
<b>Total</b>	124	100
<b>Maternal occupation</b>		
Class I: Senior public servants, professionals	5	4
Class II: Intermediate public servants, senior teachers	9	7.3
Class III: Junior school teachers, drivers and artisans.	14	11.3
Class IV: Petty traders, labourers, messengers	28	22.6
Class V: Unemployed, students, farmers	68	54.8
<b>Total</b>	124	100

The mean maternal age was 23.60 (5.2) 95% CI, (22.68 – 24.52) years. Table 3 shows

birthweight of babies according to their maternal age. The difference in the mean birthweight of

babies according to increasing maternal age calculated using ANOVA was not significant ( $F = 1.35, p = 0.255$ ).

Table 3: Maternal age and birthweight distribution of babies

Maternal age (years)	Birthweight of babies (kg)	
	Mean (SD)	95 CI
17-21	3.11 (0.52)	2.99 – 3.25
22-26	3.12 (0.63)	<b>2.87 - 3.38</b>
27-31	2.82 (0.61)	2.54 – 3.09
32-36	2.91 (0.57)	2.52 – 3.29
37-41	3.05 (0.54)	2.18 – 3.92

$F = 1.35, p = 0.255$

## DISCUSSION

Maternal age, irrespective of socioeconomic variables, was not associated with LBW of babies in present study. This Finding is consistent with the finding of a study conducted by Sheeder et al, (13) in Denver, Colorado, USA. In contrast, other investigators have reported links between rising maternal age and LBW among black mothers irrespective of socioeconomic variables in a predominantly white community (14). Factors other than maternal weathering effect could have accounted for this phenomenon, since LBW was only seen among black mothers, even if they had affluence from the white population in that neighborhood. Moreover, it has been demonstrated that some psychosocial stressors such as racial bias, token stress and role overload can also lead to LBW among individuals who are exposed to these stressors (2). In many affluent neighborhoods having predominantly white population, stressors directly related to perceived or actual racial discrimination may persist despite the neighborhood economic environment (2, 15). The impact of perceived racism has recently been shown to be stronger in neighborhoods where blacks comprise a racial minority within a community made up mostly of whites (16). Poverty is more likely to be found among women having low socioeconomic factors, and this might be responsible for maternal weathering with increasing age among others. The effects of low socioeconomic factors on maternal weathering starts at the time of

conception through low physiologic reserves, inadequate medical care, poor diet, increased exposure to toxic agents and high risk of infectious diseases (3-5). Since maternal weathering effects have been found more in mothers that have low socioeconomic variables, maternal education and occupation were used as socioeconomic factors. However, no significant effect was demonstrated on birth weight by maternal socioeconomic variables in this study. Most babies included in our study population had normal birthweight outcomes, while several studies have shown different results on birthweight outcomes of babies relative to maternal socioeconomic factors (1, 17). The inconsistencies of these findings may be due to many indices that are being used for socioeconomic variables. Attempts to measure socioeconomic variables have been difficult to make, for instance, occupational class, household income and wealth, type of housing, education, behavior mode, marital status and social origins have been used (4). Identifying all these socioeconomic variables can be difficult; as such different authors generated different proxy socioeconomic variables for their studies. For example, one study found out no association between LBW and household socioeconomic status (18). Another study, which used wealth and occupation as maternal socioeconomic factors, discovered that poor and unemployed mothers gave birth to babies with high number of LBW (1).

We were not able to demonstrate LBW in babies as a result of maternal weathering effects possibly because the majority of the mothers who participated in this study were in their twenties. More so, it is expected that mothers at this age can have more physiologic reserve compared to older mothers. This is because mothers in the latter category are more likely to be multiparous, which has a depleting effect on their nutrient store. Only 12.1% of the mothers in this study had no western education, others had one form of education or the other and the majority had secondary school education. This could have exposed them to information on the importance of prenatal health care coupled with personal and environmental cleanliness, which has been found to reduce the toll of infectious diseases (4). These practices, therefore, may

lower the possibility of mothers giving birth to LBW babies (4).

Unfortunately, data constraint limited this study because maternal age was skewed in favor of those who were at their third decades and below. It could have been better to compare effects of maternal weathering on babies' birthweight using equal sample size among different maternal strata ranging from adolescents to advanced maternal age. This could have improved the power of observation and statistical outcome.

To sum up, maternal weathering was not associated with LBW outcome in this study. This suggests that mothers who become pregnant in their late reproductive life may not encounter a high risk of delivering babies with LBW. Therefore, we recommend future research incorporating this issue.

#### ACKNOWLEDGEMENTS

We would like to thank Dr. Njidda Sajo and Dr. Malgwi Esther for their insightful and constructive comments.

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