

## Effect of Maternal Indices on Fetal Outcomes in a Primary Health Care Centre

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**Abstract:** It is well known that perinatal and neonatal morbidity and mortality rates are functions of birth weight. In the present study, the effects of maternal indices on the fetal outcome were investigated. A total of Two hundred consenting pregnant mothers who delivered between 2007-2010 in a primary Health Care centre in Delta State, Nigeria were recruited for the study. Those who had chronic ailments or pregnancy complications were excluded from this study. The data collected includes maternal weight, maternal age, gestational age, sex of baby. The result shows a significant ( $p < 0.05$ ) relationship between the mean maternal weight, mean maternal age and mean gestational age with the mean birth weight and also a non significant relationship between the sex of babies with birth weight and gestational length. Therefore, it is advocated that special attention should be given to pregnant women during antenatal care/prenatal care in order to minimize or eliminate the complications associated with low birth weight delivery.

**Key words:** Fetal outcome, low birth weight, maternal indices

### INTRODUCTION

On the average, worldwide incidence of Low Birth Weight (LBW) is 17% per year, making LBW an important infant health problem especially in developing countries (Goldenberg *et al.*, 1998). The incidence of LBW varies among countries; it is much higher in developing countries depending on the geographical region (Coriasoto and Bobadilla, 1998). In addition to its impact on infant mortality, LBW has been associated with higher probabilities of infections, malnutrition and handicapping conditions during childhood, including cerebral palsy, mental deficiencies and problems related to behaviour and learning during childhood (Berkowitz, 1998).

Children who survive LBW have a higher incidence of disease, retardation in cognitive development and undernourishment. There is also evidence that LBW or its determinant factors are associated with a predisposition to higher rates of diabetes, cardiac diseases and future chronic health problems (Barker, 2001). Several studies have shown different results on whether socioeconomic factors affect pregnancy outcomes and newborn conditions (Kramer, 1987). Low maternal weight before pregnancy and small weight gain during pregnancy has been shown to be associated with higher risks of preterm infants and LBW (Bloomfield *et al.*, 2003). The biological processes that affect the fetus in utero are related to the mother's physiology including her nutrition (mother's weight before pregnancy and history of having newborns with LBW), exercise, infections and consumption of tobacco, alcohol and other drugs (Lynch and Kaplan, 2000).

Birth weight as a function of gestational age was introduced in the 1960s as a method to distinguish morbidity/mortality risk of low birth weight babies. Birth weight is the mass of a baby, it has direct links with gestational age at which the child was born and can be estimated (WHO, 1995)

Birth weight and gestational age are two very important determinants not only of disability and death among newborn infant but also of their subsequent health among well being (Kierans *et al.*, 2004). The birth of an infant is dependent on the duration of the pregnancy and its rate of fetal growth. It is a strong indicator of maternal health and nutritional status. The causes of LBW are multifactorial (Kamaladoss *et al.*, 1992): it is associated with sex of baby (Oni, 1986; Kramar, 1987; Pakrasi *et al.*, 1985), maternal hemoglobin level during pregnancy, hard manual labour (Ghosh *et al.*, 1977), maternal nutrition (Fedrick and Adelstein, 1978), economic condition (Pakrasi *et al.*, 1985; Dhall and Bagga, 1995), maternal height, antenatal care (Kamaladoss *et al.*, 1992; Rehan, 1982), parents education (Makhija and Murthy, 1990), maternal weight (Mavalankar *et al.*, 1994), tobacco consumption (Varma *et al.*, 1983), place of residence (Makhija *et al.*, 1989), season of the year, ethnicity (Bantje, 1983), and most importantly mother's age and parity (Cramer, 1995).

Low birth weight increases the risk of developing type II diabetes mellitus later in life (Kramer *et al.*, 1988). Birth weight charts can be used to identify infants who exhibit accelerated or retarded intrauterine growth compared with other infants in the same population. They are useful for evaluating nutritional status and postnatal growth (Joseph *et al.*, 2005). Weight is more variable than

length and depends more on the maternal environment than on the hereditary factors of the child. At birth, a full term baby weighs an average of about 3.4 kg, within a range of about 2.7-4.5 kg (Robertson, 1999). Full term females are on the average of about 140 g lighter than full term males and a twin weighs 680 g less than a single baby (Kramer *et al.*, 1988).

There is evidence; those women who smoke during pregnancy are more liable to have smaller or low birth weight babies than those who do not (Luepker *et al.*, 1994). Low birth weight and small size at birth have been related to raise blood pressure in both childhood and adult life and reports shows lower arterial compliance in middle aged adult who were small at birth, also infants with lower gestational age appear less active than normal (Breslau, 1995).

Many studies have shown that low birth weight babies that are less than 2.5 kg have deficits in average intelligence test scores at school, and within the low birth weight range, children who are smaller at birth have larger deficit than those closer to normal birth weight, the effect seems to be similar to both performance and verbal IQ (Breslau, 1995). Evidence shows that association between Intelligence Quotient (IQ) and birth weight continues well into the normal range of birth weight (Richards *et al.*, 2001). A recent report noted sex differences in the relation of body measurement at birth to coronary artery disease in adult life (Forsen *et al.*, 1999). It has been postulated that sex differences in fetal growth rates with growth generally being slower among girls could lead to different responses to fetal under nutrition (Hutchinson, 1997). Hormonally mediated sex difference in prenatal brain development could also play a role (Forsen *et al.*, 1999). Low birth weight is associated with an increased risk of adult Coronary Heart Disease (CHD) and the related disorders insulin resistance, type II diabetes and metabolic syndrome (Barker, 2001).

Tested hypothesis from intergenerational data examined disease outcome in men and women in relation to the birth weight of their children. Diabetes in fathers, for example is associated with lower offspring birth weight (Lindsay *et al.*, 2000). The opposite is true for diabetic mothers because gestational diabetes causes fetal macrosomia (McCance *et al.*, 1994). However, lower offspring birth weight is associated with cardiovascular disease and insulin resistance in both parents (Wannathee *et al.*, 1990).

The aim of this present study, therefore, is to investigate the effects of maternal indices (maternal age, weight, gestational age) on fetal outcome.

## MATERIALS AND METHODS

**Study area:** This Cross-sectional Retrospective study was carried out in Obiaruku (Catholic Hospital), one of the

populated town in Delta State, in the Midwestern part of Nigeria. Obiaruku is the headquarter of Ukwuani Local Government Area and has a population of about 120, 390 in which there is a male population of 59, 162 and female population of 61, 228 (NPC, 2006).

**Study population, data collection:** The population of the study comprises of Two hundred (200) consenting women, who delivered in the hospital between the months of June 2007 to November 2010. Women with pregnancy induced hypertension, diabetes mellitus, parity greater than four, renal disease, smokers and other chronic ailments e.g., sickle cell, and asthma were excluded from this study. Maternal age, weight, birth weight and gestational age of the babies' were collected for this study; among the data collected were 95 males and 105 female babies.

**Data analysis:** All the data collected were recorded as mean±standard deviation (SD), analyzed using simple linear correlation test and t - test, the SPSS computer software (version 15) was used, and the level of significance was considered at  $p < 0.05$ . Data presentation was done using suitable tables.

## RESULTS

In relating the maternal weight and birth weight, maternal weight has effect on birth weight. The computed t-calculated value is greater than t-critical value, ( $p < 0.05$ ). Hence there is significant difference (Table 1).

In Table 2, shows the relationship between maternal age and birth weight. Maternal age has effect on birth weight. The computed t-calculated is greater than the t-critical value. Hence, there is significant difference ( $p < 0.05$ ) between maternal age and birth weight.

Table 3 shows the effect of gestational age on birth weight. The gestational age was found to have effect on

Table 1: Relationship between maternal weight and birth weight of babies

Maternal weight mean±standard deviation (Kg)	68.52±9.3
Birth weight mean±standard deviation (kg)	2.97±1.0
No.	200
Decision	Has significant effect
T-cal	0.344
T-critical value	0.142
d.f	180
Decision	Has effect

Table 2: Relationship between maternal age and birth weight of babies

Maternal age mean±standard deviation (years)	27.91±8.4
Birth weight mean±standard deviation (Kg)	2.97±1.0
No.	200
Decision	Significant effect
T-cal	0.145
T-critical value	0.0070
d.f	180
Decision	Significant effect

Table 3: Relationship between gestational age and birth weight

Gestational age mean±standard deviation (weeks)	37.1±2.09
Birth weight mean±standard deviation	2.97±1.0
No.	200
Decision	Significant effect
T-cal	0.142
T-critical value	0.112
d.f	180
Decision	significant effect

Table 4: Relationship between sex and birth weight

Female & male weight		T-cal	T-critical	df	Decision
mean ± S.D (Kg)					
Male	3.1±0.428	0.945	1.972	198	p>0.05
Female	3.0±0.986				

Table 5: Relationship between male gestational length and female gestational length

Female & Male gestational length (weeks)		T-cal	T-critical	df	Decision
mean ± S.D					
Male	37.26±1.59	-0.044	1.972	198	p>0.05
Female	37.25±1.19				

the birth weight. Analysis shows that the value in t-calculated was greater than the t-critical value. Hence, there was significant difference (p<0.05) between gestational age and birth weight.

Sex has no effect on birth weight, the male baby weight and female baby mean±S.D weight is 3.1±0.428 and 3.0±0.986 respectively, their differences is 0.1 which resulted in a t-calculated value of 0.945 with a t-critical value of 1.972. No significant difference (p>0.05) was observed (Table 4).

Table 5, Male and female gestational length comparison had no significant difference (p>0.05) after their mean±S.D. showed 37.26±1.59 and 37.25±1.19 respectively with their mean difference at 0.01 which resulted to t-calculated value of -0.044 with t-critical value of 1.972.

### DISCUSSION

From the present study (Table I), it was observed that maternal weight has statistically significant (p<0.05) effect on birth weight. This finding is in line with Bloomfield *et al.* (2003) and Mavalankar *et al.* (1994) who reported low maternal weight before pregnancy and small weight gain during pregnancy is associated with higher risk of preterm infant and low birth weight.

Also, maternal age was observed to have a significant (p<0.05) effect on birth weight in this study, This is similar to the report of Kierans *et al.* (2004) and Bantje (1983) who reported that birth weight is significantly associated with sex of the child, maternal age and parity of the mother. Gestational age also showed a significant difference (p<0.05) with birth weight, this finding is contrary to the report of Kramer (1987), that reported that gestational age has no relevance to birth weight, length and any other measurement of neonatal size.

Additionally, the sex of the baby has no significant relationship with birth weight and length of gestation as observed in this research but this contrary to an earlier report by Kierans *et al.* (2004) who posited that birth weight is significantly associated with the sex of the child. This research has been able to clarify some controversies that existed previously about effects of maternal indices on fetal anthropometries.

### CONCLUSION

The present research has been able to resolve the controversies that existed on the relationship between maternal weight, maternal age, gestational age and birth weight, and on relationship between sex of baby and birth weight or gestational length. This therefore needs to be applied in determining pregnant mothers that will need closer monitoring for a better fetal outcome.

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