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MATERNAL SOCIO-DEMOGRAPHIC CHARACTERISTICS AND BIRTH OUTCOMES IN ABUTH SHIKA, ZARIA

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ABSTRACT

Low birth weight and other birth outcomes are indicators of both present and future morbidity and mortality of every child. The relationship between socio-demographic characteristics of pregnant women and the birth outcomes in ABUTH Shika, Zaria was evaluated in this study. A cross-sectional comparative study involving 103 subjects that had live, singleton births within a 28- 42 weeks' gestation period was carried out. The incidence of babies born with Low birth weight was 21.4%. Their Maternal socio-demographic characteristics were assessed. The socio-demographic characteristics of the pregnant women in ABUTH Shika, Zaria revealed that 90.29% of the pregnant women were between the age range of 15-34 years, 25.24% had no formal education, 43.68% were full time house wives and 21.36% of them earned less than the minimum wage monthly income. Their nutritional status distribution using MUAC revealed that 0% were severely malnourished 14.6% were moderately malnourished while 85.4% were normal. Correlating socio-demographic characteristics with birth outcome; the household income had a significant association with birth outcome (χ^2=37.694, p=0.000) those with lower income were more prone to low birth outcome compared to those with higher income. Strong significant correlation was found between maternal height, weight measurements and MUAC with the birth weight of neonates (r=0.690 p=0.000, r=0.593 p=0.003, and r=0.489, p=0.000) respectively. This study has established that socio-demographic characteristics of pregnant women are major contributors to their birth outcome. Therefore, this study recommends urgent public health interventions that will reduce the incidence of low birth weight through awareness and other programs that will improve both maternal and child health.

Keywords: Pregnant-women, maternal-socio-demographic, New-born, Weight, Height/Length, birth outcome, low birth weight (LBW).

INTRODUCTION

In the past few decades, the world has experienced an appreciable decline in the burden of child mortality rate partly because of intervention programs within the frame work of the Millennium Development Goals (MDGs) (He *et al.*, 2018). Despite this progress in terms of total child mortality, the prevalence of neonatal mortality is still on the rise (38% in 2000 as against 45% in 2015), which posed significant barriers to the fulfillment of the MDGs (Wardlaw *et al*., 2014). Globally, preterm birth, severe infections, and asphyxia, constitute the most important causes of neonatal death (He *et al.*, 2018). However, low birth weight (LBW) is also considered a crucial underlying determinant and contributor to neonatal and infant mortality. Birth outcomes such as low birth weight represents a child's current and future morbidity. Low birth weight (LBW) is defined by the World Health Organization as birth weight of less than 2500 grams. This is based on epidemiological observations that neonatal mortality in infants weighing less than 2500 g was 20 times more than in heavier babies (Sangamam, 2017). Every year 32million babies are born small-for- gestational age (SGA) globally – representing 27% of all births in lower- middle-income countries (Black *et al.*, 2013). The intergenerational transfer of under nutrition begins with the poor nutritional status of women, both before and during pregnancy. Although it is a normal physiological process, pregnancy is a time when the nutritional needs of the mother, and the foetus must be met through careful choice of foods. The increased nutritional demand during pregnancy is not only aimed at supporting both maternal and foetal metabolism, but also for foetal and placental growth (Kominiarek, and Rajan, 2016). Pregnancy

outcomes ranks among the pressing reproductive health problems in the world (Demissie, and Kogi-Makau, 2017).

Malnutrition represents a situation of nutritional imbalance consisting of undernutrition (intake of food deficient in macronutrients and sometimes micronutrients) and over nutrition (intake of nutrient poor diet in spite of excess calorie) (Adinma *et al.,* 2017). Pregnancy places a lot of physiologic, metabolic, and nutritional demands on the woman. Consequently, if optimal nutritional needs are not met, morbidity and even mortality can occur for both the mother and her foetus. The pregnant woman, therefore, needs to have a dietary intake sufficient to provide energy and nutrients for the mother as well as foetus (Adinma *et al.,* 2017). The status of maternal, and foetal mortality in Nigeria may be threatening, and calls for serious attention. Health-care providers, and policy makers need information about the state of maternal and child health especially of neonates, in order to plan counseling and behavioral interventions for pregnant women.

According to report by NDHS (2013), the incidence of low birth weight across the regions of Nigeria reveals that North-West has the highest incidence with (27.2%), followed by North-East (13.6 %), South-South (11.6 %), North- Central is (7.5%), South-East (4.3%), while South –West has the lowest, (3.4%). In Nigeria, malnutrition is prevalent because fertility rates are high, and women enter child bearing at an early age and therefore giving birth to many children (NBS, 2018). The increased population by this high birth rate increases competition for both the quality and quantity of foods available for consumption. Food security is threatened when a population grows without a corresponding increase in food production. The importance of maternal nutrition to foetal development, and birth outcomes may have been demonstrated in experimental animal studies, the findings from human studies are much less consistent due to secondary factors that vary from study to study (Sommer *et al.,* 2013). In Nigeria the neonatal mortality rate is 37 deaths per 1,000 live births, the post neonatal mortality rate is 31 deaths per 1,000 live births and the prenatal mortality rate is 41 per 1,000 pregnancies (NDHS, 2013 and UNAIDS 2019).

Nutrition is a modifiable risk factor that must be addressed as part of infant mortality efforts (Bhutta *et al.,* 2013). While nutrition may not be the only factor in infant mortality reduction, it is part of a complex whole of interventions necessary to make a sustained difference. The Sustainable Development Goals cannot be achieved without improving maternal and child nutrition (Baye, 2017). Without adequate and sustained investments in good nutrition the SDGs will not be realized.

From conception to birth, all parts of the infant (bones, muscles, organs, blood cells, skin, and other tissues) are made from nutrients in the foods the mother eats. For most women, nutrient needs during pregnancy and lactation are higher than at any other time. Therefore, to meet the high nutrient demands of pregnancy, a woman will need to make careful food choices, but her body will also help by maximizing absorption, and minimizing losses.

Anthropometric assessment

Anthropometry refers to the measurement of body size, weight, and proportions. Common anthropometric measurements include weight, height, Mid upper arm circumference (MUAC), head circumference and skin fold (Shapiro *et al.,* 2017). Weight is usually the first in anthropometric assessment and is a pre-requisite for finding weight-for-height z-score (WHZ) for children and body mass index (BMI) for adults (Corgill, 2003). MUAC has been found to be a reliable alternative indicator to women at risk of poor pregnancy outcome especially when there is no pregnancy BMI (WHO & UNICEF, 2019).

Factors that affects nutritional status such as food choices, are highly sensitive to price and dietary diversity, including micronutrients and protein-rich foods being usually the first to be dropped from the diet because they are usually more expensive. Presently the world has a crisis of hike in food prices and this affects access to food. Socio-economic factors affect both the quality and quantity of food consumed.

Education provides the pregnant woman with both the knowledge and the resources to make good food choices. Illiteracy on the other hand, has a negative effect on both the quality and quantity of food that is considered adequate for a pregnant woman.

The appropriate age range for a woman to conceive without much risk of undesirable birth outcome is 20-35 years. Any age outside this (20-35 years) increases the risk of poor pregnancy outcomes like

preterm, low birth weight, small for gestational age and high neonatal mortality (Steward *et al*., 2007).

MATERIALS AND METHODS

ABUTH is located at Shika, Zaria which is a major city in Kaduna state in northern Nigeria. It is a major referral hospital that receives patients both within and outside the state. The hospital is located along Sokoto road in Samaru Zaria. The city of Zaria is located at a latitude 11.09 and longitude of 7.72 and is situated at 641 meters above sea level. The population is estimated at 549,400 (NBS 2018), with an economy predominantly based on agriculture.

Study Population

Subjects include pregnant women who attended ANC at ABUTH, Shika Zaria. The women who were at their third trimester and willing to participate in the study after getting information about the study were recruited.

Study Design

This was a descriptive cross sectional health facility based study.

Sample Size.

The sample size was calculated using the formula shown below:

$$n = \frac{Z^2 p (1-p)}{d^2}$$

Where:

n: required sample size

z: standard normal distribution at 95% confidence limit=1.96

p: (7%) prevalence of Nigerian women of reproductive age in the north west region reported to be malnourished (NBS, 2014)

d: absolute desired precision of 5%

The minimum calculated sample size was 100 clients (mother-baby pairs). For more accuracy the sample size was increased to 113 clients, but 103 clients completed the study.

Sampling Technique

Systematic sampling technique was used to recruit the subjects during their ANC clinic sessions. The inclusion criteria were strictly considered and eligible subjects were selected.

Inclusion Criteria

All singleton pregnant women in their third trimester attending antenatal clinic at ABUTH that did not have medical illnesses.

Exclusion Criteria

Pregnant women attending ABUTH who were sick, those at the first and second trimester and those with multiple pregnancies were excluded from the study.

Informed Consent

Informed consent was sought from all pregnant women in their third trimester using the standard protocol.

Ethical Considerations

Ethical clearance was obtained from the Health Research Ethics committee in ABUTH Shika, Zaria.

Data collection

Maternal anthropometry was obtained through weight, height and mid-upper arm circumference (MUAC) as described by Corgill (2003). The maternal weight (Kg) record in the third trimester was measured to the nearest 0.1kg using a UNICEF seca weighing scale. Each pregnant woman was weighed bare footed with minimal clothing. Height was measured (cm) using a stadiometer. the measuring device was checked for accuracy using a standard 2m steel tape. Subjects were measured to the nearest 0.1cm with minimal clothing and bare feet. Each subject was asked to stand straight, arms hanging loosely to the side, feet together and with heels, buttocks and shoulder blades in contact with the vertical surface of the stadiometer. MUAC (mid upper arm circumference) was measured to the nearest 0.1cm using a non stretched MUAC tape. The tape measures the circumference of the upper arm at the midpoint from the shoulder to the tip of the elbow when the left hand is held at right angle (90^o).

Neonatal Nutritional status

Neonatal nutritional status through weight, head circumference was assessed using methods as described by Fareeha *et al.* (2014) and values where compared with WHO (2020) Z-score standard using anthro software version 14. Weight was measured using a digital weighing scale that had a pan were the babies were placed before the values are recorded to the nearest 0.01kg.

The length of babies was measured by laying the baby face upwards on a measuring board, and moving another board up to and resting against the child's heels with the legs straight. head circumference was measured to the nearest 0.1cm with a flexible non stretch tape laid over the supraorbital ridges and the part of the occiput which gives maximum circumference.

Maternal Socio-demographic information was collected by the use of semi-structured questionnaire. The questionnaires were administered by the researcher and three nurses (that functioned as research assistants). The research assistants were trained by the researcher. All literate and English speaking participants were given the questionnaire for their response to participate in the research while non-literate participants had the questions translated to them in interview format by trained research assistants. Probing questions where used to help the respondent remember all the foods they consumed the previous day or week.

Statistical Analysis

Data analysis was carried out using statistical package for social sciences (IBM SPSS) software version 20.0. Results is presented as mean ± SD except where otherwise stated. Socio-demographic characteristics is presented as frequencies and percentages (descriptive statistics). Z-score calculation for nutritional status was analyzed using anthro software version 14. Chi-square was used to determine the relationship between dietary pattern and the birth weight. P values less than 0.05 ($p<0.05$) were taken as significant.

RESULTS

A total of 113 questionnaires were distributed and 103 were retrieved for analysis, giving a response rate of 91.2%. Sex distribution among the babies was 56 females and 47 males of which 78 of them were born through vaginal delivery while 25 by caesarean section.

Socio-demographic Characteristics of the Pregnant Women Attending Antenatal Clinic at ABUTH Shika.

The mean age was found to be 23.38±8.20 years and their ages ranges from 15 - 44years. Majority of the women (27.19%) fell within the age range of 25-29 years' age group. There were many (23.3%) underage mothers (15-19 years) that participated in the study. In terms of educational attainment, 42.72% had primary school education followed by those with no formal education (25.24%). Those with secondary and tertiary education were 19.42% and 12.62% respectively. Distribution of the women based on household monthly income showed that 59.22% of them had monthly household income in the range of N18,000 - N35,999. In terms of maternal parity majority of the mothers (54.36%) had two babies that are alive.

Table 1: Socio-demographic Characteristics of the Respondents Attending Antenatal Clinic at ABUTH Shika.

Characteristics	Frequency (n=103)	Percentage (%)
Age(years*)*		
15-19	24	23.3
20-24	25	24.27
25-29	28	27.19
30-34	16	15.53
35-39	6	5.83
40-44	4	3.88
Mean ± SD (23.38±8.20)		
Education		
No formal education	26	25.24
Primary school	44	42.72
Secondary	20	19.42
Tertiary	13	12.62
Occupation		
Full time H/wife	45	43.68
Farming	9	8.74
Trader/ hawking	18	17.48
Civil servant	7	6.80
Others (Driver, carpenter e.t .c.)	24	23.30
Household monthly income(USD)		
<N18,000 ($50)	22	21.36
N18,000 - N35,999 ($50-$99.99)	61	59.22
N36,000 - N53,999 ($100- $149.99)	13	12.62
≥N54,000 ($150)	7	6.80
Maternal parity		
1	20	19.42
2	56	54.36
3	16	15.53
≥4	11	10.67

Relationship Between Maternal Socio-demographic Characteristics and Birth Weight.
Table 2; below shows the relationship between maternal age, household monthly income, educational attainment and parity with birth weight of babies. Among the socio-demographic characteristics, age, household monthly income and maternal parity showed a significant association with birth weight of babies.

Table 2: Relationship Between Maternal Socio-demographic Characteristics and Birth Weight

n =103	Normal (> or = 2.5kg)	Underweight (< 2.5kg)	Incidence of LBW newborns %	Chi-square	P-value
Age (years)				33.897	0.000*
15-19	17(70.8%)	7(29.2%)	6.80		
20-24	19 (76.0%)	6(24.0%)	5.83		
25-29	23(82.1%)	5(17.9%)	4.85		
30-34	15(93.8%)	1 (6.2%)	0.97		
35-39	4(66.7%)	2(33.3%)	1.94		
40-44	3 (75.0%)	1 (25.0%)	0.97		
Household income (Naira)				37.694	0.000*
<N18,000($50)	7(31.8%)	15(68.2%)	14.56		
18,000-35,999($50-$99.99)	54(88.5%)	7(11.5%)	6.80		
36,000–53,999($100-$149.99)	13 (100.0%)	0 (0.0%)	0.00		
> 54,000($150)	7 (100.0%)	0 (0.0%)	0.00		
Education				6.294	0.098
No education	17 (65.4%)	9 (34.6%)	8.74		
Primary	35 (79.5%)	9(20.5%)	8.74		
Secondary	16 (80.0%)	4(20.0%)	3.88		
Tertiary	13 (100.0%)	0 (0.0%)	0.00		
Maternal Parity				51.62	0.000*
1	8 (40%)	12 (60%)	11.65		
2	48 (85.71%)	8 (14.29%)	7.77		
3	14 (87.5%)	2 (12.5%)	1.94		
>4	11 (100.0%)	0 (0.0%)	0.00		

*Significant ($p<0.05$)

Relationship Between Maternal Anthropometric Indices and Birth Outcomes (Birth weight, head circumference, weight for height z-score, length for age-z-score, weight for age z-score)

Table 3 below shows the association between maternal anthropometric indices such as height, weight, MUAC, body mass index (BMI) and birth outcomes. The study findings showed a strong significant ($p<0.05$) positive relationship between the new born birth weight and maternal anthropometric indices such as MUAC($r=0.489$), weight ($r=0.593$) and height ($r=0.690$). There was also a strong significant ($p<0.05$) negative correlation between the newborn head circumference and maternal anthropometric parameters such as height ($r= -0.548$) and MUAC ($r= -0.413$).

Table 3: Relationship Between Maternal Anthropometric Indices and Birth Outcomes

Variables	N	Height		Weight		MUAC		BMI	
		R	P	R	P	R	p	R	p
Birth weight	103	0.690**	0.000	0.593**	0.003	0.489**	0.000	0.194*	0.050
Head circumference	103	-0.548**	0.000	-0.150	0.130	-0.413**	0.000	-0.078	0.434
Weight for height z score	103	0.028	0.780	0.084	0.401	-0.133	0.181	0.075	0.449
Length for age z score	103	-0.061	0.540	-0.023	0.815	0.029	0.769	-0.005	0.957
Weight for age z score	103	-0.021	0.825	-0.026	0.792	-0.033	0.741	-0.019	0.849

*. Correlation is significant at the 0.05 level (2-tailed); **. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

The study findings showed that in terms of maternal educational attainment, most of the low birth weight babies were delivered by mothers without formal education and those with primary school education. This work didn't find a significant relationship between maternal education, and birth weight, this is probably due to the involvement of other factors (physiological, genetical, age etc.) that had an impact on birth weight. The socioeconomic status of husbands can affect the nutritional status of the mothers and hence the birth weight of their babies. This finding was not in agreement with the outcome of studies by Auger *et al.* (2008) that revealed that maternal educational level influences food choices and has effect on birth outcome.

The present study also showed that the relationship between household monthly income, and birth weight was significant. This is consistent with study by Toledano *et al.* (2013) that found a significant relationship between parent's income, and birth weight. Poor socio-economic status is one of the major contributing factors that influence neonatal mortality. Low income adversely affects food and nutritional security, thus increasing the risk for poor pregnancy outcomes like poor gestational weight gain which can lead to low birth weight babies. Maternal parity showed a significant association with birth weight and this finding is consistent with a study conducted by Shah (2010). It has been hypothesized that the first pregnancy primes the body and with each subsequent pregnancy the body is more efficient in terms of delivering babies with better birth weight (Hinkle *et al.*, 2014).

This study also showed a significant relationship between maternal age and birth weight which is in agreement with a study conducted by Aparna (2013). An underage mother may deliver a low birth weight baby due to an underdeveloped pelvis because their bodies are still growing and changing. An underage mother is undergoing dual growth processes (her own body, and that of the foetus). This simultaneous growth (mother and foetus) may lead to competition on nutrients to meet up with the increased demand and hence she is more likely to give birth to a low birth weight baby.

There was a strong relationship between the MUAC of pregnant women, and birth weight, a result that is consistent with studies that monitored the association between low maternal MUAC ranges, and infant low birth weight (Mohanty *et al.*, 2005, Kayode e*t al.*, 2014 and Ververs *et al.*, 2013) all of which found similar results.

The incidence of low birth weight in ABUTH, Shika based on this study was 21.4%. Although the incidence (21.4%) of low birth weight recorded in this study was lower than the 27% in the North west zone of Nigeria as reported by NDHS (2013), more effort needs to be channeled towards reducing the incidence. Furthermore, the lower incidence in the present study suggests a reduction in the prevalence of low birth weight deliveries in that region, possibly due to the growing economic strength of the population and / or increased awareness of the need

to prevent low birth weight deliveries through the scale up of the primary health care activities in the locality.

Maternal anthropometric indices such as height, weight, and MUAC, showed a strong positively significant correlation with the birth weight of babies. This finding is in agreement with a study by Mohanty *et al.* (2005) which also showed a strong correlation between maternal anthropometry with birth outcomes. The present study also showed a strong negative correlation between the head circumference of the babies with maternal height, and MUAC. This finding didn't conform to studies from various countries including India which corroborated the utility of head, and chest circumference as a valuable substitute for birth weight (Rani, *et al*., 2017).

CONCLUSION

The pregnant women that participated in this study were mostly within the appropriate age range although 23.3% were under age. This study has established that socio-demographic characteristics of pregnant women are major contributors to their birth outcome. Most of the pregnant women were found to be of good nutritional status based on their anthropometric measurement.

The study also found the incidence of low birth weight in pregnant women attending ANC at ABUTH Shika, Zaria to be 21.4%. Although the incidence of low birth weight reported in this study is slightly lower than the value reported by NDHS (2013), it is still above the global incidence of 15.5% (Sharma *et al.,* 2015). This is a disturbing trend that needs immediate redress in order to close the gap with the developed world. Maternal socio-demographic characteristics showed a significant association with birth weight.

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