FACTORS INFLUENCING DELIVERY OF LOW BIRTH WEIGHT BABIES IN A SECONDARY HEALTH FACILITY AND MISSION HOME IN IBADAN.

BY

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CERTIFICATION

I, the undersigned supervisor certify that the project titled " Relationship between maternal socio-demographic characteristics and birth weight at a secondary health facility and mission home in Ibadan" was duly carried out and also meets the regulations governing the award of the degree of M.Sc. Epidemiology of the University of Ibadan. This project was duly supervised and is therefore approved for the contribution to knowledge.

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Sign & Date

DEDICATION

This project is dedicated to the ALMIGHTY GOD, who has always been my help at all times, to my parents; Barrister & Mrs. A.S. Shittu who contributed morally and financially to the success of my academic career, and to my dear husband "Oladipupo Johnson Opeseitan" who gave me the support and opportunity to run this programme.

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LIST OF ABBREVIATIONS

ANC: Antenatal care

LBW: Low Birth Weight

NBW: Normal birth weight

NDHS: National Demographic Health Survey

UNICEF: United Nations Children Fund.

WHO: World Health Organization

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ABSTRACT

Low birth weight is an important factor that affects neonatal mortality. It is also a significant determinant of post-neonatal infant mortality and of infant and childhood mortality. Low birth weight (<2,500g) is of clinical and epidemiological significance and a target for public health intervention. In particular, considerable attention has been focused on the causal determinants of low birth weight, and especially to identify potentially modifiable factors.

The main objective of this study was to determine the relationship between maternal socio-demographic characteristics and birth weight at a secondary health facility and mission homes in Ibadan. A comparative cross-sectional study was conducted amongst two hundred and eighty mothers who just delivered in the secondary health facility and mission homes. An interviewer administered structured questionnaire was used for data collection. The sample was obtained by administering questionnaire to all consecutive mothers delivering babies in the health facilities in order to identify low birth weight babies and normal birth weight babies. All data was analyzed with the use of SPSS version 16. Analysis was considered significant association at $p<0.05$.

The overall prevalence of low birth weight was 13.6%. The prevalence of low birth weight in the mission and secondary health facility was 15.7% and 11.7% respectively. The mean birth weight in the secondary health facility (2.93±0.42kg) was higher than that of the mission house (2.79±0.41kg). Irrespective of the place of delivery, prevalence of low birth weight was comparatively higher among babies delivered by mothers who were ≤25 years, less educated, earned weekly income less than ₦2,500, had less than two years pregnancy interval and gestational week less than thirty-seven weeks ($P<0.05$). Maternal age, education, weekly income, period of ante-natal care registration, inter-pregnancy interval, gestational age were each significantly related to the incidence of low birth weight ($p<0.05$). Place of delivery, parity and birth order were not significantly associated with low birth weight.

Irrespective of place of delivery, maternal age, education, ANC registration, inter-pregnancy interval, gestational age, were factors that were strongly associated with low birth weight. More attention should be given to preventing low birth weight by improving maternal education, discouraging teenage pregnancy, promoting early and regular ANC attendance.

Key words: Low birth weight, antenatal care, inter-pregnancy interval, gestational age.

CHAPTER ONE

INTRODUCTION

1.1 BACK GROUND OF THE STUDY

Birth weight is a reliable index of intrauterine growth retardation (IUGR) and a major factor determining survival, future physical growth and mental development of the child (Ramakutty, et al., 1983). A multifactoral inter-relationship exists between the environments in which pregnant mothers live and the growth of the foetus (Makhija et al., 1989). This relationship has prompted public health personnel to suggest the influence of maternal and social factors as predictors of low birth weight in infants (Carmelo, 2007; Nobile et al., 2007).

Low birth weight is one of the poor outcomes of pregnancy that has caught the attention of the World Health Organization. Low birth weight is defined as the weight at birth of less than 2500g as measured by trained health care professionals at township-level hospitals or higher during the first hour of delivery irrespective of mothers' gestational age (WHO 1992, UNICEF, 2005). A low birth weight (<2500grams) constitutes health risks for children. This is based on epidemiological observation that infants weighing less than 2500 grams are approximately 20 times more likely to die than heavier babies (de Onis et al., 1998). Low birth weight is an important indicator of obstetric, paediatric and maternal care available in a setting. It is a major contributor to overall child mortality and a new borns' chances of survival, growth, long term health and psychosocial development (UNICEF, 2008). Low birth weight is at an unacceptably high level in developing countries, especially in Sub-Saharan Africa. It ranges between 13% to 15%, with little variation across the region as a whole (UNICEF WHO, 2004). Recent estimates show that low birth weight in developed regions of the world is about 7% compared with 16.5%, which is more than double in less developed regions of the world (UNICEF, 2008). More than 20 million infants worldwide representing 15.5% of all births are born with low birth weight, 95.6% of them in developing countries (UNICEF, 2004).

The link between maternal factors and birth outcome is well established (Lawoyin, 1992). Several determinants have been associated with low birth weight. These include maternal smoking, poor diet, and low weight of mothers. Causal socio-economic factors and social factors have also been suggested (Pearl et al., 2001). Substantial changes in the society and medical care

over time have influenced women's reproductive choices about where to deliver, subsequently affecting birth outcome, "low birth weight being one of such outcomes". Aspects influencing the life of pregnant women and consequently intra uterine growth and gestation period are a part of this context. Maternal ages, economic status, exposure to drugs, place of delivery have been suggested as factors that may influence pregnancy outcome in developed economies (Kramer 1987, Victoria et al., 1987).

1.2 PROBLEM STATEMENT

In Nigeria each day, about 2,300 under-five year olds die. These deaths are often associated with the incidence of low birth weight, thus making Nigeria the second largest contributor to under-five mortality in the world (UNICEF, 2008). Nigeria is a low income country, and has experienced a surge in low birth weights over the past few decades. Earlier estimate (in 1999) of low birth weight prevalence in Nigeria was estimated to be about 8.5% in 1999 (Ann Blanc et al., 2005). The figure rose to 14% by the year 2003 (DHS, 2003). The implication of the rising level of low birth weight in Nigeria is that the country may not attain the Millennium Development Goals by year 2015.

The level of low birth weight in a community is influenced by maternal and social factors affecting place of delivery (Samuelson et al., 2002). For instance in Nigeria, only 35% of births are delivered in a health facility (NDHS, 2008) and prevalence of low birth weights is 14% (DHS, 2003) compared with the United States, where 99.3% of live births are delivered in a health facility and prevalence of low birth weight is 8% (UNICEF;WHO, 2004). Therefore, understanding the maternal and social factors that affect birth weight can lead to improved perinatal health outcomes, and ultimately reduce child hood mortality in line with the Millennium Development Goals.

1.3 JUSTIFICATION

Low birth weight rates vary considerably between studies and countries. It ranges from 3.1% to 13.3% (Rodriguez et al., 1995). The United Nations have established as part of the institutional health goals to be reached by 2015, the reduction of low birth weight rates by one third of the current burden (UNICEF, 2002). Previous studies in developed countries have also linked birth weight with mothers education, age at child birth, delivery status, health status, parity and marital

union, fathers education and employment, household income and consumer goods, slum and rural residence(UNICEF,2004; UNICEF, 2008). Very few studies have investigated whether the role of place of delivery is a predictor of low birth weight in developing countries (Samuelson et al., 2002). This study therefore aims to determine if the relationship between maternal socio-demographic characteristics and low birth weight vary by place of delivery. The study compares the prevalence of low birth weight among mothers who deliver in the secondary health facility and mission home, and identify the possible risk factors among the low birth weight babies. It also determines if the results of the study will guide public health and suggest methods to reduce the prevalence of low birth weight.

1.4 BROAD OBJECTIVES

To determine the relationship between maternal factors and birth weight.

SPECIFIC OBJECTIVES

1. To describe socio-demographic characteristics of mothers who delivered low birth weight babies
2. To determine proportion of low birth weight deliveries amongst all mothers interviewed.
3. To compare the prevalence of low birth weight at secondary health facility with prevalence of low birth weight in a mission home
4. To identify maternal and social factors predictive of low birth weight deliveries at secondary health center and mission homes.

RESEARCH QUESTION

1. What are the socio-demographic correlates of mothers delivering low birth weight babies?
2. What is the prevalence of low birth weight babies born at the secondary health facility and babies delivered at the mission homes?
3. Do the relationship between maternal and social characteristics and low birth weight vary by place of delivery?

CHAPTER TWO

LITERATURE REVIEW

2.1 BIRTH WEIGHT

Birth weight is the first weight of the foetus or newborn obtained after birth. For live births, birth weight should (preferably) be measured within the first hour of life, before significant post natal changes occur (WHO, 1992). Many factors affect the duration of gestation and foetal growth, and thus, the birth weight. These factors relate to the infant, the mother or the physical environment. All these play important roles in determining the infant's birth weight and future health (WHO, 2004).

Low birth weight is not a homogenous pregnancy outcome, but instead, conceptually may be composed of infants who are either born too early, (preterm birth), or too small, (with foetal growth restriction). Low birth weight has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500grams (WHO, 1992). Preterm infants are babies born at less than thirty seven weeks (<37 weeks) from the first day of the last menstrual period, regardless of birth weight, where as growth-restricted infants are babies born weighing less than the 10^{th} percentile of birth weight-for-gestational age, regardless of whether that weight is <2500grams. Thus, it is possible for both preterm and growth-restricted infants to weigh >2500 grams (Goldenberg, 2004). This practical cut-off for international comparison is based on epidemiological observations that infants weighing less than 2,500grams are approximately 20 times more likely to die than heavier babies (Kramer, 1987). A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or of restricted foetal (intrauterine) growth (Kramer, 1987). Low birth weight is closely associated with foetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life (Barker, 1992).

2.2 PREVALENCE OF LOW BIRTH WEIGHT

Low birth weight is a public health problem linked to lack of equity in population (Finch, 2003). Despite consistent efforts to improve the quality of maternal child health, and decrease the proportion of new borns with low birth weight, success has been quite limited and the problem

persists in both developing and developed countries (Finch, 2003). More than twenty million low birth weight babies are born every year throughout the world and half of all perinatal and one third of all infant deaths are directly or indirectly related to low birth weight (LBW) (Aurora, 1994). The average global incidence of low birth weight is 17% per year. Thus low birth weight is an important infant health problem in many populations (Goldenberg et al., 1998).The incidence of low birth weight varies between countries, ranging from 4% to 6% in Western countries like Sweden, France, United states and Canada (UNICEF, 2003) and much higher in developing countries. The prevalence of low birth weight lies between 5.8% to 28.3% in Asia and 17.2% to 21.3% of all births in Africa (Lawn et al., 2006). In sub-Saharan Africa, low birth weight levels lie within 13 percent to 15 percent, with little variation across the region as a whole. While a few countries have very high or very low rates, the majority lie between 10 percent and 20 percent (UNICEF, WHO, 2004). In Nigeria, low birth weight accounts for about 14% of the 5.3 million annual deliveries (UNICEF, 2005), and is a principal contributor to neonatal morbidity and mortality (Lawn et al., 2005; Lawoyin, 2001).

2.3 CONSEQUENCES OF LOW BIRTH WEIGHT

De onis et al (1998) found that low birth weight babies, (a reliable index of intra uterine growth retardation babies) are at increased risk of perinatal mortality and morbidity. They also found out that such babies constitute a burden for their government and a source of problem for their families (de onis et al., 1998).In addition to its impact on infant mortality, low birth weight has been associated with higher probabilities of infection, malnutrition and handicapping condition during childhood (Berkowitz et al., 1993). Children who survive low birth weight have a higher incidence of disease and undernourishment. There is also evidence that low birth weight or its determinant factors are associated with a pre disposition to diabetes, cardiac diseases and other future chronic health problems (Barker et al., 2001; Barker, 1994).

Investigators have studied the impact of social and maternal factors on the outcome of pregnancy, particularly on birth weight. This result reveal a significant risk of prematurity and intra uterine growth retardation in low socio-economic status mothers and among those who deliver outside hospitals (Rodriguez et al., 1995; Buka et al., 2003; Fairley et al., 2005; Chen et al., 2007).The role of biological as well as social risk factors on birth weight is well established (Bjerre et al., 1975). Maternal age, parity, marital status, the social class of the parents and place

of delivery are known predictors of birth weight. It has also been argued that there have been changes in the distribution of these factors over recent years, since mean maternal age have increased (Fairley, 2005).

2.4 FACTORS INFLUENCING BIRTH WEIGHT

Kramer in a comprehensive review of risk factors for low birth weight (Kramer, 1987) identified 43 risk factors and grouped them into the following categories: genetic, constitutional, demographic and psychosocial, obstetric, nutritional, maternal morbidity during pregnancy, toxic exposures and antenatal care. The medical literature is rife with studies elucidating the association between lower social class or other social factors and either increased risk of low birth weight or infant mortality throughout various parts of the world (Morris et al., 1955; Drillien, 1957, Illsley , 1955) with much of the pioneering work been conducted in Great Britain by Morris (1955), Baird (1945), and Illsley (1955).Although, many of these studies have simply highlighted the association between social factors and low birth weight, it has been suggested that poverty could affect maternal health status at the time of conception through lowering physiologic reserves (Lieberman, 1995). Other potential causes of low birth weight could be variation in the quality and quantity of medical care, diet, housing conditions, lower social support, and unemployment, increased exposure to toxic agents or differences in risk of infectious diseases (Mutale et al., 1991; Mavalanker et al., 1991).The significance of place of delivery as risk factor for adverse perinatal health outcome remains largely context dependent. Previous research aimed at explaining the association between place of delivery and various quality of life measures, including perinatal, neonatal infant mortality, and low birth weight have yielded inconsistent results (Karan et al.,1972),whereas, a few studies reported negative findings.

The bulk of epidemiological evidence suggests that depending on the setting, hospital deliveries or deliveries outside the hospital have its own associated risk factors. United Nations Childrens Fund implemented a national perinatal survey, and estimated the prevalence of low birth weight in Nigeria at 14% (UNICEF, 2003). Other risk factors apart from place of delivery (delivery in a hospital/ or outside the hospital) were listed among the inter-related risk factors, such as education, medical coverage, smoking and work during pregnancy, prenatal consultation, area of residence as well as size and scope of delivery facility services (Lebanese Republic, Ministry of Public Health & UNICEF, 2000).The main concern of recent epidemiological research nowadays

is to establish the existence of the independent effect of either delivery in the health facility or outside the health facility on perinatal health outcomes, taking into account all potential confounders or risk modifying characteristics (Islam, Yoshida, 2009)

Well established risk factors for preterm delivery or low birth weight that are also correlated with place of delivery include socio-economic status (Dinh et al., 1996; Arif et al.,1998), medical complications (Mc Gregor et al.,1990), parity (Wessel et al., 1996), maternal age, life style characteristics such as maternal employment (People Shepe et al.,1991) and cigarette smoking (Tuthill et al., 1999) Maternal age and parity have a significant effect on birth weight as shown by Dhall and Bagga (1995) Studies have also shown that low birth weight occurred more at the extremes of the reproductive age of 19years below and 40years above (Ekwempu, 1985; Amin et al., 1993, Karim et al., 1997) Several studies have demonstrated an increase in pregnancy-related complications due to teenage pregnancy This includes anaemia, preterm labour, hypertensive disorders of pregnancy, low birth weight babies (Osborne et al., 1981; Uhan et al., 1967; Abiodun et al., 2004) Medical disorders in pregnancy such as diabetes mellitus, hypertension is commoner with advanced maternal age, thereby predisposing babies to low birth weight.

2.4.1 MATERNAL AGE

Studies that compared birth weight with mother's age have shown that the rate of low birth weight babies among teen mothers was thirty five percent higher than that among mothers aged twenty to twenty-nine years (9.5% as against 7.1%). The rate among the younger teens (those fifteen and younger) was 16.1%, higher than in any age group except forty-five to fifty four years of age (Joyce et al., 2000) The reasons why teenage mothers deliver low birth weight babies has several explanation. A pregnant teenager who is still growing competes for nutrients with the foetus. Becoming pregnant within the "two years" after menarche, increases the risk for preterm delivery (Allison et al., 1995). Many teen pregnancies have been found to be unplanned, unwanted, or discovered late, and pregnant teens are more likely than older mothers to be poor, under educated, lack access to resources or services all of which constitute, risk factors for low birth weight (Cheryl, 1997, Cliff, 1986). Also, women who give birth in their late forties or older are also at increased risk for having low birth weight babies. For these groups of women,

the risks are biological and may be a result of older ova and a greater likelihood of medical risk factors such as hypertension (Robert et al., 1995).

The significance of young and old maternal ages at child birth as risk factors for adverse perinatal health outcomes remains largely context dependent. Previous research that aimed at providing an explanation to the frequently observed association between mother's age and low birth weight has yielded inconsistent results (School et al., 1988; Feleke et al., 1999). Whereas a few studies reported negative findings, the bulk of epidemiological evidence suggested that, depending on the setting, teenage (School et al., 1988) or old age (Kiely et al., 1986; Milner et al., 1992) pregnancies represented high risk categories.

2.4.2 ANTENATAL CARE

Antenatal care received by pregnant women has many aspects "including at minimum when it starts, the number and spacing of the visits, the content of each visit, the type of provider (e.g. doctors, midwives, traditional), the provider setting (e.g. hospital, home, mission), the assessment of risk status, the schedule of medical screening tests and the use of specific medical, educational, nutritional and social support intervention services" to promote the well being of the mother and the foetus (Alexander & Korenbrot,1995). ANC is globally accepted and commonly understood to have a beneficial impact on pregnancy outcome either through the treatment of complications or by contributing to the reduction of modifiable maternal risk factors. It helps to identify mothers at risk of delivering low birth weight babies and to provide an array of medical, nutritional & educational interventions intended to reduce the risk of low birth weight and other adverse pregnancy outcomes (Ahmed & Das, 1992; Alexander & Korenbrot, 1995)

Along with maternal age and parity, number of antenatal visits and place of delivery have independent effect on birth weight, even when the effects of gestational age and sex of infants were eliminated (Xu et al., 1995). Women who had no antenatal care were found to have a significantly higher incidence of low birth weight (Dawodu et al., 1985; Nahor et al., 1998; Ahmed et al., 1992; Islam et al., 2009). In a study at a mission hospital in Benin City, Nigeria, the leading maternal factor associated with delivery of low birth weight infant was "absent" or in adequate "antenatal" care (Onyiriuka, 2006). In a similar study at Dhaka, Bangladesh, birth weight had a positive correlation with the frequency of antenatal care visit. It showed that three

antenatal care visits were quite effective in reducing the proportion of low birth weight in infants (Ahmed et al., 1992). Better antenatal care with special attention to primips and elderly women (>=35years) also reduces the incidence of low birth weight babies (Nair et al., 2002). Early antenatal care initiation has also been found to be associated with heavier birth weights (Eisner et al., 1979; Gortmaker, 1979). Early trimester and regular antenatal care visit have been associated with a reduced incidence of low birth weight and prematurity (Letamo & Majelantle, 2001).

2.4.3 SOCIO ECONOMIC STATUS

Several studies have shown different results on whether socio economic factors affect pregnancy outcomes and new born conditions (Kaipilova et al., 2000; Peoples-shep et al., 1991). The inconsistency of these findings may be due to poor clarification of the mechanisms by which socio economic status affects low birth weight. Women of low socio economic status traditionally have been considered at high risk for adverse pregnancy outcomes and are at increased risk for delivering low birth weight babies (Berkowitz, 1981), irrespective of whether socio economic status is defined by income, occupation, or education (Dana & Lisa, 1995). Several socio economic status indicators: such as maternal education (Berkowitz, 1981), income level (Starfield et al., 1991) influence preterm and low birth weight. Education may also have independent effects, above and beyond income, because more highly educated mothers may know more about family planning and healthy behaviors. The increased risk associated with these crude indicators of socio economic status is probably mediated through high risk behaviors and adverse environments that are globally related with socioeconomic status (Kleinman & Kessel, 1987; Kramer, 1987). For example, behaviors such as smoking and alcohol consumption (Kramer, 1987) and delayed onset of prenatal care as well as measures of poverty such as poor housing and level of violence in the past have been associated with rates of low birth weight (O'Campo et al., 1997).

Mondol (2000) showed that socio-cultural variables like maternal education, hard manual labor and place of residence have significant effects on birth weight. Studies also show that illiteracy and poor educational background significantly affected the incidence of low birth weight (Nahor et al., 1998). In a study in Tanzania, mothers without formal education were four times more likely to give birth to low birth weight neonates than those who attained higher education (Siza, 2008). The illiterate or poorly educated were more likely not to receive antenatal care than the

educated. In an earlier study in Zaria, Nigeria, women who had no formal education and had no antenatal care had higher incidence of low birth weight babies, perinatal and maternal mortality.

2.4.4 GESTATIONAL AGE, PARITY AND BIRTH ORDER

Gestational age at delivery significantly determined the incidence of low birth weight. It has been reported that low birth weight was strongly associated with gestational age below 37 weeks (Reid, 1961; Neligan, 1966; Siza, 2008).

Biological factors such as sex and parity of the baby also showed differential impact on birth weight (Defo&Partin, 1993). Mothers having a fourth or subsequent pregnancy have been reported to significantly have babies at the extreme of the low birth weight range (Jayant, 1966). Magadi et al (2000) have found birth order as an important factor influencing birth weight and reported "first order births are on average more likely to be smaller babies than higher order births".

2.4.5 SMOKING

Maternal cigarette consumption has been clearly associated with an increased incidence of low birth weight neonates (Butler et al., 1972). Russel, Taylor and Madison (1966) showed that the smoking of five or more cigarette per day resulted in lower birth weight infants than in mothers who smoked less or were non-smokers. The finding was that smoking was associated with a lower weight gain in the mother during pregnancy (Rush, 1975), and that maternal weight gain during gestation was strongly associated with birth weight (Rush, Davis and Susser, 1972), would further suggest that nutrition during pregnancy has an effect on birth weight. Although smoking is clearly associated with reduced birth weight, the specific relationship of smoking level and the timing of smoking reductions in pregnancy to birth weight appear to be complex.

2.4.6 GESTATIONAL WEIGHT

High percentage of low birth weight new borns have been found to be born to women with low gestational weight (<45kg) (Schieve et al., 2000). One explanation that has been given for the lower mean neonate birth weight in women with low pre-pregnancy weight is that the foetus may have been prevented from receiving adequate supply of nutrients from the mother because of changes in maternal hemodynamic status (Philip, 2000). These studies suggested that in

malnourished underweight women, lower volume expansion related to decreased micronutrient status might be associated with reduced foetal growth.

2.4.7 INTER- PREGNANCY INTERVAL

The interval between two successive pregnancies in months is defined as inter-pregnancy interval. Studies have shown that highest rate of low birth weight babies belonged to mothers whose inter-pregnancy interval was less than twelve months (<12months) (Anand, 2000). This finding indicates the importance of birth spacing in preventing low birth weight babies (Trivedi et al., 1986).

2.4.8 MATERNAL MORBIDITY DURING PREGNANCY.

Common episodic illnesses and symptoms, such as upper respiratory infections, fever, nausea, vomiting, diarrhoea, headache, and anorexia, could affect intrauterine growth or gestational duration through any of three mechanisms (Kramer, 1987). Firstly, such symptoms often result in decreased caloric intake, which, if prolonged, could lead to a reduction in the energy available to the foetus and, in women who have inadequate nutritional reserves, impair fetal growth. Secondly, the metabolic cost of maintaining febrile temperatures or of mounting appropriate host defences may reduce the energy available to the foetus, even with a constant dietary caloric intake. Finally, the infection or symptom could lead to diminished uterine blood flow or even spread to the placenta or amniotic fluid and hence interfere with intrauterine growth or precipitate premature delivery. These conditions have been found to be associated with low birth weight in several studies and mothers who experience such reoccurring conditions have been found to deliver lighter (low birth weight) babies (Dawodu, 1983; Siza, 2008).

The causes of low birth weight are therefore multi-factoral involving genetic, placental, foetal and maternal factors (Malik et al., 1997; Kamaladoss,Abel& Sampathkumar,1992).

CHAPTER THREE

MATERIALS AND METHODS

3.1 STUDY LOCATION

The study was carried out in Ibadan, Oyo state Nigeria. The specific locations of the study were Adeoyo Maternity hospital, Yemetu; Christ apostolic church mission home, Olugbode; and Christ apostolic mission home Irefin. Adeoyo Maternity represents the secondary health facility, while the two Mission homes represent the Faith based missionary health delivery homes. They are located in Ibadan North East Local Government area of Oyo state. Adeoyo maternity hospital is a government owned secondary hospital located in Yemetu area of Ibadan, Oyo state Nigeria. Adeoyo Maternity hospital has two hundred and four beds. Their staff strength is made up of two hundred and twenty nine nurses, they have twenty wards. Antenatal clinics are run on Mondays, Tuesdays, and Thursdays while immunization days are every day of the working week, except on Wednesdays. The average number of delivery being recorded in a week is eleven. The mission centers are Faith based missionary delivery homes which cater for pregnant women and expectant mothers. It is owned by the Christ apostolic church (CAC). CAC Olugbode mission home has four beds, staff strength consist of two midwives & one nurse. They run their immunization days on Mondays, while their clinic days are run weekly and average number of delivery in a week is five. CAC Irefin mission home has five beds, their staff strength consist of two mid wives and one nurse. They also run their immunization days on Mondays, while their clinic days are also run weekly. The average number of delivery recorded in a week is four.

3.2 STUDY DESIGN

A comparative cross sectional survey of mothers who delivered in the secondary health facility and the Faith based missionary health delivery homes from January to April 2011 was carried out.

3.3 STUDY POPULATION

The study population was all mothers who delivered at the health facilities and their infants.

3.3.1 INCLUSION CRITERIA

- All newly delivered mothers and their infants.
- Mothers who delivered in these health facilities and have brought their infants (from day zero to two months of life) to receive immunization; and also have birth records that can be traced.
- Mothers should be in the 15-49 years age bracket group. This is because these are usually women of reproductive age, and refers to potential mothers in the population.
- Willingness to participate in the study as evidenced by signing of consent form

3.3.2 EXCLUSION CRITERIA

- Mothers who have serious medical problems, and so were unable to respond adequately to questions.
- Mothers with multiple births were excluded from the study

3.4 SAMPLE SIZE

The sample size used in the study was calculated using the formula:

$$\frac{[Z_{1-\alpha/2}\sqrt{2P_1(1-P_1)} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}]^2}{[P_2-P_1]^2}$$

Z = The standard normal deviation, usually set at 1.96 which corresponds to 95% confidence level.

P_1=14% (prevalence of low birth weight in Nigeria as reported by UNICEF (2005, 2007)

P_2-P_1= difference in the prevalence of birth weight that the study wishes to detect between Mission and secondary health facility

P_2-P_1 = 15%

Power=90% $Z_{1-\beta}$ = 1.28

$\alpha = 0.05 \qquad Z_{1-\alpha} = 1.96$

$$\frac{[1.96\sqrt{2\,(0.14)(1-0.14)} + 1.28\sqrt{0.14(1-0.14) + 0.29(1-0.29)}]^2}{[0.14 - 0.29]^2}$$

$$\frac{[1.96\sqrt{2(0.14)\,(0.86)} + 1.28\sqrt{\,0.14\,(0.86) + 0.29\,(0.71)\,}\,]^2}{[0.14 - 0.29]^2}$$

$$\left[\frac{0.96 + 0.73}{0.14 - 0.29}\right]^2$$

= 126.94 approximately 127 mothers.

Accounting for non response rate,

$\frac{10}{100} \times 127 = 12.7 \approx 13$

Sample size = 127 + 13 = 140 mothers in each group.

140 x 2 = 280 mothers in all.

140 mothers in each group (public secondary health facility and Faith based missionary health centre)

3.5 SAMPLING METHOD

The Public secondary health facility and Faith based missionary delivery homes were purposively selected. Infants delivered in the health facilities were included in the study by interviewing mothers delivering consecutively, until the desired sample size is arrived at.

3.6 DATA COLLECTION INSTRUMENT

Data were collected using a semi- structured questionnaire. The data were collected from women within age bracket 15-49years and was interviewer administered. The questionnaire was developed using questions from literature of several studies on factors influencing birth weight. The questionnaire collected comprehensive information on socio-demographic characteristics of mothers, characteristics of babies, social factors, obstetric history of mothers (previous

pregnancies and/or abortions, duration, characteristics), delivery (place, type, e.t.c) and on new born (sex, birth order, weight e.t.c.). (See appendix 1).

3.7 DATA COLLECTION METHOD

An "interviewer administered data collection method" of administering questionnaire and collecting information from the mothers was used. Training of research assistants was not necessary because the questionnaire was administered by the researcher.

3.8 STUDY VARIABLES

The main explanatory variable is place of delivery which was categorized as institutional delivery or mission delivery. Institutional delivery refers to births occurring in a health facility while mission delivery refers to deliveries occurring in a Faith based missionary delivery home.

Other variables included in the study were mother's socio-demographic characteristics; age, religion, weight, height, education, parity, Social factor; monthly income, occupation, drug use, smoking activity and access to ANC in terms of number of visits and registration at antenatal care, mothers obstetric history, Variables related to the infant's gestational age, sex, and birth weight was also collected.

The outcome variable was the birth weight of the new born and categorized as LBW babies (<2.5kg) or normal birth weight (>2.5kg) as appropriate.

3.8.1 MEASUREMENT OF VARIABLES

Birth weight in grams and gestational age in weeks was collected from the antenatal registry card. In the antenatal registry card, gestational age was obtained using the last normal menstrual period and confirmed by ultrasound examination, done before twenty weeks of gestation. If both last menstrual period and ultrasound dating were available, and the two agreed within seven days, then the former was used to determine gestational age. If the two differed by more than seven days, the ultrasound date was used. In instances where the gestational age was not a full week, it was recorded and reported as an interval e.g. "thirty seven to thirty eight weeks", then the higher of the two figures was used.

Maternal education was categorized into: No formal, primary, secondary, and tertiary education.

Some variables were collected as continuous measures, but were later converted into categorical measures. This included maternal age, gestational age, gap between this and previous pregnancy, number of antenatal visits before delivery, birth order, parity, number of cigarette smoked/week. Maternal age was categorized into ≤25 years, 26-35 years, >35 years. Gestational weight was categorized as <45kg, 45-55kg, >55kg. Gestational age was categorized as <37weeks and >37weeks.

Information on number of ANC was not collected because almost all the women in the overall study population reported visiting the health facility for ANC more than five (5) times during their pregnancy period. Time of Antenatal care registration was therefore used and this was later banded into registration at first, second or third trimester. Inter pregnancy interval was categorized as less than two years, two years and above. The gender of the newborn was categorized as male or female child.

3.9 DATA ANALYSIS

All data analysis was performed using SPSS 16 statistical software. All data collected were cleaned up manually and checked for consistency by evaluating the frequency distribution of all variables. Cross tabulations was used to describe and compare maternal and child characteristics by the main explanatory variable (place of delivery). Frequencies, proportions and cross tabulations were used to summarize the qualitative variables, while quantitative variables were presented as mean with standard deviation. Inferential statistics of Chi square test was used to test for association in the bivariate analysis of maternal characteristics and pregnancy outcome (birth weight) and place of delivery.

The relationship between the explaining variable (maternal age, parity, inter pregnancy interval, bad obstetric history, gestational age, education, ANC registration period) and the outcome variable-low birth weight (coded as zero if child is <2.5kg and One if child is >2.5kg within this period) was also examined. The final stage of analysis involved the use of logistic regression analysis to estimate the effect of place of delivery on birth weight, after controlling for confounders. The P level was considered significant at $p<0.05$.

3.10 ETHICAL CLEARANCE

Ethical clearance was obtained from the research and ethical committee of the Ministry of Health in Oyo state. Written informed consent was obtained from the heads of the health facilities and permission was also obtained from the research participants. Each questionnaire was coded and names of respondents were not included during data entry, to ensure the confidentiality of information collected and anonymity of respondents who provided the data.

3.11 LIMITATIONS OF THE STUDY

The risk factors that could affect infant birth weight are limitless as described by other researchers. In order to focus on causal determinants of low birth weight, only the identifiable risk factors for low birth weight were included in the study. The assessment of the risk factors was therefore restricted to singleton births among mothers, and the potential public health impact of such a factor which depends on its prevalence in the study population. Also, exposure to several other factors during pregnancy may have effect on foetal birth weight and these factors were not studied in this study; these include prenatal, perinatal and postnatal complications, trauma, neurologically compromising events that may occur during development of the foetus before and after birth.

Non-availability of some important variables in some of the birth registers and ANC registers. This information include- pre-gestational weight, maternal weight at time of delivery made data on maternal weight incomplete, thus making data collected on maternal weight to be excluded during data analysis. However, when key variables were missing, such mothers were not enlisted into the study.

Recall bias on part of the mothers, because some could not remember their age, when they started attending ANC, and the sickness encountered & drug use during the course of pregnancy. This was minimized by using "logical dating" to check the authenticity of the age such mothers gave.

Relying on the birth weight recorded by the health personnel in the birth register was a strong limitation because people who were neither nurses nor midwives were not allowed in the delivery room to monitor the measurement of the infant at delivery. However, considering that

all the health workers had some form of training on infant delivery and births, this is likely to be minimal. Also, scales were examined to ensure they gave accurate readings.

CHAPTER FOUR

RESULTS

The results of this study are presented in sections which gives answers to the objectives of the study. Detailed information on the socio-demographic of the mothers, characteristics of infants, obstetric history of mother, sickness encountered by mothers during the course of pregnancy, and relationship between maternal age, parity, ante-natal care registration, inter pregnancy interval, education, gestational age on birth weight are presented as follows:

4.1 GENERAL CHARACTERISTICS OF THE STUDY PARTICIPANTS

A total of 280 mothers aged between eighteen to forty-three years (18 – 43 years) delivering infants were studied. An equal number of mothers (one hundred and forty each) were studied in the mission home and the secondary health facility.

The socio-demographic characteristics of the respondents studied are presented in **Table 1**. The mean age of the study participants in the total population was found to be 28 ±4.92years with the minimum and the maximum age being eighteen (18) and forty-three (43) years respectively. Majority of the participants were in the age group 26 - 35 years (61.8%). Of the infants delivered to the two hundred and eighty participants, 53.2% were males.

The ethnic composition of the study subjects was such that 243 (86.8%) of the respondents were Yoruba, 34 (12.1 %) were Igbo, and 3 (1.1%) were Hausa. The two predominant religions of the respondents were Christianity and Islam, out of which over two-third (76.4%) were Christians and about one-third (22.9%) were Muslims. Generally, majority of the respondents, 210 (75.0%) had at least secondary education. See **Table 1** for more details.

Table 1: Socio-demographic characteristics of respondents

Socio-demographic Characteristic	Total Population(n=280)	Mission House(n=140)	Secondary Health Facility(n=140)
Maternal age(years)			
≤25	90(32.1%)	54(38.6%)	36(25.7%)
26 -35	173(61.8%)	76(54.3%)	97(69.3%)
>35	17(6.1%)	10(7.1%)	7(5.0%)
Mean maternal age=	28.15±4.92	27.77±5.40	28.52±4.38
Religion			
Islam	66(33.6%)	25(17.9%)	41(29.3%)
Christianity	214(76.4%)	115(82.1%)	99(70.7%)
Education			
No formal	15(5.4%)	13(9.3%)	2(1.4%)
Primary	55(19.6%)	33(23.6%)	22(15.7%)
Secondary and above	210(75.0%)	94(67.1%)	116(82.9%)
Ethnicity			
Yoruba	243(86.8%)	122(87.1%)	121(86.4%)
Igbo	34(12.1%)	16(11.4%)	18(12.9%)
Hausa	3(1.1%)	2(1.4%)	1(0.7%)

4.2 CHARACTERISTICS OF INFANTS DELIVERED BY MOTHERS

The characteristics of infants delivered are presented in **Table 2**. Of the two hundred and eighty infants delivered by the mothers, the mean gestational age of infants delivered was 37.08 weeks±1.47weeks, with minimum and maximum gestational age being 32 weeks and 40 weeks respectively. More babies 214(76.4%) were delivered to mothers whose gestational age was 37 weeks and above (≥37 weeks).

The mean birth weight of infants delivered by mothers in the Total population was 2.86kg±0.42kg having its minimum and maximum birth weight to be 1.90kg and 4.20kg respectively. Thirty-eight (13.6%) infants were delivered as low birth weight babies (<2.5kg). More low birth weight babies 22(15.7%) were delivered in the Mission house as compared with the number of low birth weight babies 16(11.4%) delivered in the Secondary health facility (P=0.265)

More than a quarter (37.1%) of infants delivered to mothers in the Total population was second order births, followed by primips (25.4%). Third order births and births greater than third order births reported 105(37.5%) number of infants. See **Table 2** for more details.

Table 2: Characteristics of infants delivered to respondents

Infant Characteristic	Total Population(n=280)	Mission House(n=140)	Secondary Health Facility(n=140)
Gestational age(weeks			
<37	66(23.6%)	45(32.1%)	21(15.0%)
>37	214(76.4%)	95(67.9%)	119(85.0%)
Mean Gestational age	37.08±1.47	36.66±1.64	37.50±1.12
Birth weight			
Low birth weight	38(13.6%)	22(15.7%)	16(11.4%)
Normal birth weight	242(86.4%)	118(84.3%)	124(88.6%)
Mean Birth weight(kg)	2.86±0.42	2.79±0.41	2.93±0.42
Gender			
Male	149(53.2%)	73(52.1%)	76(54.3%)
Female	131(46.8%)	67(47.9%)	64(45.7%)
Birth order			
First	71(25.4%)	36(25.7%)	35(25.0%)
Second	104(37.1%)	50(35.7%)	54(38.6%)
Third and above	105(37.5%)	54(38.6%)	51(36.4%)

4.3 OBSTETRIC HISTORY OF MOTHERS

The obstetric histories of the respondents (mothers) are presented in **Table 3.** 37(13.2%) of the women delivering in the Total population reported to have had abortion, 36(12.9%) ever delivered still birth, 15(5.4%) ever had premature delivery, 20(7.1%) ever had breeched delivery and 17(6.1%) reported to have delivered through caesarian section.

Out of the infants delivered by the respondents studied, about 70(25%) deliveries occurred among primiparous. Mothers whose inter pregnancy interval was greater than 2 years recorded the highest proportion of births 177(63.2%). See Table 2 for further details.

Incidence of births was highest in mothers who are in the parity group three and above (37.9%).

Table 3: Obstetric history of mothers

Obstetric variables	Total Population(n=280)	Mission House(n=140)	Secondary Health Facility(n=140)
Obstetric history			
Ever had abortion	37(13.2%)	23(16.4%)	14(10.0%)
Ever delivered still birth	36(12.9%)	21(15.0%)	15(10.7%)
Ever had premature delivery	15(5.4%)	11(7.9%)	4(2.9%)
Ever had breeched delivery	20(7.1%)	14(10.0%)	6(4.3%)
Ever had delivery through caesarian session	17(6.1%)	11(7.9%)	6(4.3%)
Inter-pregnancy interval			
<2 years	33(11.8%)	17(12.1%)	16(11.4%)
>2 years	177(63.2%)	88(62.9%)	89(63.6%)
Primips	70(25.0%)	35(25.0%)	35(25.0%)
Parity			
1 child	71(25.4%)	36(25.7%)	35(25.0%)
2 children	103(36.8%)	50(35.7%)	53(37.9%)
3 children	106(37.9%)	54(38.6%)	52(37.1%)

4.4 MATERNAL MORBIDITY ENCOUNTERED DURING PREGNANCY

Of the two hundred and eighty mothers interviewed on illness encountered during the course of pregnancy, 73(26.1%) reported having malaria, 6(2.1%) reported having typhoid fever, 3(1.1%) reported high blood pressure, 7(2.5%) reported respiratory tract infection and 9(3.2%) reported having one form of sexually transmitted infection or the other. See **Table 4** for more details.

Table 4: Maternal morbidity experienced in the course of pregnancy

Maternal morbidity	Total Population(n=280)	Mission House(n=140)	Secondary Health Facility(n=140)
Malaria	73	36(25.7%)	37(26.4%)
Typhoid	6	3(2.1%)	3(2.1%)
High blood pressure	3	2(1.4%)	1(0.7%)
Respiratory tract infecton	7	3(2.1%)	4(2.9%)
Sexually transmitted infection	9	3(2.1%)	6(4.3%)

4.5 SOCIAL FACTORS OF MOTHERS

Smoking is a known social factor for low birth weight, but it was not reported by any of the mothers interviewed in the mission houses and secondary health facility. Concerning alcohol intake as a social factor, **Table 5** reveals 2(0.7%) of the mothers interviewed gave any history of alcohol intake during the course of pregnancy. Out of all the mothers interviewed, most mothers 134(47.9%) reported registering for ante-natal care in the first trimester.

More mothers in the mission homes 68(48.6%) reported earning a weekly income of ≤ ₦2,500 as compared with mothers in the secondary health facility 48(34.3%) reporting same weekly income. Out of all the mothers interviewed, 2(1.7%) mothers declined to give any response to question regarding "income earned weekly". **See Table 5** for more details.

Table 5: Social factors of mothers

Maternal morbidity	Total Population(n=280)	Mission House(n=140)	Secondary Health Facility(n=140)
Smokes cigarette	0(0.0%)	0(0.0%)	0(0.0%)
Consumes alcohol	2(0.7%)	2(1.4%)	3(0%)
ANC registration period			
1st Trimester	134(47.9%)	63(45.0%)	71(50.7%)
2nd Trimester	123(43.9%)	68(48.6%)	55(39.3%)
3rd Trimester	23(8.2%)	9(6.4%)	14(10.0%)
Weekly income(₦)			
<2500	116(41.4%)	68(48.6%)	48(34.3%)
2500-10000	159(56.8%)	71(50.7%)	88(62.9%)
>10000	3(1.1%)	1(0.7%)	2(1.4%)
No response	2(0.7%)	0(0.0%)	2(1.4%)

4.6 INFORMATION ABOUT PREVALENCE OF LOW BIRTH WEIGHT.

The information about the prevalence of low birth weight is presented in **Table 6.** Thirty- eight infants (13.6%) were delivered as low birth weight babies (weighed less than 2.5kg at birth), thus making the prevalence of low birth weight in the Total population to be 13.6%. Twenty two infants (15.7%) out of the thirty-eight low birth weight babies were delivered by mothers in the Mission home, while the remaining sixteen (11.4%) were delivered in the Secondary health facility. The prevalence of low birth weight in the Mission home is reported higher (15.7%) as compared with the prevalence of low birth weight in the Secondary health facility (11.4%).(P=0.295)

Table 6: Prevalence of low birth weight by place of delivery

	LBW	NBW	TOTAL	P value
MISSION	22(15.7%)	118(84.3%)	140	
2^{O}HEALTH FACILITY	16(11.4%)	124(88.6%)	140	0.295
TOTAL	38(13.6%)	242(86.4%)	280	

X^2= 2.098

4.7 THE EFFECTS OF SELECTED MATERNAL FACTORS ON MEAN BIRTH WEIGHT.

Information about the effect of some selected maternal factors on the mean birth weight of newly delivered infants is described in **Table 7.** Maternal age, mothers' literacy level, Gestational age, antenatal care registration time, inter-pregnancy interval, weekly income, and birth order were found to be significantly associated with birth weight ($p < 0.05$) in the total population. Parity was found not to be significantly associated with birth weight. See **Table 7** for more details.

Infants delivered by mothers in the age group ≤ 25 years have the lowest mean birth weight. There was a significant increase in the mean birth weight of infants studied as the maternal age, literacy level, gestational age, inter-pregnancy interval, weekly income increased ($p < 0.05$).

Infants delivered by mothers who registered for ante natal care in their first trimester have a higher mean birth weight when compared with infants delivered by mothers who registered for ANC in the second and third trimester respectively.

In the mission house, every other maternal factor was significantly associated with mean birth weight, except birth order and parity. See **table 8** for details.

Parity was the only maternal factor that was not significantly associated ($p>0.05$) with mean birth weight in the secondary health facility. See **Table 9** for details

Table 7: Maternal factors on mean birth weight in the Total population

Maternal factor	Mean Birth weight(kg)	X^2 value, P value
Maternal Age(years)		
≤25	2.67±0.36	
26-35	2.94±0.41	19.43, < 0.001
>35	2.91±0.45	
Education		
No formal	2.55±0.35	34.79, <0.001
Primary	2.63±0.38	
Secondary and above	3.01±0.41	
Gestational age(weeks)		
<37	2.51±0.39	65.50, < 0.001
>37	2.96±0.36	
Parity		
1	2.76±0.38	4.37, 0.113
2	2.94±0.42	
3 and above	2.84±0.42	
ANC Registration		
1st Trimester	2.97±0.39	33.52, < 0.001
2nd Trimester	2.78±0.41	
3rd Trimester	2.56±0.31	
Birth order		
1	2.74±0.37	13.27, 0.004
2	2.95±0.43	
3 and above	2.85±0.42	

Inter-pregnancy interval			
<2 years	2.62±0.26	15.18,	0.001
>2 years	2.94±0.43		
Primips	2.75±0.37		
Weekly income(₦)			
<2500	2.73±0.42	17.24,	<0.001
2500-10000	2.93±0.39		
>10000	3.17±0.55		

Table 8: Maternal factors on mean birth weight in the Mission population

Maternal factor	Mean Birth weight(kg)	X^2 value, P value
Maternal Age(years)		
≤25	2.66±0.42	
26-35	2.75±0.23	13.27, 0.001
>35	2.88±0.40	
Education		
No formal	2.53±0.35	15.60, 0.001
Primary	2.62±0.38	
Secondary and above	2.89±0.39	
Gestational age(weeks)		
<37	2.50±0.39	47.97 < 0.001
>37	2.92±0.34	
Parity		
1	2.76±0.47	3.17, 0.205
2	2.86±0.41	
3 and above	2.73±0.35	
ANC Registration		
1st Trimester	2.87±0.42	59.72, < 0.001
2nd Trimester	2.72±0.40	
3rd Trimester	2.71±0.30	
Birth order		
1	2.72±0.44	6.457, 0.091
2	2.89±0.41	
3 and above	2.59±0.34	

Inter-pregnancy interval		
<2 years	2.64±0.25	12.91, 0.003
>2 years	2.83±0.40	
Primips	2.74±0.45	
Weekly income(₦)		
<2500	2.65±0.43	18.74, <0.001
2500-10000	2.91±0.34	
>10000	2.94±0.41	

Table 9: Maternal factors on mean birth weight in the Secondary health facility

Maternal factor	Mean Birth weight(kg)	X^2 value, P value
Maternal Age(years)		
≤25	2.69±0.27	
26-35	3.00±0.41	14.59, 0.003
>35	3.13±0.60	
Education		
No formal	2.65±0.49	20.54, <0.001
Primary	2.63±0.39	
Secondary and above	3.09±0.38	
Gestational age(weeks)		
<37	2.54±0.42	74.47, < 0.001
>37	3.00±0.38	
Parity		
1	2.76±0.28	2.83, 0.243
2	3.01±0.42	
3 and above	2.95±0.46	
ANC Registration		
1st Trimester	3.07±0.35	70.33, 0.001
2nd Trimester	2.86±0.42	
3rd Trimester	2.46±0.28	
Birth order		
1	2.75±0.29	10.34, 0.016
2	3.01±0.42	
3 and above	2.80±0.52	

Inter-pregnancy interval		
<2 years	2.60±0.27	13.99, 0.001
>2 years	3.05±0.43	
Primips	2.76±0.28	
Weekly income(₦)		
<2500	2.85±0.85	12.15, 0.004
2500-10000	2.96±0.38	
>10000	3.30±0.42	

4.8 RELATIONSHIP BETWEEN MATERNAL AGE AND BIRTH WEIGHT

Table 10 describes the relationship between maternal age and delivering low birth weight babies. The results from the study showed that low birth weight incidence was highest in mothers whose age was less than or equal twenty years. The incidence decreased significantly ($p<0.05$) with increase in maternal age. The same trend was observed in the mission and secondary health facility. See **Table 10** for more details

Table 10: Maternal age by birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
≤25 years	16(29.6%)	38(70.4%)	54(38.6%)	
26- 35 years	6(7.9%)	70(92.1%)	76(54.3%)	0.001
>35 years	0(0%)	10(100%)	10(7.1%)	
SECONDARY HEALTH FACILITY				
≤25 years	8(22.2%)	28(77.8%)	36(25.7%)	0.003
26- 35 years	7(7.2%)	90(92.8%)	97(69.3%)	
>35 years	1(14.3%)	6(85.7%)	7(5.0%)	
TOTAL RESPONDENTS				
≤25 years	24(26.7%)	66(73.3%)	90(32.1%)	
26- 35 years	13(7.5%)	160(92.5%)	173(61.8%)	<0.001
>35 years	1(5.9%)	16(94.1%)	17(6.1%)	

Fishers' exact test was used

4.9 RELATIONSHIP BETWEEN MOTHERS LITERACY LEVEL AND BIRTH WEIGHT

Mothers with no formal education were found to have the largest proportion of low birth weight. The incidence of low birth weight decreased significantly with an increase in the literacy level of the mothers ($p<0.05$). The same trend was observed in the Mission and Secondary health facility. See **Table 11** for more details

Table 11: Mothers literacy level by birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
No formal	5(38.5%)	8(61.5%)	13(9.3%)	
Primary	10(30.3%)	23(69.7%)	33(23.6%)	0.001
Secondary and above	7(7.4%)	87(92.6%)	94(67.1%)	
SECONDARY HEALTH FACILITY				
No formal	1(50.0%)	1(50.0%)	2(1.4%)	
Primary	8(36.4%)	14(63.6%)	22(15.7%)	<0.001
Secondary and above	7(6.0%)	109(94.0%)	116(82.9%)	
TOTAL RESPONDENTS				
No formal	6(40.0%)	9(60.0%)	15(5.4%)	
Primary	18(32.7%)	37(67.3%)	55(19.6%)	< 0.001
Secondary and above	14(6.7%)	196(93.3%)	210(75.0%)	

Chi square test of analysis was used.

4.10 RELATIONSHIP BETWEEN GESTATIONAL AGE AND BIRTH WEIGHT

Results from the study revealed that low birth weight incidence was higher amongst infants delivered to mothers whose gestational age (weeks) was less than thirty seven weeks in the mission home, secondary health facility and total population. The results also showed gestational age have a significant relationship with birth weight ($p<0.05$). See Table 12 for more details,

Table 12: Gestational age of pregnancy (weeks) level by birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
<37 weeks	21(46.7%)	24(53.3%)	45(32.1%)	
>37 weeks	1(1.1%)	94(98.9%)	95(67.9%)	<0.001
SECONDARY HEALTH FACILITY				
<37 weeks	14(66.7%)	7(33.3%)	21(15.0%)	<0.001
>37 weeks	2(1.7%)	117(98.3%)	119(85.0%)	
TOTAL RESPONDENTS				
<37 weeks	35(53.0%)	31(47.0%)	66(23.6%)	0.001
>37 weeks	3(1.4%)	211(98.6%)	214(76.4%)	

Fishers' exact test was used.

4.11 RELATIONSHIP BETWEEN PARITY AND BIRTH WEIGHT

The results of this study as shown in **Table 13** revealed that Parity was not significantly ($p>0.05$) associated with birth weight irrespective of place of delivery. In the Mission house, mothers in parity 1 category delivered the highest proportion (25.0%) of low birth weight babies, while in the secondary health facility, mothers in the parity 3 and above category delivered the highest proportion of low birth weight babies. See **Table 13** for more details.

Table 13: Mothers' parity and birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
1 child	9(25.0%)	27(75.0%)	36(25.7%)	
2 children	6(12.0%)	44(88.0%)	50(35.7%)	0.205
≥3 children	7(13.0%)	47(87.0%)	54(38.6%)	
SECONDARY HEALTH FACILITY				
1 child	5(14.3%)	30(85.7%)	35(25.0%)	
2 children	3(5.7%)	50(94.3%)	53(37.9%)	0.243
≥3 children	8(15.4%)	44(84.6%)	52(37.1%)	
TOTAL RESPONDENTS				
1 child	14(19.7%)	57(80.3%)	71(25.4%)	
2 children	9(8.7%)	94(91.3%)	103(36.8%)	0.113
≥3 children	15(14.2%)	91(85.8%)	106(37.8%)	

Chi square test of analysis was used.

4.12 RELATIONSHIP BETWEEN ANC REGISTRATION PERIOD AND BIRTH WEIGHT

The relationship between ante-natal registration period and birth weight was found to be highly significant ($p<0.05$). **Table 14** shows that irrespective of the place of delivery, mothers who registered for antenatal care during the first trimester have the lowest incidence of low birth weight babies, while mothers who registered for antenatal care during the third trimester have the highest incidence of low birth weight babies.

Table 14 : ANC registration period by birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
1st TRIMESTER	8(12.7%)	55(87.3%)	63 (45.0%)	
2nd TRIMESTER	12(17.6%)	56(82.4%)	68(48.6%)	<0.001
3rd TRIMESTER	2(22.2%)	7(77.8%)	9(6.4%)	
SECONDARY HEALTH FACILITY				
1st TRIMESTER	2(2.8%)	69(97.2%)	71(50.7%)	
2nd TRIMESTER	4(7.3%)	51(92.7%)	55(39.3%)	0.001
3rd TRIMESTER	11(78.6%)	3(21.4%)	14(10.0%)	
TOTAL RESPONDENTS				
1st TRIMESTER	10(7.5%)	124(92.5%)	134(47.9%)	
2nd TRIMESTER	16(13.0%)	107(87.0%)	123(43.9%)	<0.001
3rd TRIMESTER	12(52.2%)	11(47.8%)	23(8.2%)	

4.13 RELATIONSHIP BETWEEN BIRTH ORDER AND BIRTH WEIGHT

Birth order was significantly associated with low birth weight in the secondary health facility ($p=0.016$), and total population ($p=0.004$). There was no significant association between birth order and low birth weight in the mission house ($p=0.091$). Generally, first order births and ≥ third order births have the highest proportion of low birth weight, as compared with second order births. See **Table 15** for more details.

Table 15 : Infants birth order by birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
FIRST ORDER	10(27.8%)	26(72.2%)	36(25.7%)	
SECOND ORDER	5(10.0%)	45(90.0%)	50(35.7%)	0.091
≥THIRD ORDER	7(12.9%)	47(87.1%)	54(38.6%)	
SECONDARY HEALTH FACILITY				
FIRST ORDER	6(17.1%)	29(82.9%)	35(25.0%)	
SECOND ORDER	3(5.6%)	51(94.4%)	54(38.6%)	0.016
≥THIRD ORDER	3(7.5%)	37(92.5%)	40(28.6%)	
TOTAL RESPONDENTS				
FIRST ORDER	16(22.5%)	55(77.5%)	71(25.4%)	
SECOND ORDER	8(7.7%)	96(92.3%)	104(37.1%)	0.003
≥THIRD ORDER	6(8.2%)	67(91.8%)	73(26.1%)	

Fishers' exact test was used.

4.14 RELATIONSHIP BETWEEN INTER-PREGNANCY INTERVAL AND BIRTH WEIGHT

The relationship between inter-pregnancy interval and low birth weight was statistically significant ($p<0.05$). Infants delivered by mothers whose inter-pregnancy interval was less than two years have a larger proportion of low birth weight babies, as compared with women whose inter-pregnancy interval was greater than two years. See **Table 16** for more details.

Table 16: Inter-pregnancy interval(years) and birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
<2 YEARS	4(23.5%)	13(76.5%)	17(12.1%)	
≥2 YEARS	9(10.2%)	79(89.8%)	88(62.9%)	0.003
PRIMIPAROUS	9(25.7%)	26(74.3%)	35(25.0%)	
SECONDARY HEALTH FACILITY				
<2 YEARS	6(37.5%)	10(62.5%)	16(11.4.0%)	
≥2 YEARS	5(5.6%)	84(94.4%)	89(63.6%)	0.001
PRIMIPAROUS	5(14.3%)	30(85.7%)	35(25.0%)	
TOTAL RESPONDENTS				
<2 YEARS	10(30.3%)	23(69.7%)	33(11.8%)	
≥2 YEARS	14(7.9%)	163(92.1%)	177(63.2%)	<0.001
PRIMIPAROUS	14(20.0%)	56(80.0%)	70(25.0%)	

Chi square test of analysis was used.

4.15 RELATIONSHIP BETWEEN WEEKLY INCOME AND BIRTH WEIGHT

The relationship between weekly income and birth weight was found to be highly significant ($p<0.05$). Table 17 shows that irrespective of the place of delivery, mothers who earned a weekly income < ₦2500 had the highest incidence of low birth weight babies. The incidence of low birth weight reduced significantly as the weekly income earned increased.

Table 17: Mothers' weekly income(₦) by birth weight

	LBW INFANTS	NBW INFANTS	TOTAL NUMBER OF INFANTS DELIVERED	P value
MISSION				
< ₦2500	20(29.4%)	48(70.6%)	68(48.6%)	
₦2501-10000	2(2.8%)	69(97.2%)	71(50.7%)	<0.001
>₦10000	0(0.0%)	1(100.0%)	1(0.7%)	
SECONDARY HEALTH FACILITY				
< ₦2500	7(14.6%)	41(85.4%)	48(34.8%)	
₦2501-10000	8(9.1%)	80(90.9%)	88(63.8%)	0.001
>₦10000	0(0.0%)	2(100.0%)	2(1.4%)	
TOTAL RESPONDENTS				
< ₦2500	27(23.3%)	89(76.7%)	116(41.7%)	
₦2501-10000	10(6.3%)	149(93.7%)	159(57.2%)	<0.001
>₦10000	(0.0%)	3(100.0%)	3(1.1%)	

Fishers' exact test was used.

4.15 LOGISTIC REGRESSION ANALYSIS OF MATERNAL FACTORS ASSOCIATED WITH LOW BIRTH WEIGHT

Bivariate analysis showed that association of some maternal factors with low birth weight were statistically significant in the Mission house and some factors were not, while in the Secondary health facility, association of some maternal factors were statistically significant with low birth weight, and some were not. Logistic regression was then used to control for confounders in the Total population, and then used to suggest factors that are actually predictive of low birth weight in the total respondents.

This section reveals the relationship between different maternal variables associated with delivering low birth weight babies in the Total respondents. After controlling for confounding variables using logistic regression, maternal age, education, period of ANC registration, Birth interval and weekly income were factors found to be significantly associated ($p<0.05$) with low birth weight in the Total respondents, while birth order and parity were found not to be statistically significantly associated with birth weight.

Mothers whose maternal age was less than or equals twenty-five years of age were found to have delivered the largest proportion (26.7%) of low birth weight babies (OR: 3.74; 95% CI: 1.21-11.51). Low birth weight incidence decreased significantly with increase in maternal age, with mothers of age >35years having the lowest incidence (5.9%) of low birth weight. The risk of delivering low birth weight babies was almost four times among the mothers who were ≤ 25 years and it is statistically significant ($p<0.05$). Low birth weight incidence was highest (40.0%) amongst mothers with no formal education, when compared to mothers with Primary education (32.7%), Secondary education and above (6.7%). The association was found to be highly statistically significant ($p<0.01$). The odds ratio for mothers with no formal education was 4.95, which indicates that Mothers with no formal education have about five times the risk of delivering low birth weight babies as compared with mothers whose literacy level was highest($p<0.05$). The relationship between Gestational age and delivering low birth weight was also found to be statistically significant. Mothers whose gestational age was less than 37 weeks reported a higher incidence of low birth weight (53.0%), and such mothers were 3.24 times more likely (OR:3.24; 95%CI: 1.42-19.23) to deliver low birth weight as compared to Mothers whose gestational age was greater than 37 weeks. More number of babies (30.3%) were delivered by mothers

whose inter-pregnancy interval was less than two years (OR: 3.55; 95%CI: 1.42-10.23), followed by Primiparous mothers (20.0%). Mothers whose inter-pregnancy interval was less than two years were about four times more likely to deliver low birth weight babies as compared with mothers whose inter-pregnancy interval was greater than two years. A significant relationship was also observed in the relationship between period of ANC registration and low birth weight ($p<0.05$). A high number of low birth weight babies (52.2%) were delivered by mothers who got registered for ANC in the third trimester (OR: 4.76; 95% CI: 1.69-11.72). The lowest proportion of low birth weight babies were delivered by mothers who registered for their ANC in their first trimester.

The relationship between birth order, parity and birth weight was not found to be significant $p>0.05$.

See **Table 18** for more details.

Table 18: Multivariate analysis showing the selected maternal factors associated with low birth weight in the Total respondents

FACTOR	OR (95%CI)	P value
Maternal age(years)		
≤25	3.74(1.21-11.55)	0.02
26-35	0.91(0.15-0.96)	0.04
>35(ref)	1.00	
Parity		
1	1.71(0.37-11.85)	0.06
2	0.38(0.16-11.88)	0.11
3 and above(ref)	1.00	
ANC registration		
I Trimester(ref)	1.00	
II Trimester	2.01(1.28-14.09)	0.04
III Trimester	4.76(1.69-11.72)	0.01
Birth-interval (years)		
Primiparous	2.37(1.02-8.93)	0.01
<2	3.55(1.42-10.23)	0.02
>2(ref)	1.00	
Education		
No formal	4.95(1.69-15.46)	0.01
Primary	2.56(1.87-10.83)	0.02
Secondary and above(ref)	1.00	
Gestational age		
<37 weeks	3.24(1.42-19.23)	0.00
>37 weeks(ref)	1.00	

Birth order		
First	1.74(0.60-13.58)	0.11
Second	0.15(0.10-11.65)	0.06
≥Third(ref)	1.00	
Weekly income (₦)		
≤2500	2.41(1.14-12.32)	0.02
2500- 10000	1.07(1.04-14.41)	0.01
>10000(ref)	1.00	
Place of delivery		
Mission	1.51(0.53-14.32)	0.44
Secondary health facility(ref)	1.00	

CHAPTER FIVE

DISCUSSION

5.1 PREVALENCE OF LOW BIRTH WEIGHT

This cross sectional study of mothers delivering and their newly delivered infants was carried out to examine the prevalence and factors associated with low birth weight in a secondary health facility and faith based delivery homes (mission). The observed mean birth weight of infants in the study is comparable to study conducted by Lawoyin (1992). This similarity could have been due to similar population and cultural background. The overall prevalence of in the study was slightly lower than the national average of 14% (NDHS, 2003). The prevalence of low birth weight recorded in the secondary health facility, though lower than the national average of 14%, still lies within the recent estimates of low birth weight incidence in Nigeria 6-21% (Lawoyin & Oyediran, 1992; FMOH, 2005). The prevalence observed is however higher than that from developed world (5%, 6%, 8% seen in Norway, Canada and United Kingdom) (UNICEF, 2007). This could be as a result of efforts to address demographic, social and environmental risk factors of low birth weight (Martin et al.,2009) in the developed world, increased social supports for mothers at high risk of having low birth weight babies (Ellen, 2000), expanded access to medical and family planning services, taking a life span approach to health care, ensured that their pregnant women get adequate nutrition, support sustained research on the causes of low birth weight (Johnson et al.,2006) and sustain programs that offered nutritional support to low-income expectant mothers and infants (Bitler & Currie, 2005).

The study site is geographically located in south west of Nigeria, therefore, it is not surprising that majority of respondents in the mission and secondary health facilities were Yorubas. Of all the babies delivered by mothers in the total population, in the mission, and in the secondary health facility, the proportion of boys was higher than those of the girls delivered. However, the ratio boys/girls were not higher than expected biologically.

Low birth weight was associated with maternal age, mother's educational status, gestational age, period of ANC registration, inter pregnancy interval, and mothers' weekly income. No association was found between low birth weight and parity, low birth weight and birth order, low

birth weight and place of delivery in the Total population. In the mission home, the bivariate analysis showed that low birth weight has a statistically significant association ($p<0.05$) with maternal age, education, gestational age, period of ANC registration, inter-pregnancy interval, weekly income only, and no association was found between low birth weight and parity, low birth weight and birth order. In the secondary health facility, the bivariate analysis showed that Low birth weight has bivariate association with maternal age, mother's educational status, gestational age, period of ANC registration, inter pregnancy interval, birth order and weekly income. No association was found between low birth weight and parity.

5.2 FACTORS PREDICTIVE OF LOW BIRTH WEIGHT IN THE TOTAL RESPONDENTS

Further analysis to control for confounding effect of some variables using logistic regression in the total respondents revealed that maternal age, education, gestational age, period of ANC registration, inter-pregnancy interval, weekly income were factors found to be significantly associated with birth weight ($p<0.05$) while parity and birth order were not significantly associated with birth weight. This implies that irrespective of the place of delivery, maternal age, education, gestational age, period of ANC registration, inter-pregnancy interval, weekly income influence the birth weight of infants.

The incidence of low birth weight increased as the literacy level of mothers reduced (Table 11). This study reported mothers with no formal education being five times more likely to deliver low birth weight babies than more literate mothers. This is in line with what was reported by a research conducted in a tertiary hospital in Enugu, South east Nigeria, where mothers without formal education were four times more likely to give birth to low birth weight neonates than those who attained higher education (Ezugwu et al, 2010). This could be because illiterate or poorly educated mothers are more likely not to receive ANC than the educated. In an earlier study conducted in Zaria, Nigeria, women with no formal education and no antenatal care had higher incidence of low birth weight babies, perinatal and maternal morbidity (Briggs, 2004).

During the study, there was no significant difference in the maternal age of mothers delivering in the secondary health facility and the mission home. However, mothers below age of twenty-five years (≤25years) age group gave birth to significantly lighter babies. There was an increasing

trend of birth weight with mothers' age in both groups. Irrespective of place of delivery, mothers in the age category ≤25years were about four times more likely to deliver low birth weight babies (see Table 19). This result is consistent with other studies where a higher incidence of low birth weight was recorded amongst teenage mothers as compared with women in other age group category (Dawodu, 1985; Abiodun, 2004). Younger mothers have been found to deliver lighter babies for variety of reasons. One contributing factor is thought to be as a result of competition for nutrients in the younger mothers who are themselves growing, and the most commonly hypothesized biological explanation for lighter babies in adolescent mothers is the biological immaturity of the mothers (Kirchengast et al, 2003). Apart from the possible competition for nutrients between the adolescent and foetus, one other contributing factor has also been said to be that these adolescents make less use of antenatal care and obstetric services (Amosu, 2010)

Irrespective of place of delivery, mothers who registered early for ANC in their first trimester have better weight babies and a reduced incidence of low birth weight was recorded by such mothers. This is in line with what was reported by other studies. Early antenatal care initiation has been associated with heavier birth weights (Eisner et al, 1979; Negi et al, 2006). Also associated with reduced incidence of low birth weight is "early trimester and regular antenatal care visit by pregnant women (Letamo &Majelantle, 2001). Mothers who registered late for ANC (third trimester) were about five times more likely to deliver low birth weight babies as compared with babies delivered to mothers who registered early (first trimester) for ANC. This suggests the importance of early ANC registration by pregnant women.

Gestational age was found to be significantly associated with infant birth weight ($p<0.05$) in the study. Mothers whose gestational age was less than thirty-seven weeks were found to deliver more low birth weight babies as compared with mothers whose gestational age was greater than thirty-seven weeks. Several studies also reported that gestational age at delivery significantly determined the incidence of low birth weight, and that mothers whose gestational age was less than thirty seven weeks had more incidence of low birth weight (Siza, 2008). Mothers whose gestational age was less than thirty-seven weeks were about three times more likely to deliver low birth weight babies than mothers whose gestational age was greater than thirty seven weeks.

The highest incidence of low birth weight babies recorded were babies delivered by mothers whose birth interval was less than two year (Table 18). Babies delivered by such mothers were

3.55 times more likely to deliver low birth weight babies, than babies delivered to mothers whose birth interval was higher (greater than two years). This is similar to what was observed in other studies (Lawoyin, 1992; Anand, 2000). A short birth interval since the previous birth might lead to poor pregnancy outcome (low birth weight). As reported by Kramer (1987), nutritional depletion could be the most obvious biological mechanism for such an effect, but inadequate physiological (e.g hormonal) recovery could arise for other reasons.

Even though several studies reported birth order and Parity as important factors influencing birth weight (Nurul et al, 1993; Defo & Parkin, 1993; Magadi et al, 2000), this study found no association between "Parity and birth weight" and "Birth order and birth weight".

CONCLUSION

The study recorded a high LBW prevalence and this requires urgent attention in order to attain the Millennium Development Goals by year 2015.

No significant association was found between the main explanatory variable- place of delivery with birth weight. However, irrespective of place of delivery, the results of this study found that maternal age, education, gestational age, period of ANC registration, inter-pregnancy interval, and weekly income affected infant birth weight.

The study has demonstrated gross disadvantages of teenage pregnancy, low maternal education, late ANC registration period, close inter-pregnancy interval and gestational age less than 37 weeks amongst pregnant women. There is an urgent need to address the broader developmental challenge of these reproductive health behaviours, and much redress should be made through interventions that will be designed to address them.

This study therefore suggests that for reducing low birth weight, intervention approaches that will go beyond clinical or primary care settings are warranted for better education of women, and whatever strategy that would be put in place must focus attention on education, ANC provision to encourage wider child birth interval and discourage teenage pregnancy. Concerted efforts in health and non- health sectors are necessary for improvement in health and social status of women in order to reduce low birth weight.

Finally, lowering the LBW rate can help to improve our nation's overall health and relieve the increasing burden it places on educational institutions, social services, families and individuals, thus a good strategy towards achieving MDG 4.

RECOMMENDATIONS

Numerous opportunities exist before pregnancy to reduce the incidence of low birth weight, yet these are often looked in favor of interventions during pregnancy. The recommendations that follow are divided into suggested public health intervention which is based on those modifiable factors that have been found to be significantly associated with birth weight irrespective of place of delivery.

1. Among the risk factors that can be recognized and addressed before pregnancy are: age (teenagers), possibility of very short interval between pregnancies, high parity. Therefore, reducing the risk before conception by advising such mothers on the reasons why not to conceive early should be put in place. This can be done by making pre-pregnancy consultations more available from a variety of professionals in different setting- obstetrician & gynecologists, nurses & midwives, family planning personnel.

2. Education about reproduction, contraception, pregnancy and associated topics should be done, and provided in a variety of ways through public information campaigns in schools, lectures and related printed materials in all health care settings. Also, sex education and family life education curricula and teaching materials should be provided in schools and work sites. This is also in a bid to discourage teenage pregnancy.

3. Encouraging wider space "birth interval", especially by educating them on the available family planning services available e.g. use of contraception especially for low-income women and young adolescents, to encourage a wider space "birth interval" should be an integral part of overall strategies to reduce the incidence of low birth weight. When this is done,

   i) It will help to reduce the number of births to women with a variety of high risk characteristic.

   ii) It will also reduce the proportion of pregnancies that are intended and wanted at time of conception. It is apparent, for example that a woman who has planned for and welcomed her pregnancy will follow the health, and practices necessary to increase

the chances of a successful pregnancy outcome more adequately than a woman with an undesired pregnancy.

4. Pregnant women should be encouraged by everyone around them to register for ante-natal care early, so that "at risk pregnancy can be detected on time and treated. Also, safe maternal hygienic practices to reduce harmful practices during pregnancy will be taught them during such visits. Maternal illnesses during pregnancy will also be checked early.

5. Discouraging teenage pregnancies at all cost should be the duty of every member of the society. This is because delayed child bearing amongst our young adolescents will help the teenagers who themselves are still growing to grow, develop mentally, physically and be able to take decisions as regards their health and pregnancy.

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APPENDIX 1

QUESTIONNAIRE ON RELATIONSHIP BETWEEN MATERNAL SOCIO-DEMOGRAPHIC CHARACTERISTICS WITH BIRTH WEIGHT AT A SECONDARY HEALTH FACILITY AND MISSION HOMES IN IBADAN.

Dear Respondent,

I am a postgraduate student and presently carrying out a study on the "**Relationship between maternal socio- demographic characteristics with birth weight at a Secondary Hospital and 2 mission homes in Ibadan.**" Please be informed that participation is voluntary and also that there is no right or wrong answer to the questions. Please, be rest assured that all information provided by you would be used for research purpose only and strict confidentiality would be ensured. No name is required in filling the questionnaire. Please try and give honest response to the question as much as possible. You are free to ask questions where it is not clear.

Thank you for your co-operation.

Shittu. D.I.

FOR OFFICIAL USE ONLY
SERIAL NUMBER_____

INSTRUCTION: PLEASE TICK (√) OR FILL IN THE ANSWER WHERE APPROPRIATE

SECTION A: SOCIO DEMOGRAPHIC INFORMATION

1. Age at last birthday in years .....
2. Highest level of education

   1. No formal education [ ] 2. Primary education [ ]
   3. Secondary education [ ] 4. Tertiary education [ ]
   5. Others (please specify) _____

3. Ethnic group: Yoruba [ ] Igbo [ ] Hausa [ ] Others (please specify) _____
4. Religion: Christianity [ ] Islam [ ] Traditional [ ] Others (please specify) _____
5. Occupation (what do you do?).....
6. Maternal weight in kg.....

7. Maternal height.....

8. Which of these best describe your marital status?

Married living with husband [ ] Married but live separately [ ]

Divorced [ ] Widowed [ ] Never married [ ]

9. Parity (no of children born).....

10. How many wives have your husband? .....

11. What is your position? 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Others (please specify) _____

SECTION B: CHARACTERISTIC OF BABIES

12. Gestational age (ultrasound).....

13. Gender: Male [ ] Female [ ]

14. Birth order: 1 [ ] 2 [ ] 3 [ ] 4+ [ ]

15. Weight of baby in kg.....

16. Number of foetus: Single [ ] Multiple [ ]

SECTION C: OBSTETRIC HISTORY OF MOTHER

	Yes	No	If yes, number
17. Ever had abortion?	[ ]	[ ]	[ ]
18. Ever delivered still birth?	[ ]	[ ]	[ ]
19. Ever had premature delivery?	[ ]	[ ]	[ ]
20. Breeched delivery?	[ ]	[ ]	[ ]
21. Delivery by C/S?	[ ]	[ ]	[ ]

22. Gap between this baby and the previous one: .....

SECTION D: SOCIAL FACTORS

		Yes	No
23.	Drug use during the course of pregnancy	[ ]	[ ]

24. If yes, please state the drug used.....

25. Smoking activity during pregnancy [ ] [ ]

If yes,

26. How many sticks per week.....

27. Alcohol intake during the course of pregnancy [ ] [ ]

If yes,

28. How many bottles per week.....

Access to Ante natal care

29. Number of Ante natal visits before delivery.....

30. How many months old was the pregnancy when you started attending antenatal.....?

31. When was the last time you attended antenatal before delivery (day).....?

32. Who attended to you at the health centre.....?(is it doctors or skilled health provider?)

		Yes	No
33.	Do you meet health personnel to attend to you always...	[ ]	[ ]

Which of these people attend to you?

34.	Doctors	[ ]	[ ]
35.	Nurses	[ ]	[ ]

36. Mid wives [ ] [ ]

37. Others (specify)

39. How much does it cost you to transport yourself from your house to the health centre.....?

40. Can you conclude that your use of Ante natal care is?

Inadequate [ ] Fair [ ] Adequate [ ]

How much do you earn?

41. Daily [_____]

42. Weekly [_____]

43. Monthly [_____]

SECTION E: MATERNAL MORBIDITY (SICKNESS) DURING PREGNANCY

What sickness was encountered during the course of pregnancy?

	Yes	No
44. Malaria	[ ]	[ ]
45. Typhoid fever	[ ]	[ ]
46. High blood pressure	[ ]	[ ]
47. Respiratory tract infection	[ ]	[ ]
48. Sexually transmitted infection	[ ]	[ ]
49. Diabetes	[ ]	[ ]

50. Others (please specify) _____

THANK YOU FOR YOUR ATTENTION

INFORMED CONSENT FORM

IRB Research approval number:

This approval will elapse on:

Title of the research: Relationship between maternal socio- demographic characteristics with birth weight at a Secondary Hospital and 2 mission homes in Ibadan."

My name is _____. I am a student of the Department of _____ Faculty of _____ U.I. Ibadan.

Purpose of research: This research is self sponsored. The purpose of this research is to determine the Relationship between maternal socio- demographic characteristics with birth weight at a Secondary Hospital and 2 mission homes in Ibadan. Nigeria.

Procedure: The research will be carried out in a public secondary health facility and two Faith based missionary delivery homes which will be purposively selected. About 236 participants are to participate from the health facilities. If you agree to participate in this study, you will be expected to provide some information on a questionnaire.

Expected duration: The research is expected to take about 12-14 weeks.

Risks: There are no risks involved in taking part in this study.

Costs to the participant: Your participation in this study will not cost you anything.

Benefits: Health-care workers and mothers who are not knowledgeable about low birth weight will be provided with the right answer to the question asked in the questionnaire so as to enlighten them about low birth weight and factors involved which will in turn help them to take preventive measure against low birth weight.

Confidentiality: All information provided by you and/or collected about you will be treated with the utmost confidentiality and will be used only for research purposes. Codes will be given to questionnaire and other data collected so that information cannot be linked back to you.

Voluntariness: Mother's participation in this research is entirely voluntary. You will not be paid any fees for participating in this research. However the researchers promise to make good faith effort to comply with your wishes as much as possible.

Treatment in case of injury: There is no injury expected in the course of this project.

Conflict of interest: There are no conflicts of interest among the researchers.

Statement of person obtaining informed consent:

I have fully explained this research to _____
and I have given sufficient information, including about risks and benefits to make an informed decision.

Date: _____ Signature _____

Name: _____

Statement of person giving informed consent:

I have read the description of the research or have had it translated into the language I understand. I also understand that my participation is voluntary. I know enough about the purpose, methods, risks and benefits of the research study to judge that I want to take part in it. I have received a copy of this consent form and additional information sheet to keep for myself.

Date: _____ Signature _____

Name: _____

Witness' signature (If applicable) _____

Witness' name _____

Contact information:

This research has been approved by the Oyo State Ministry Ethics Committee and the Chairman of this Committee can be contacted at Oyo State Ministry of Health. In addition, if you have any question about your participation in this research, you can contact the principal investigator Miss Shittu Deborah Iwalola at the department of Epidemiology, Medical Statistics and Environmental Health, Faculty of Public Health, UCH, Ibadan. The phone number is 08033615135.