RISK FACTORS ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES AMONG ADOLESCENTS AND YOUNG PERSONS IN IBADAN METROPOLIS

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CERTIFICATION

This is to certify that AYOOLA, Ayobami Esther carried out this work under my supervision in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria.

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DEDICATION

This dissertation is dedicated to the Almighty God, the Author and Finisher, who was with me from the beginning of this project to its ultimate completion.

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ABSTRACT

BACKGROUND: Adverse pregnancy outcomes are those pregnancy outcomes other than normal live birth which are the major causes of neonatal morbidity, mortality and long term physical and psychological problems. Although substantial studies have been carried out in order to determine the prevalence and determinants of adolescent pregnancy, research to investigate the risk factors associated with adolescent pregnancy outcomes has been few and far between especially in Ibadan and its environs. This study was aimed at determining the knowledge of adverse pregnancy risk factors, identifying the adverse pregnancy outcomes, and the risk factors associated with adverse pregnancy outcomes among adolescents in Ibadan.

METHOD: The study was a descriptive cross – sectional study in which 186 adolescent mothers who gave birth within three months before the commencement of the study in the selected health facilities were recruited. Data was collected using an author formulated semi – structured questionnaire that was interview administered. Obstetric records of the respondents was extracted from the case notes by the nurses who were recruited into the study as research assistants. Knowledge of pregnancy risk factors of the respondents was also tested, of which those that scored below the mean had poor knowledge and those that scored above the mean had good knowledge of pregnancy risk factors. Statistics such as frequencies, percentages, bivariate analysis, and logistic regressions were used in the analysis of the data.

RESULT: Of the 186 respondents recruited into the study, 163 (87.6%) of them were aged between age group 15 – 19 years with 100 (53.8%) of them being Christians, 101 (54.3%) single, 117 (62.9%) of them self – employed, 92 (52.2%) of them secondary school leavers and 131 (70.4%) primipara. Knowledge of the adolescents on pregnancy related risk factors were also tested and scored. 54.3% of them had good knowledge of risk factors while 10.8% had poor

knowledge of the risk factors. Most commonly reported maternal adverse pregnancy outcome were PROM 19 (10.2%), and post – partum haemorrhage 22 (11.83%). Common perinatal outcomes observed in the study were LBW 43 (23.1%), preterm delivery 52 (28.0%), and cord around the neck 3 (1.6%). Chi – square and logistic regression analysis was carried out to test the association between risk factors and adverse pregnancy outcomes, and preterm birth had factors such as age (OR=7.926, p value 0.009), ANC attendance <4 (OR=3.224, p value 0.019), and non – prescription drug usage (OR=0.297, p value 0.035). ANC attendance (OR=5.150, p value 0.044), parity (OR=0.024, p value 0.003), antepartum haemorrhage (0.276, 0.039), and preterm birth (OR=15.886, p value 0.000) were significantly associated with LBW. PROM was significantly associated with age (11 – 19 years) (OR=0.139, p value 0.014), PIH (OR=4.434, p value 0.033), and non – prescription drug usage (OR=5.164, p value 0.045).

CONCLUSION: This research has been able to show that adolescent mothers, though, have a high knowledge of the adverse pregnancy risk factors, only few of them know the main outcomes of most of these risk factors, and as such need more education regarding pregnancy risk factor and outcomes.

KEYWORDS: *Adolescenst, Young persons, Adverse pregnancy outcomes, Risk factor*

WORD COUNT: 494

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LIST OF ABBREVIATIONS

PROM:	Premature Rupture of the Membrane
PIH:	Pregnancy Induced Hypertension
APH:	Haemorrhage
PPH:	Post – partum Haemorrhage
LBW:	Low Birth Weight
IUFD:	Intra – uterine foetal death
IUGR:	Intra – uterine growth restriction

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

An adolescent, according to World Health Organization (WHO), is defined as an individual aged 10 – 19. Adolescent pregnancy is a serious health and social problem worldwide, and more than 90% of cases occur in developing countries and carry considerable risk. About 14 million women and girls between the ages 15 and 19 years (both married and unmarried) give birth each year and complications of pregnancy and childbirth for this age group are a leading cause of death, with unsafe abortions being a major factor (UNFPA, 2005).

Pregnancy outcomes refer to life events that occur to new born babies from the age of viability (usually 28 weeks) to the first week of life.Adverse pregnancy outcomes are those pregnancy outcomes other than normal live birth which are the major causes of neonatal morbidity, mortality and long term physical and psychological problems. Some of the adverse pregnancy outcomes are preterm birth, low birth weight, low Apgar scores, preterm birth, macrosomia, perinatal death, obstructed labour, maternal deaths, etc. (Nkwo et al., 2014; Najim et al., 2015; Althabe *et al*., 2015; Kohei et al., 2019). Children born to adolescents are more likely to have low birth weight, inadequate nutrition and anemia, and these young women are more likely to develop cervical cancer later in life. Moreover, early child bearing has been linked to obstetric fistula, a devastating and socially isolating condition that leaves women incontinent, disabled, and in chronic pain (WHO, 2008; UNFPA, 2010).

Risk factors associated with pregnancy are all the aspects that endanger the life of the mother and the baby (Theobald and Napendaeli, 2010). Thesefactors may include maternal factors such as poor nutrition of the woman, child spacing, maternal age (under 15 years and

over 35 years), inadequate prenatal care, lifestyle behaviours; e.g. smoking, alcohol consumption, drug abuse and unsafe sexual practices; overweight, obesity and poverty (Wardlaw & Kessel, 2002). A study by Kazaura *et al.* (2006) reported that, several risk factors influence neonatal mortality. These include parity, maternal age, race, marital status, smoking, birth weight, gestation age, labour complications, antenatal care, previous unfavourable outcomes e.g. stillbirth, neonatal deaths, maternal morbidity e.g. malaria and HIV infection and poor socio-economic conditions. LBW remains a public health problem in many parts of the world and is associated with a wide range of health problems, lasting disabilitiesand even deaths (March of Dimes, 2009). One-halfof low birth weight infants in industrialized countries are born preterm (<37 weeks gestation), however, in the developing countries these children are born at term but are affected by intrauterine growth retardation that begins early in pregnancy (Ramakrishnan**,**2004).Low birth weight (LBW) and preterm infants are at higher risk ofmortality and different health anddevelopmental problems. Due to this, the birth of a preterm or low birth weight infant can havesignificant emotional and economic effects on the infant's family (IOM, 2007).Birth outcomes related topreterm birth and low birth weight are the second leading cause of infant death in the UnitedStates (after birth defects).The infant mortality rate for LBW infants is about 25times that of the infant mortality rate for normal weight babies. Likewise, the infant mortalityrate for late preterm babies (34–36 weeks of gestation) is about three times the infantmortality rate for term babies, and the infant mortality rate for very preterm babies (less than32 weeks of gestation) is 75 times that of term babies (Matthew and MacDorman, 2008).Preterm infants may experiencecomplications such as acute respiratory, gastrointestinal, immunologic, and central nervoussystem problems. Longer – term effects of preterm birth, including motor, cognitive, visual,hearing, behavioral, social-emotional, health, and growth

problems, may not become apparentfor years and may persist throughout a child's life into adulthood. It is important to recognizethat not all infants born before 37 completed weeks have the same risk of adverse healthoutcomes. As gestational age decreases, the risk of morbidity and mortality increases greatly.Also, recent research suggests that even early term births, those at 37 or 38 weeks, are atincreased risk of respiratory and other adverse neonatal outcomes (Clark et al, 2009; Tita et al, 2009; Moster et al, 2010).

Evidence from literature suggests that adolescents; who are unmarried, with low socio – economic status, little or no education, are not employed, who live in rural areas; are more likely to have adverse maternal and perinatal outcomes than their counterparts who have all these things because they are not likely to make use of maternal and child services available, hence leading to all sorts of pregnancy complications. As a result of this, there will be an increase in neonatal and maternal morbidity and mortality.

Nigeria is the most populous country in sub-Saharan Africa with a population of over 178 million. It also has a very young population. The majority of the population (63.3 percent) is below the age of 25 years, and 22.5% of the country's population between the ages of 10- 19 years.In Northern Nigeria, eclampsia was reported to be the leading cause of maternal mortality (Kullima et al. 2009). This is attributed to cultural practices such as early marriage leading to early child bearing in the wake of poor maternity care services that are grossly underutilized. In a recent report from Maiduguri North eastern Nigeria, eclampsia accounted for 46.4% of all maternal death (Kullima et al. 2009; Mairiga and Salihi, 2009).

This study aimed to examine the risk factors associated with adverse pregnancy outcomes among adolescents in Ibadan metropolis.

1.2 PROBLEM STATEMENT

Maternal mortality ranks second among causes of death of 15–19 year old girls globally, exceeded only by suicide (WHO, 2014). Adolescent pregnancy remains a major contributor to maternal and child mortality, and to intergenerational cycles of ill – health and poverty. Pregnancy and childbirth complications are the leading cause of death among 15 – 19 year old girls globally, with low and middle income countries accounting for 99% of global maternal deaths of women of reproductive group, i.e., 15 – 49 years. Adolescent mothers face higher risks of eclampsia, puerperal endometris, and systemic infections than women aged 20 – 24 years. In the same vein, some 3.9 million unsafe abortions among adolescent girls aged 15 – 19 years occur each year contribution to maternal mortality and lasting health problems. Furthermore, the emotional, psychological and social needs of pregnant adolescent girls is usually greater than those of older women, and such, more care and attention is needed to be shown to them (WHO factsheet, 2018).

According to World Health Organization report, more than 830 women die from pregnancy and or childbirth related complications around the globe daily. In 2015 alone, more than 303,000 women died during and following pregnancy and childbirth (WHO, 2015). Adverse pregnancy outcomes such as stillbirths, miscarriage, abortions and preterm births are being used as a maternal health indices globally (Awiti, 2013). Over 60% of preterm births take place in south Asia and sub – Saharan Africa (Lee et al., 2013). Abortions and stillbirths are also common adverse pregnancy outcomes that contribute substantially to poor maternal health outcome. Among an estimated 210 million pregnancies, 75 million end in abortion or stillbirth (Grimes et al., 2006; UNDESA, 2009).

The overall prevalence of adolescent pregnancy is Africa was found to be 18.8%, with Sub – Saharan Africa having a pooled prevalence of 19.3%, which is higher than the overall prevalence of Africa (Kassa et al., 2018). This simply shows that adolescent pregnancy is predominant in Sub - Saharan Africa, Nigeria belonging to this group. Evidence from various studies have also shown that adverse pregnancy outcomes have a strong and consistent association with biological, social and environmental factors. Many studies have found that socioeconomic status, income inequality and demographic factors are correlate with pregnancy outcomes.

Majority of maternal deaths (99%) of women aged 15 – 19 occur in low and middle income countries, particularly in Sub – Saharan African countries (WHO, 2016). Varying degrees of adolescent pregnancies were observed in the different sub – regions of Africa. East Africa had the highest prevalence of adolescent pregnancy (21.5%) while North Africa had the lowest (9.2%) in the region. The possible reasons for this observed disparity was put down to socio – cultural, environmental and economic factors, which all result in differences in access to the limited adolescent sexual and reproductive health services (Kassa et al., 2018).

1.3 JUSTIFICATION OF THE STUDY

Adolescent pregnancies are high risk pregnancies and it is important that health care providers take the necessary precautions so as to help reduce the associated morbidity and mortality. Making pregnancy safer for adolescents should be a clear priority for countries in their efforts to meet the SDGs (WHO, 2009). Although substantial studies have been carried out in order to determine the prevalence and determinants of adolescent pregnancy, research to

investigate the risk factors associated with adolescent pregnancy outcomes has been few and far between especially in Ibadan and its environs. As a result, this study will outline the risk factors associated with adolescent pregnancy outcomes and this will help policy makers in formulating policies to protect this group of individuals, some of whom are vulnerable.

The methodology will also make it possible to identify adolescent mothers that have already experienced the pregnancy outcomes and then questions will be asked to identify factors that might have led to it. The study will inform policy decisions related to adolescent sexual and reproductive health leading to a reduction in adolescent pregnancies which will subsequently reduce maternal and perinatal mortality especially among adolescent mothers.

This study focuses on adolescents because pregnancy can prevent girls from exercising their rights, including the right to education and to the social supports they need for healthy development and a safe and successful transition to adulthood. The consequences of adolescent pregnancy have a lasting effect throughout the girl's life and for generations after, especially concerning the children born to her (UNFPA, 2015). This is why it is important to make the young teenage mothers healthy enough and avert all kinds of harm to them and their babies that could be incurred as a result of poor maternal and obstetric services. This study will enable health workers to identify adolescent pregnancy as high risks pregnancies and subsequently treat it as such. It also enable family members to provide the necessary social support and connectedness needed by the young mothers at this period.

1.4 RESEARCH QUESTIONS

1. What is the knowledge of the young mothers regarding pregnancy related risk factors?
2. What are the various adverse outcomes associated with adolescent pregnancy?

3. What are the risk factors associated with adverse pregnancy outcomes in adolescents in Ibadan?

1.5 GENERAL OBJECTIVE

To determine the knowledge of adverse pregnancy risk factors, and the risk factors associated with adverse pregnancy outcomes among adolescents in Ibadan.

1.6 SPECIFIC OBJECTIVES

1. To assess the knowledge of adverse pregnancy outcomes related risk factors among adolescent mothers in Ibadan.
2. To identify the common adverse outcomes associated with adolescent pregnancy among adolescent mothers in Ibadan.
3. To identify the risk factors associated with adverse pregnancy outcomes among adolescent mothers in Ibadan.

CHAPTER TWO

LITERATURE REVIEW

2.0 PREVALENCE OF ADOLESCENT PREGNANCY

A population registry – based study carried out in Northwest Russia observed a 4.7% prevalence of adolescent pregnancy (Usynina et al., 2018) which is lower than that found by Lewis et al. (2009) in West Australia (11%) and Chen et al. (2007) in the United States (8.75%). Kassa, *et al*. (2018) carried out a meta–analysis and discovered that one – fifth (18.8%) of adolescents get pregnant in Africa. From their study, it was discovered that East Africa sub – region had the highest prevalence (21.5%) and North Africa sub – region had the lowest prevalence (9.2%). Possible reasons for the observed disparities was supposedly due to sociocultural, environmental and economic factors, which all hinders access to the already inadequate adolescent sexual and reproductive health services. This showed a higher prevalence of adolescent pregnancy in Africa compared to other low and middle income countries. Rates of adolescent pregnancy are increasing in developing countries, with higher occurrences of adverse maternal and perinatal outcomes (Kassa, *et al*, 2018).

The Global Network's Maternal and Newborn Health Registry Study carried out in six low – and – middle – income countries (Kenya, Zambia, India, Pakistan, Gautemela and Argentina) found an overall prevalence of adolescent pregnancy of 11.9% among adolescents within age group 15 – 19 years and 0.14% in age group < 15 years. Disaggregating the

prevalence in the age group 15 – 19 years according to countries, Kenya had 21.4%; Zambia, 25.1%; India, 9.6%; 3.8% in Pakistan; 16.1% in Gautemela; and 26.0% in Argentina. Among the < 15 years age group, 0.2%; 0.4%; 0%; 0%; 0.3% and 1.1% in the above listed countries respectively. This shows huge discrepancies in the prevalence from each of these countries although they are all LMIC (Althabe et al., 2015). These disparities in pregnancies could be attributable to differences in lifestyle and even meeting of the contraceptive needs of the adolescents in these countries. Also, attitudes towards sex will be different in these countries as can be seen with Pakistan having the least prevalence, followed by India. Studies from different countries in Sub – Saharan Africa has also shown these differences in the prevalence of adolescent pregnancy. Mombo – Ngoma et al (2016) in their study in Sub – Saharan Africa, found out that among 4100 pregnant women with singleton livebirths in their study, 24% were adolescents, with 6% aged ≤16 years old.

In 2010, Adeyinka D.A, Oladimeji O., Adekanbi T.I., et al. in their study in Ibadan, Southwestern Nigeria, aimed at evaluating the risk factors of adolescent pregnancy, assessing and exploring the occurrence of specific complications among adolescent parturient to older controls in University College Hospital (UCH), found out that the proportion of adolescent pregnancy between January, 2007 and November, 2008 was between 1.5% and 2.2% (Adeyinka et al., 2010). This is almost similar to findings by Isiugo – Abanihe and Oke (2011) in their study in Ibadan. They found the prevalence of teenage pregnancy to be 2.8%. This is slightly higher than that found by Adeyinka et al in their study in 2010, and could be as a result of an increase in the use of health facilities by pregnant adolescent. It could also be attributed to the fact that it was a multicenter study.

A study carried out by Maduforo and Ojebode (2011) found that the prevalence of adolescent pregnancy in Adamawa State, Northeastern Nigeria was 51%. Ezegwui et al (2011) in their study in Enugu State, Southeastern Nigeria, found an incidence of 1.67% adolescent pregnancy. A study in Bayelsa State, Nigeria, found out that 6.2% of deliveries at the Niger Delta University Teaching Hospital were to adolescents aged 14 – 19 years old (Ayuba and Owoeye, 2012). In Kano State on the other hand, Garba et al (2016) in their study to assess the obstetric of teenage pregnancy, its current trend, socio – demographic determinants and incidence, found a higher incidence of 5.8% (58/1000 deliveries). This observed difference in incidence could be as a result of the practice of early marriage and early childbirth which is a cultural practice predominant in the Northern parts of Nigeria, compared to the East, where adolescent pregnancy is seen as a social stigma on the adolescent mother and the family as a whole. The high incidence of adolescent pregnancy in Bayelsa State could be as a result of low sexual education and contraceptive use and a more liberal attitude towards adolescent pregnancy as most of the adolescents in the area were unmarried.

Guimaraes et al (2013) in a study carried out in Northeastern Brazil among mothers and their newborns to determine whether adolescent pregnancy is a risk factor for low birth weight babies, found 20.6% prevalence of adolescent mothers, 9.6% of which were mothers aged < 18 years, while the remaining 11% were aged 18 – 19 years old. In contrast, a higher prevalence (28.6%) was observed by Yohannes et al (2018) in North – eastern Ethiopia. In the retrospective population registry – based study by Usynina et al (2018) in Northwest Russia, the prevalence of adolescent pregnancy was found to be 4.7%. This is significantly lower than the prevalence found by Guimaraes et al and Yohannes et al in Northeast Brazil and Northeast Ethiopia respectively.

Rexhepi et al (2019) in their study in Republic of Macedonia, aimed at comparing maternal, perinatal and neonatal outcomes in adolescents and adult women aged 20 – 24 years, they found out that the prevalence of adolescent pregnancy was 2.27%.

2.1 KNOWLEDGE OF ADOLESCENT MOTHERS REGARDING PREGNANCY RELATED RISK FACTORS

Pregnancy risk factors are all aspects or activities involved with the pregnancy that could pose danger to the mother and baby (Theobald and Napendaeli, 2010). Such factors which could be risk to pregnant women include lifestyle behaviours (such as smoking and alcohol consumption), poor nutrition of the woman, child spacing, inadequate prenatal care, maternal age (under 15 years and over 35 years), drug abuse, unsafe sex, overweight and obesity and even low socio – economic status (Wardlaw and Kessel, 2002) .

A study in Tanzania by Theobald and Napendaeli, carried out to determine the factors influencing pregnancy outcomes, most of the above listed pregnancy related risk factors were identified. It was further found out that most of the pregnant women had knowledge of most of these risk factors as been of high risk although majority of them don't know their exact outcome on the baby and mother. 79.6% of the women knew that tobacco use during pregnancy could lead to adverse outcomes. Of these, only 20.4% knew that tobacco use especially cigarette smoking could lead to harmful effects on the mother and the unborn child. The others were not aware of the danger, they just know that it is not a good habit especially during pregnancy. On the dangers of alcohol consumption, 42.7% of the women were not aware of the danger of

alcohol to the unborn child. Only 29.3% of the women knew the effect of alcohol on the unborn child. 70.7% of the women were not aware that closely spaced births could lead to harmful effects on the mother and the unborn child, most of whom were primi – gravidas. 14% of the women were not even aware that there was an association between child spacing and poor pregnancy outcomes (Theobald and Napendaeli, 2010).

On the other hand, a study carried out in Naples, Italy to assess the levels of knowledge, attitudes and behaviours of women about the main maternal risk factors in pregnancy, it was found out that a large percentage of the women knew that alcohol (90.4%), smoking (88.1%), obesity (66.1%) and passive smoke (63.3%) during pregnancy could harm the health of the foetus, leading to different adverse pregnancy outcomes (Guiseppe et al., 2015). Only 42% of the respondents however correctly knew the main maternal risk factors outlined in the study. The study also found that women of lower educational status, young maternal age and Italians were less likely to know the main risk factors. A large proportion of the women also agreed that alcohol consumption (91.4%), rubella infection (86.7%), maternal weight (56.2%) and smoking (53.7%) in pregnancy could cause harm to the foetus. Out of these, only 21.7% of the women were very worried about causing harm to the foetus or the child with their risk behaviours. 22.3% of the women reported smoking during pregnancy, which was slightly lower than the 26.3% who smoked during pregnancy in a study in Greece. 28.9% reported drinking alcohol regularly before pregnancy, but 74.8% of these women reported that they had stopped alcohol when they became pregnant. Also, 7.6% of the women both smoked and drank alcohol during the first trimester of pregnancy despite knowing that they were risk factors to the baby (Guiseppe et al., 2014; Vivalaki et al., 2016). The knowledge of tobacco as a pregnancy risk factor in this study is slightly higher than that found by Theobald and Napendaeli in their study in Tanzania. This

difference in knowledge could be as a result of higher educational status of the Italy respondents compared to the Tanzanian participants.

Using results from the Health Styles, 2008 survey, a study carried out in Atlanta, Georgia to determine the knowledge and attitudes towards prenatal smoking and its effects on pregnancy outcomes among adult in general and reproductive aged women, it was discovered that there was 15% high knowledge, 58% low knowledge and 27% low knowledge about smoking during pregnancy and its potential adverse outcomes. Those with high knowledge of the effects of smoking in pregnancy were characterized by higher educational level (> high school), married, and non – smokers. Also, women were more likely to have a higher knowledge about the associated adverse outcomes of smoking in pregnancy than men (Polen et al., 2016).

2.2 VARIOUS ADVERSE OUTCOMES ASSOCIATED WITH ADOLESCENT PREGNANCY

Adolescent pregnancy, especially among early adolescents (aged ≤ 15 years), is associated with higher rates of morbidity and mortality of both the mother and infant. Adolescent sexual activity and pregnancy is of major concern globally. A review on teenage pregnancy reported that 25% of all pregnancies in Sub-Saharan Africa and Asia end in induced abortion. A WHO report showed that pregnancy and childbirth complications are the second commonest cause of deaths among adolescent girls (WHO, 2014). A study by Socolov et al (2017) in their study in Romania Europe, to determine pregnancy and delivery outcomes among adolescents, found out that the number of deliveries increased with increasing age. They also found out that the teenage group had no risk for chronic or gestational hypertension, or pre – eclampsia compared to the young adults (20 – 24 years old) (Socolov et al., 2017).

There have been evidence from several studies to show that early adolescence is a risk factor for several adverse pregnancy outcomes. Overall, studies have found that adolescent women are at increased risk of adverse neonatal and perinatal outcomes such as preterm birth, low birth weight babies, low 1 minute and 5 minute APGAR scores, etc. (Kongnyuy et al., 2008; Natalie et al., 2011; Adane et al., 2014; Nkwo et al., 2014; Althabe et al., 2015; Butali et al., 2016; Usynina et al., 2018; Kassa et al., 2019; Kohei et al., 2019; Rexhepi et al., 2019). Contrary to other studies however, Usynina et al (2018) did not find any significant difference between adolescents and adult women in some adverse pregnancy outcomes such as preterm delivery, still birth, and low 5 minutes Apgar score.

2.2.1 ADVERSE PERINATAL OUTCOMES

2.2.1.1 STILL BIRTH

In a study by Adane et al (2014), the prevalence of still birth was found to be 7.1% of all deliveries to women aged 10 – 34 years in Gondar Hospital, Northwest Ethiopia. Padhi et al (2015) in their study in rural India to assess whether poor sanitation were associated with increased risk of poor adverse pregnancy outcomes, they found out that among women who practiced open defecation, 1.7% experienced spontaneous abortion and 0.9%, still births. Asiki et al (2015) in their study to estimate and compare adverse pregnancy outcomes and associated factors in rural Southwestern Uganda, they found a prevalence rates of 7.2% abortion and 1.3% stillbirth among adolescents (Asiki G. et al., 2015). The stillbirth prevalence in this study is lower than that found by Adane et al in Northwest Ethiopia and higher than that found by Padhi et al in rural India.

In a study carried out in the Southwestern part of Nigeria (Ile –Ife) by Adeoye et al (2013), to determine the incidence, determinants and perinatal outcomes of near miss maternal morbidity, the incidence of still birth rate was found to be 28.4% among cases compared to the 4.8% among controls. Adeyinka et al (2010) in Ibadan discovered a stillbirth prevalence of 22.2% among adolescents compared to 20.2% in the older parturient. This also showed no significant difference after further analysis.

In Kano State, on the other hand, the still birth rate observed by Garba et al (2016) in their study was 2.5% among adolescents. The observed disparity of still birth rates in this two studies could be due to the fact that the study in Ile – Ife was among mothers with cases of near miss, while that of Kano was among normally healthy and without complications mothers, hence, the reason for the high incidence in the former.

2.2.1.2 INTRA – UTERINE FOETAL DEATHS (IUFDs)

Takita et al., (2017) carried out a retrospective study in Showa University Hospital in Japan, to investigate how causes of IUFD have changed in recent years with the advancement of prenatal diagnosis at a single perinatal center in Japan, an IUFD prevalence of 0.58% (38/6878) in 2001 – 2007 and 0.48% (35/6878) in 2008 – 2014. This showed a marked decreased in the rate of IUFD in 2008 – 2014 and this reduction could be attributed to the advancement of prenatal diagnosis, and as such, foetal abnormalities are detected early, and treatment can be initiated early.

2.2.1.3 NEONATAL AND PERINATAL DEATH

Ezegwui et al (2011) in their study to determine the current incidence of all teenage pregnancies and their obstetric outcomes for a six – year period in Enugu State found a total of 16.2% perinatal deaths among adolescent mothers, relative of 12.4% observed among adult parturient. In the same vein, Ganchimeg et al (2013), in a study to investigate the risk of adverse pregnancy outcomes and CS among adolescents in LMIC, in which data from three continents were analyzed (Africa, Latin America and Asia), found out that the risk of perinatal death was significantly higher among adolescent mothers in Africa compared with non – adolescent mothers (Ganchimeg et al., 2013).

A retrospective population – based cohort study using the Washington State birth certificate data found out that there was a four – fold risk of infant death among adolescents aged 11 – 14 years old compared to young adults aged 20 – 24 years old (Torvie et al., 2015). Kassa et al (2019) in their study to assess the adverse neonatal outcomes of adolescent pregnancy carried out in Northwest Ethiopia, observed three newborn death cases among adolescents (10 – 19 years) and twelve cases among adult women (20 – 34 years). Najim et al (2015) found out in their study in Baghdad, Iran, that the highest rate of neonatal admission and neonatal death was detected in the early adolescent (11 – 14 years) age group.

In contrast, Adeyinka et al (2010) in their study in UCH, Ibadan found that the prevalence of perinatal death among adolescents (22.2%) and older parturient (20.2%) were not significantly different from each other. Similarly, Ayuba and Owoeye (2012) in their study in Bayelsa State, Nigeria, found no significant difference in perinatal death between adolescent mothers and older parturient.

2.2.1.4 PRETERM DELIVERY

In a study carried out in two hospitals in Malaysia to assess outcomes and risk factors of adolescent pregnancy, Khairani et al (2010) discovered that preterm delivery (delivery at < 37 weeks gestation) was significantly associated with adolescent pregnancy. This shows that more adolescent were at risk of preterm delivery in their study compared to adults aged 20 – 35 years.

Ezegwui et al (2011), in their study to determine the incidence of teenage pregnancies and their obstetric outcomes in Enugu State, Southeastern Nigeria, discovered that the prevalence of preterm delivery was higher (25.7%) among the teenage mothers compared to (11.4%) found among the adults (20 – 34 years). Isiugo – Abanihe and Oke (2011), in their study in Ibadan to investigate the influence of maternal and environmental factor on infant birth weight, observed a preterm delivery index of 4.5%, of which, 94.1% of the babies weighed below 2500g. Butali et al (2016) in their study which was aimed at identifying the characteristics associated with preterm births in a tertiary health facility in Lagos State, Southwestern Nigeria on the other hand, found a prevalence of 16.8% preterm births among all deliveries during the study period. They also found out that infants born preterm were more likely to be LBW and have lower Apgar scores at 1 and 5 minutes than their term counterparts (Butali et al., 2016). The prevalence of preterm birth found by Butali et al in their study, which although, outside the range reported by WHO for Sub – Saharan Africa (9.5% - 15.8%) (Blencowe et al., 2013), is still consistent with previous estimates of 15% - 23% from Nigeria (Etuk et al., 2005; Mokuolu et al., 2010; Olusanya and Ofovwe, 2010; Iyoke et al., 2014).

As in previous studies, Ayuba and Owoeye (2012) in their study in Bayelsa State, aimed at evaluating the risk factors associated with teenage pregnancy and compare the obstetric and foetal outcomes to older parturient, also found out that adolescents (51.8%) were more likely to deliver preterm compared to older parturient (10.6%). This study showed a higher prevalence of

preterm delivery than other studies, and it could be attributable to the high proportion of the teenage mothers that were unbooked in any health facility for delivery services and ANC. In 2016, Garba et al in their study in Kano State, Nigeria, aimed at assessing the obstetric outcomes of teenage pregnancy, its current trends, socio – demographic determinants and incidences, they found a preterm delivery incidence of 11.5% among adolescent deliveries.

Adane et al (2014) in their study found out that almost one – fifth (14.3%) of all births in Gondar Hospital were found to be preterm. Five years after the study by Adane et al, Kassa et al (2019) carried out a study in the same Northwest Ethiopia to assess adverse neonatal outcomes in adolescent pregnancy, they found out that the prevalence of preterm birth among adolescents was 14.1%, which was significantly higher than that found in adult women (8.1%). In these two studies which were carried out in the same area, there was no significant difference between the two prevalence observed despite the five – year difference. This indicates that pregnancy outcome, especially preterm delivery has not significantly changed for the better in the area.

Guimaraes et al (2013) in their study in Northeastern Brazil found out that preterm births was significantly higher among adolescents than women aged 20 – 34 years. Also, Ganchimeg et al (2014) in a WHO multi – country study to investigate the risk of adverse pregnancy outcomes among adolescents, found out preterm delivery prevalence to be 11.2%, 8.6%, 7.7% and 7.0% for mothers aged ≤15, 16 – 17, 18 – 19 and 20 – 24 years respectively. From this figures, it can be seen that prevalence of preterm delivery increases with decreasing maternal age. Similar to the finding above, Ganchimeg et al (2013) found out from their study that there was significant dose – dependent relationships between maternal age and preterm delivery. They found out that younger mothers had a higher risk of delivering preterm than older women. Padhi et al (2015) in their study in rural India found a preterm delivery prevalence of 19.4% among pregnant women

who practiced open defecation. This shows that it is important for pregnant women to practice proper hygiene and sanitation.

In a randomized prospective clinical study by Najim et al (2015) in Baghdad, Iran, to assess the adverse maternal, foetal and neonatal outcomes in early and late adolescent mothers, the highest rate of preterm deliveries(43.5%) was found among the early adolescents (11 – 14 years) while only 12.2% was found in the late adolescent group (15 -19 years) and 5% in the control group (women aged 20 – 29 years). Yuce et al (2015) in Ankara, Turkey found a preterm prevalence of 9.09% among adolescents in their study, aimed at evaluating adolescent pregnancies for gestational complications and perinatal outcomes.

A study in Romania, Europe, aimed at determining pregnancy and delivery outcomes among adolescents found out that adolescents were at higher risks of delivering preterm than adult mothers (Sovolov et al., 2017).

2.2.1.5 LOW BIRTH WEIGHT (MICROSOMIA)

In Malaysia, Khairani et al (2010) found out in their study that adolescents were more likely to give birth to low birth weight (< 2500g) infants compared to their adult counterparts (aged 20 – 35 years). In line with this, Ganchimeg et al (2013) in their study to investigate the risk of adverse pregnancy outcomes and caesarean section among adolescents in LMIC, found out that adolescent mothers were more likely to have LBW babies compared to adult mothers in all the three regions (i.e., Africa, Latin America and Asia).

Guimaraes et al (2013) in their study in Northeastern Brazil found out that the prevalence of LBW observed was 7.2% of births and the rates was about two times higher among adolescents < 18 years than among mothers of older age groups, and was approximately 30%

higher among adolescents aged 18 – 19 years than women aged 20 – 34 years old. Najim et al, 2015 in their study in Baghdad, Iran also found out that neonatal birthweight was significantly lower among adolescents than their adult counterparts. Similarly, Usynina et al (2018) in their study in Northwest Russia also discovered that adolescents were more likely to have LBW infants compared to adults. Similarly, Socolov et al (2017) also found out in their study that adolescent mothers were more likely to have LBW babies than young adult mothers.

Twenty – three percent (23.0%) LBW infants were born to adolescent mothers compared to 10.5% to adult mothers in Enugu State, Nigeria (Ezegwui et al., 2011). This is in line with previous studies further buttressing the point that adolescents are more at risk of delivering LBW infants than adult women. A study by Isiugo – Abanihe and Oke (2011), carried out in Ibadan, Southwestern Nigeria, to investigate the influence of maternal and environmental factors on infant birthweight, they found a prevalence of 20.5% LBW babies, with the remaining 79.5% being normal birth weight. They also found out that the highest prevalence (about 63%) was found among teenage mothers (aged 15 – 19 years). Adeoye et al (2013) in their study in Ile – Ife, Southwestern Nigeria found an incidence of 44.4% LBW babies among mothers who experienced near miss mortality during delivery compared to 13.5% found among those mothers without near miss experiences. Taiwo et al (2014), in their study in Ilorin to determine the relationship between maternal weight gain and pregnancy outcomes among adolescent and adult mothers, found a LBW prevalence of 13.9% among adolescent mothers compared to 10.1% found among adult women. In Kano State, Nigeria, Garba et al (2016) found out that adolescents aged 15 – 19 years had a LBW infant incidence of 17.8%. The high LBW prevalence observed in the study by Adeoye et al (2013) in Ile – Ife could be as a result of the pregnancy itself being a high risk one, and as a result, the mothers being at risk which could affect the foetus.

Adane et al (2014) in a study to determine the prevalence and associated factors of adverse birth outcomes among deliveries of Gondar Hospital, Northwest Ethiopia found a prevalence of 11.2% LBW infants. This prevalence of LBW was low compared to the one found by Ezegwui et al in Enugu state Nigeria, and could be as a result of the fact that this prevalence is the prevalence of all LBW infants born to all women aged 10 – 34 years during the study period. In 2019, Kassa et al also carried out a study in Northwest Ethiopia to assess the adverse neonatal outcomes of adolescent pregnancy, they found a prevalence of 12.4% LBW babies. This slightly higher prevalence could be as a result of an increase in the proportion of pregnant adolescents in the area.

Ganchimeg et al (2014) in their study also found out that the prevalence of LBW infants was higher among adolescent mothers compared to older women. They found a LBW prevalence of 14.6%, 12.4%. 12.2% and 12.3% for mothers aged ≤15, 16 – 17, 18 – 19 and 20 – 24 years. This shows that the rates of LBW infants among mothers aged 16 –19 and 20 – 24 years was not significantly different. This means that from their findings, adolescents aged ≤15 years were more at risk of delivering LBW infants compared to older age groups (Ganchimeg et al., 2013; 2014). Similar to this, Mombo – Ngoma et al (2016) found out in their study that 16% of deliveries to adolescents aged ≤16 years were LBW, compared to 9% observed in mothers aged 20 – 30 years.

Padhi et al (2015) in their study in rural India found a prevalence of 14.2% LBW babies to women who practiced open defecation. This shows that it is important for pregnant women to practice proper hygiene and sanitation.

In contrast to the findings by studies above, Adeyinka et al (2010) in their study in Ibadan, found out that the prevalence of LBW infants born to adolescent mothers (≤18 years)

was not statistically different from those born to older parturient (20 – 34 years). Although, from the study, the prevalence of LBW infants born to adolescents was 24.4% compared to 21.1% found among the older parturient, it was not of statistical significance.

2.2.1.6 FOETAL MACROSOMIA

Foetal macrosomia is a term used to describe a newborn with a birth weight of more than 4,000 grams, regardless of his / her gestational age. The risks associated with foetal macrosomia increase greatly when birth weight is more than 4,500 grams. It may complicate vaginal delivery and could put the baby at risk of health problems after birth. It can be caused by genetic factors as well as maternal conditions, such as obesity or diabetes. Some risk factors associated with foetal macrosomia include maternal diabetes, history of foetal macrosomia, maternal obesity, excessive weight gain during pregnancy, number of pregnancies, sex of the baby (male babies weight slightly more than female babies), post term delivery, maternal age (women older than 35 years are more likely to have babies diagnosed with foetal macrosomia), etc. There are various health risks associated with foetal macrosomia, for both mother and baby, both during pregnancy and after child birth. Possible maternal complications include labour problems, genital tract lacerations, post – partum haemorrhage, uterine rupture, etc. Newborn and childhood risks include lower than normal blood sugar level, childhood obesity, metabolic syndrome, etc. (Mayo Clinic, 2018).

A case control study aimed at determining the relationship between mother's characteristics and macrosomic births and also comparing macrosomic and normal newborns regarding maternal and offspring complications of diabetes during pregnancy by Mohommadbeigi et al. (2015) in Iran, found out that mothers of macrosomic newborns

experienced more caesarean sections and macrosomic deliveries in their last pregnancies than those with normal weight newborns. It was also found that the percentage of diabetes in pregnancy, section delivery episiotomy, and preeclampsia was significantly higher in the currnet pregnancy of the macrosomic newborns' mothers. They also found out that in compared to the normal newborns, the macrosomic babies were more affected by hypoglycaemia. From their findings, it was also discovered that gestational diabetes, macrosomic birth history, and preeclampsia could increase the likelihood of macrosomic newborns by 11.9, 3.8 and 3.3 folds respectively. From this it can be deduced that gestational diabetes is the primary predictor of macrosomia in newborns (Mohammadbeigi et al., 2014; 2015).

A study carried out in Southern Ethiopia by Biratu et al (2018) to determine the magnitude of foetal macrosomia and associated factors, among women delivering in Public health institutions found 11.86% incidence of macrosomic babies delivered. They also found out that male babies were 2 times more likely to be macrosomic than female babies. It was also discovered that gestational ages ≥ 37 weeks, and previous history of macrosomia were significantly associated with foetal macrosomia (Biratu et al., 2018).

2.2.1.7 INTRAUTERINE GROWTH RESTRICTION

A study in Romania, Europe by Socolov et al (2017), aimed at determining pregnancy and delivery outcomes among adolescents found a correlation between foetal growth restriction and teenage age during delivery.

2.2.1.8 CONGENITAL ANOMALIES

A study by Socolov et al (2017) to determine pregnancy and delivery outcomes among adolescents in Romania, Europe, found out that, the rate of foetal anomalies detected at birth did not occur more frequently among adolescents than young adults (aged 20 – 24 years)

2.2.1.9 LOW APGAR SCORES (1 MINUTE AND 5 MINUTES < 7)

In the study by Ezegwui et al (2011), in Enugu State, low 1 minute Apgar score was recorded in 35.1% of babies born to teenage mothers compared to 19.1% in non – adolescent mothers. Similar to this study, Najim et al (2015) also found out in their study in Baghdad, Iran hat low Apgar scores at 1 minute and 5 minutes were recorded among the teenage age groups (11 14 years and 15 – 19 years) than the adults (20 – 29 years). In line with studies above, Socolov et al (2017) also found out in their study that babies born to adolescent mothers were more likely to have a low 1 minute Apgar score (<7) compared to those born to adult mothers.

In contrast to the studies above, Rexhepi et al (2019) in their study in Republic of Macedonia found out that it was less common for adolescents (3.47%) to have low Apgar score (< 7) at 1 minute compared to adult mothers (13.21%).

2.2.2 ADVERSE MATERNAL OUTCOMES

Khairani et al (2010) in their study carried out in two hospitals in Malaysia, to assess outcomes and risk factors of adolescent pregnancy found out that there was no significant difference in the mode of delivery, rates of intra – partum and postpartum complications between adolescents (aged 10 – 19 years) and adults (aged 20 – 35 years). In the same vein, the Global Network's Maternal and Newborn Health Registry Study, a multi – country study (which includes Kenya, Zambia, India, Argentina and Latin America) to determine whether adolescent

mothers were at higher risks of maternal and perinatal pregnancy outcomes compared with mothers aged 20 – 24 years, also found out that adolescents did not show worse maternal outcomes than the adult mothers (Althabe et al., 2014). Similarly, Ganchimeg et al (2014) in a WHO multi – country study aimed at investigating the risk of adverse pregnancy outcomes among adolescents found out that although the risk of severe maternal outcome was higher among adolescents than older women, the difference was not significant.

On the contrary, Kohei et al (2019) found out in their study in Japan that although adolescent mothers had an increased risk of neonatal outcomes, there was no association between adolescence and other maternal outcomes such as preeclampsia and severe laceration.

2.2.2.1 PREMATURE RUPTURE OF THE MEMBRANE (PROM)

The rates of PROM observed in a study in Cameroun between adolescents (≤ 19 years) and adult mothers (20 – 29 years) was not significantly different (Kongnyuy et al., 2008). Similar to the study above, Adeyinka et al (2010) in their study to evaluate the assess and explore the occurrence of specific complications among adolescent parturient and older controls, found out that premature rupture of the membranes was not significantly higher among adolescents.

In contrast, Yuce et al (2015) in their study in An0kara, Turkey found out that the proportion of adolescents with premature rupture of the membrane (PROM) was 1.46% and was low compared to adults in the study. Adane et al (2014) in their study found out that 22.5% of participants (pregnant women aged 10 – 34 years) had PROM in their current pregnancy.

2.2.2.2 CAESAREAN DELIVERY

Despite the strong association between adolescence and adverse neonatal and perinatal outcomes, various studies have established that there is no significant difference in the maternal outcomes between adolescent mothers and older women.

Kongnyuy et al (2008) found out that in Cameroun, the rate of CS among adolescents and adult women were not significantly different from each other. This is similar to findings by Adeyinka et al (2010) in their study in Ibadan. They found out that there was no statistical difference in the prevalence of caesarean delivery between adolescents (≤18 years) and older women (20 – 34 years). Ganchimeg et al., (2013), also found out that the risk of caesarean section, although significantly lower among older adolescents (16 – 19 years) compared with young adults, it was not significantly different between young adolescents (≤ 15 years) and non – adolescent mothers; especially in African countries. Similar to the two studies above, Najim et al (2015) in the study in Baghdad, Iran, also found out that for mode of delivery, i.e. whether spontaneous vaginal delivery or caesarean section, no significant difference was observed between adolescent mothers and adults (20 – 29 years). In a study in Kano State, Nigeria among pregnant adolescents (15 – 19 years), Garba et al (2016) found out that although most of them (78.9%) delivered by SVD, 18.9% delivered by caesarean section.

In contrast, Guimaraes et al (2013) in their study in Northeast Brazil, aimed at evaluating whether adolescent pregnancy is a risk factor for LBW babies, found out that adolescents (≤ 19 years) had lower rates of caesarean section compared to older adults (20 – 34 years). A retrospective population – based cohort study of the Washington State birth certificate data linked to hospital records, by Torvie et al., (2015), to determine whether young adolescents were at increased risk of caesarean or operative delivery, as well as maternal or neonatal delivery

related morbidity compared to young adults aged 20 – 24 years, also found out that young adolescents had a 27% lower risk of caesarean delivery compared to young adults. Yuce et al (2015) in their study in Ankara, Turkey, to evaluate adolescent pregnancies as for gestational complications and perinatal outcomes, discovered that adolescents were less likely to deliver by caesarean section than adults. In fact, a high proportion of the adolescents (70.96%) delivered by spontaneous vaginal delivery (SVD). Rexhepi et al (2019) also made similar findings in their study in Republic of Macedonia. They found out that the rate of caesarean delivery was significantly higher among adult women than adolescents. Socolov et al (2017) in their study carried out in Romania, Europe also found out that caesarean delivery was more common among young adults (20 – 24 years) than adolescent women. This is also in line with findings by Kohei et al (2019) in a multicenter cross sectional study in Japan, where they found out that adolescent mothers had a significantly decreased risk of caesarean delivery compared to women aged 20 – 24 years. After adjusting for maternal height, they found out that adolescence proved to be protective of CS (Kohei et al., 2019).

Contrary to the above studies, Ezegwui et al (2011) found out in their study in Enugu State, Nigeria that caesarean delivery was significantly higher in teenage mothers (18.9%) than adult parturient (10.5%). Ayuba and Owoeye (2012) also observed in their study in Bayelsa State, Nigeria that adolescents (14 – 19 years) had a higher rate (31.3%) of caesarean delivery than their older parturient (17.8%). Similarly, Ganchimeg et al (2014) in a WHO multi – country study also found out that caesarean delivery was higher among younger adolescents aged ≤15 years (27.9%) compared to adult mothers (23.5%).

2.2.2.3 INSTRUMENTAL DELIVERY

Kongnyuy et al (2008) in an analytical cross – sectional study to determine foetal outcomes associated with adolescent pregnancies in Cameroun, they found out that the rates of instrumental delivery between adolescents (≤ 19 years old) and adults (aged 20 – 29 years old), were not significantly different. This is also similar to findings by Adeyinka et al (2010) in Ibadan and Socolov et al (2017) in Romania, Europe. Similarly, Rexhepi et al (2019) did not find significant difference in instrumental delivery between adolescent mothers and adult women. Similar to findings above, Socolov et al (2017) also found out in their study in Romania, Europe that there was no statistical correlation between instrumental deliveries, both by forceps and vacuum extractor, across age groups.

In contrast, Torvie et al (2015) in their study to determine whether adolescents were at increased risk of caesarean section or operative delivery compared to young adults aged 20 – 24 years old, it was found out that adolescents, aged 11 – 14 years old, had a lower risk of operative assistance with forceps or vacuum compared to 20 – 24 year olds. Similarly, Ayuba and Owoeye (2012), also found out in their study in Bayelsa State that 4.4% of older women had instrumental delivery, compared to 2.5% of the adolescent mothers.

Garba et al (2016) in their study in Kano State, Nigeria among pregnant adolescents found that 2.2% of the adolescents had vacuum delivery.

2.2.2.4 PRE – ECLAMPSIA / ECLAMPSIA

A study by Socolov et al (2017) found out in their study in Romania, Europe, aimed at determining pregnancy and delivery outcomes, that adolescents had no risk for either pre –

eclampsia or chronic / gestational hypertension. The number of cases of eclampsia identified was too small to interpret.

2.2.2.5 POST PARTUM HAEMORRHAGE

Socolov et al (2017) in their study aimed at determining pregnancy and delivery outcomes, found out that post – partum haemorrhage was more common in the teenage age group than the young adults.

2.2.2.6 PERINEAL TEAR / LACERATION

In the study by Kongnyuy et al (2008), adolescents had a significantly higher rate of perineal tears compared to adult mothers. In contrast, Torvie et al (2015) in their study to compare maternal and neonatal delivery related morbidity between adolescents aged 11 – 19 years and young adults aged 20 – 24 years, after stratifying the adolescents into early (11 – 14 years) and late (15 – 19 years) adolescent age groups, it was found out that among vaginal deliveries, adolescents aged 15 – 19 years had a decreased risk of third and fourth degree perineal lacerations compared to young adults. The risk in young adolescents (11-14 years) on the other hand, was comparable to that of young adults (20 – 24 years). This is almost similar to findings from a study in Romania, Europe, where no significant difference was observed in the incidence of 3rd and 4th degree perineal lacerations and cervical lacerations between adolescent women and adult mothers (Socolov et al., 2017).

Contrary to the findings above, Rexhepi et al (2019) in their study in the Republic of Macedonia, aimed at comparing maternal, perinatal and neonatal outcomes in adolescent pregnancy compared to adult women, they found out that perineal ruptures of 1st and 2nd degrees

and cervical lacerations were significantly higher among adult women compared to adolescent mothers.

2.2.2.7 MATERNAL DEATH

Ganchimeg et al (2013) in a multi – country study in which a secondary analysis of WHO data on maternal and perinatal health was done to investigate risk of adverse pregnancy outcomes among adolescents in LMIC, they found out that in Africa, the risk of maternal death was significantly higher among adolescent mothers compared with non – adolescent women. This could be as a result of the inadequate medical personnel and infrastructure to cater to the ever increasing need of maternal and child health in the region. The higher risk among this group of individuals could also be attributed to the fact that adolescent pregnancy is seen as a social problem and as a result, most adolescent don't seek ANC services and even the service of skilled medical personnel. It could also be as a result of the low socio economic status of the group of individuals in the Africa region.

2.3 RISK FACTORS ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES AMONG ADOLESCENTS

Several studies have found out that low educational status, employment status, low socio – economic status, late gestational age to start antenatal care (ANC) follow up, used ANC less frequently, low BMI of the pregnant adolescent are risk factors for adverse pregnancy outcomes, especially among adolescents (kongnyuy et al., 2008; WHO, 2009; Khairani et al., 2010; Garba et al., 2016; Yeshialem et al., 2017; Usynina et al., 2018; Najim et al., 2019). It has also been discovered by several researchers that prematurity, previous histories of adverse birth outcomes, maternal age, anaemia and inadequate food intake during pregnancy, and lack of ANC follow up

were associated factors of LBW (Tema, 2006; Khatun and Rahman, 2008; Dasgupta and Basu, 2010; Tsimbor and Verropoulu 2011; Zeleke et al., 2012).

Isiugo – Abanihe and Oke (2011) in their study aimed at investigating the influence of maternal and environmental factors on infant birth weight carried out in Ibadan, found out from their study that preterm delivery was a risk factor for low birth weight babies.

2.3.1 YOUNG MATERNAL AGE (≤ 15 YEARS)

According to the World Health Organization, adolescents aged < 16 years are four times at risk of maternal death compared to women in their 20s, and neonatal death is about 50% higher (WHO, 2009). Guimaraes et al (2013) in a study in Northeast Brazil found out that young maternal age is a major risk factor for the delivery of LBW infants. Ganchimeg et al, 2013 in their study to investigate the risk of adverse pregnancy outcomes and caesarean section among adolescents in Low and Middle Income Countries (LMIC) found out that young maternal age (i.e., <16 years) is a risk factor for adverse maternal and neonatal outcomes (Ganchimeg et al. 2013). In 2014, Ganchimeg et al in a WHO multi – country study carried out in 29 different countries found out that although there was a significant increase in the prevalence of adverse perinatal outcomes with decreasing maternal age, there was no significant difference in adverse maternal outcomes (Ganchimeg et al., 2014).

Taiwo et al (2014), in their study in Ilorin aimed at determining the relationship between maternal weight gain and pregnancy outcomes among adolescent and adult mothers, found out that the rate of LBW decreases significantly with increasing maternal age. This means that young maternal age is a risk factor for delivering LBW babies. Similarly, Mombo – Ngoma et al (2016) in a randomized controlled trial involving pregnant women and their offspring, which was aimed

at assessing whether young adolescent girls contribute a group at increased risk for adverse birth outcomes among pregnant women in Sub – Saharan Africa, found out that very young maternal age (≤16 years) was the factor associated with the highest risk for the delivery of LBW infant. They also found out that preterm delivery was closely associated with very young maternal age group.

In the Global Network's Maternal and Newborn Health Registry study by Althabe et al (2015), to determine whether adolescent mothers were++++++++++ at higher risk of maternal and perinatal pregnancy outcomes compared with mothers aged 20 – 24 years old, it was discovered that risks of preterm birth and LBW was significantly higher among both early and older adolescents, but especially among early adolescents (aged ≤ 15 years). This is in agreement with previous studies that identified young maternal age as a risk factor for various adverse pregnancy outcomes.

Findings from a retrospective population – based cohort study of Washington State birth certificate data linked to hospital records to determine whether young adolescents aged 11 – 14 years have increased risk of caesarean section or operative delivery, as well as maternal or neonatal delivery – related morbidity, compared to young adults aged 20 – 24 years old, showed that that young adolescents (11 – 14 years old) had a two – fold increased risk of preterm delivery and low birth weight infants, and a four – fold risk of infant death compared to young adults (Torvie et al., 2015). Similar to findings from the various studies above, Kohei et al (2019) in a multicenter Japanese study, found out that adolescent women are at increased risk of neonatal adverse outcomes such as preterm birth, LBW and low APGAR scores.

In contrast, Khalil et al. (2013) on the other hand found out in their study in three hospital in the United Kingdom that more advanced maternal age increases the risk of a wide range of

adverse pregnancy outcomes, such as miscarriage, pre – eclampsia, small for gestational age babies, gestational diabetes mellitus, and caesarean section.Contrary to findings from the various studies outlined above, Butali et al (2016) in their study in Lagos State, found out that older maternal age (≥ 35 years) was significantly associated high prevalence of preterm birth. Asiki et al (2015) in their study in rural Uganda, also found out that abortion risk and risk of stillbirth increased with age of mother. This could be as a result of the fact that most developed countries have recognized that adolescent pregnancies are high risk pregnancies, and as such, have taken precautions to reduce and mitigate against associated morbidities and mortality.

Kebede et al (2018) in their study, to assess the effects ofsocio – economic and demographic factors adverse pregnancy outcomes, also found out that the risk of adverse pregnancy outcomes increases with maternal age. They also found out that early sexual debut (≤15 years) was significantly associated with adverse pregnancy outcomes.

2.3.2 BMI OF THE MOTHER

Ganchimeg et al (2013), in a multi – country study to investigate the risk of adverse pregnancy outcomes and CS among adolescents in LMIC, found out that adolescent mothers were more likely to have a lower BMI compared with non – adolescent mothers. From their study, they also found out that adolescent mothers were at higher risk of adverse birth outcomes than non – adolescent mothers, as a result, an association was established.

Taiwo et al (2014) in their study in Ilorin, to determine the relationship between maternal weight gain and pregnancy outcomes among adolescent and adult mothers, found out that maternal weight gain was significantly higher among adolescent mothers than the adult women.

Despite this higher weight gain among the adolescent mothers, they still had a high prevalence of LBW babies in the study. In contrast, Isiugo – Abanihe and Oke (2011) in their study in Ibadan found out that birth weight of babies increases as maternal weight increases. The disparity in this two studies could be due to differences in dietary pattern, as delivery of LBW babies in this study was characterized by lower socio – economic status, which could be associated with poor dietary intake by the mother. The study also found out that the highest prevalence of LBW babies was found among adolescent mothers (15 – 19 years), which is line with other studies, showing that adolescence is a risk factor of adverse birth outcomes.

Mombo – Ngoma et al (2016) found out from their study in Sub – Saharan Africa that underweight adolescents (16.4%) were more likely to give birth to LBW infants than normal weight adolescents (9.9%). They also found out that underweight and overweight women were more likely to deliver preterm than normal weight pregnant women. Usynina et al (2018) found out from their study in Northwest Russia that pregnant adolescents were more likely to be underweight than adult women. Unlike other studies, Kohei et al., (2019) found that the increased risk of adverse neonatal outcome among adolescents in their study was partially as a result of the shorter maternal height, which suggest a role of physical immaturity (Ganchimeg et al, 2013; Fahmida et al., 2016; Kohei et al., 2019).

2.3.3 MATERNAL HEIGHT

A multi – country study by Ganchimeg et al (2013), to investigate risk of adverse pregnamcy outcomes among adolescent mothers in LMIC, found out that adolescents were at higher risk of adverse outcomes. It also found out that adolescents were more likely to be shorter in stature, which is suggestive of a smaller pelvic size, giving rise to the increase in the risk of

adverse outcomes (Ganchimeg et al., 2013). Similarly, a multicenter cross sectional study carried out in Japan aimed at clarifying how maternal physical characteristics explain the association between adolescent pregnancy and adverse birth outcomes; focusing on their height, Kohei et al (2019) found out that the increased risk of adverse neonatal outcomes among adolescent women was partially due to shorter maternal height, which connotes a role of maternal physical immaturity. They also found out from their study that adolescent women were shorter than adult women aged 20 – 24 years, and shorter women were seen to have an increased risk of preterm births and LBW babies which is suggested to be due to their smaller pelvic size (Kohei et al., 2019).

2.3.4 PARITY

Asiki et al (2015) found out from their study which was aimed at estimating and comparing adverse pregnancy outcomes and associated factors, that abortion and stillbirth risk reduced with increasing parity.

Isiugo – Abanihe and Oke (2011) in the study in Ibadan, Nigeria, found out that women having their first birth and those with 3 – 6 children were more likely to give birth to LBW babies compared to those with 1 – 2 children. Nkwo et al (2014) in their study using the NDHS, 2008 found out that primiparous women were more likely to experience perinatal deaths than multiparous women (2 – 4 children), especially among non – hospital births.

Ganchimeg et al (2014) in a multi – country study found out that compared with mothers aged 20 – 24 years, adolescents were more likely to be nulliparous.

Taiwo et al (2014) found out from their study that the rate of delivering LBW infants decreases significantly with increasing parity. Similarly, Mombo – Ngoma et al (2016) in their

study in Sub – Saharan Africa found out that most adolescents were nulliparous. They found a significant association between parity and infant LBW. They observed that nulliparous women (13.8%) were more likely to deliver LBW infants than multiparous women (7.6%).

2.3.5 EDUCATIONAL STATUS

In a study by Kongnyuy et al (2008) among pregnant adolescents (≤ 19 years) as the study group, and adults aged 20 – 29 years as the control in Cameroun, it was found out that adolescents were less educated than the adults, although, it ended up being a non – significant factor in the determination of adverse foetal outcomes in a logistic regression model. Findings by Khairani et al (2015) in their study in Malaysia, was also in support of this. They also discovered that pregnant adolescents were more likely to have a lower educational attainment than adult counterparts. This was also supported by Nkwo et al (2014) in their study where they used the 2013 NDHS. They found out that low educational level was one of the factors that accounts for the high prevalence of LBW infants among adolescent mothers.

As in the studies above, Ezegwui et al (2011) in their study in Enugu State, Southeastern Nigeria, found out that majority of the teenagers had only primary education, compared to their adult counterparts, who had higher educational attainment. This is also similar to findings by Ganchimeg et al (2014), in a WHO multi – country study, where they found out that adolescents were less educated relative to adult women aged 20 – 24 years (Ganchimeg et al., 2013; 2014). Similarly, Rexhepi et al (2019) in their study in Republic of Macedonia, also observed that adolescents had a lower educational attainment compared to adult women (20 – 24 years). Garba et al (2016) on the other hand in Kano found out from their study that almost all the pregnant

adolescent had no formal education, hence, the reason for their low socio – economic status, which in return impacts on their pregnancy outcomes.

A study in Bayelsa State, Nigeria, found out that 39.9% of the pregnant adolescent had at least secondary education, with 6.1% having tertiary education. Although, compared to the adults, adolescents had a lower educational status compared to the adults (Ayuba and Owoeye, 2012). The educational level of adolescents in this study is significantly higher than the ones observed in previous studies (Ezegwui et al., 2011; Khairani et al., 2015; Garba et al., 2016; Rexhepi et al., 2019).

In sub Saharan Africa, Mombo – Ngoma et al (2016) observed in their study that illiterate mothers were more likely to give birth to LBW infants and deliver preterm than literate women. Kebede et al (2018) in their study in Ethiopia, like other studies also discovered that women with no formal education were two times more likely to experience adverse pregnancy outcomes than their educated counterparts. They found out that the risk of adverse pregnancy outcomes reduced with higher educational attainment.

2.3.6 RESIDENCE

Studies have found that adolescents living in rural areas are more at risk of low birth weight babes than those in urban centres (Yeshialem et al., 2017; Kassa et al., 2019). Kassa et al (2019) in their study in Northwest Ethiopia found out that adolescents dwelling in rural areas were more likely to experience adverse neonatal outcomes than their counterparts in urban areas. They found out from their study that 13.7% LBW babies were born to adolescents in rural areas as compared to 10.7% observed among the urban dwelling adolescents. Also, a higher percentage (14.6%) of preterm birth was observed among adolescents in rural areas, compared to

(13.5%) found among urban adolescent mothers (Kassa et al., 2019). Similarly, Kebede et al (2018) also observed in their study in Ethiopia that women living in rural areas were two times more likely to experience adverse birth outcome than those in the urban areas. The reason for this is not so far – fetched as the proximity and availability of health facilities could be a determining factor

This could be as a result of the inaccessibility of health facilities to the adolescents due to the availability of few functional facilities in rural areas. Nkwo et al. (2014) on the other hand in their study to determine perinatal mortality rates (PMR) in non – hospital births and to estimate the associations between PMR and some identified a priori socio – demographic and reproductive characteristics that are known to influence PMR using the NDHS 2013, found no significant association between residence (rural and urban) and perinatal outcomes (Nkwo et al., 2014).

2.3.7 MARITAL STATUS

Kongnyuy et al (2008) found out in their study that there was no significant association between marital status and adverse foetal outcomes. Garba et al (2016) in their study in Kano State Nigeria found that almost all the pregnant adolescents were married. Despite their marital status, they still experienced adverse outcomes. This shows that similar to the study above, marital status has really no significant association with adverse foetal and perinatal outcomes.

A retrospective review of records at a tertiary hospital (UNTH) Enugu State, Southeastern Nigeria, to determine the current incidence of all teenage pregnancies and their obstetric outcomes, it was discovered that 60.8% of the pregnant adolescents were married, compared to the 100% married pregnant adults in the study (Ezegwui et al., 2011). In a study in

Bayelsa State on the other hand, it was discovered that majority (72.3%) of the pregnant adolescents were unmarried.

Adeyinka et al (2010) in their study in Ibadan found out that although there was no significant difference in the prevalence of LBW infants born to adolescents compared to adult women, the incidence of small for gestational age babies was significantly higher among unmarried women, aged >19 years old, compared to the married women in the same age group.

2.3.8 EMPLOYMENT STATUS

Adolescents in the study by Kongnyuy et al., 2008 in Cameroun were more likely to be unemployed relative to their adult counterparts, and they had worse birth outcomes. This is also aptly supported by findings by Khairani et al (2010) in their study in Malaysia. They found out that adolescents were more likely to be unemployed, due to their low educational attainment, and as such, low income, which invariably translates to lower socio – economic status, compared to the employed adults, which leads to poor pregnancy outcomes (Khairani et al., 2010).

In a study by Ezegwui et al (2011), carried out in a tertiary hospital in Enugu State, Nigeria, to determine the current incidence of all teenage pregnancies and their obstetric outcomes, it was found out that 75.7% (n = 74) of all adolescent mothers were unemployed.

2.3.9 SOCIO – ECONOMIC STATUS

This shows that adolescence itself is a major risk factor for various adverse pregnancy outcomes due to the lower socio – economic status of the adolescent mothers; which is usually influenced by their low educational attainment which in turn influences their employment status, and their income. As a result of this, higher educational attainment on the other hand is a

protective factor against pregnancy and in essence, its associated risk factors and adverse outcomes (Gupta and Mahay, 2003; Sahoo, 2011).

Isiugo – Abanihe and Oke (2011) in a study in Ibadan, Southwestern Nigeria found out that the probability of having LBW babies increase as a woman's socio – economic status declines. That is, the lower the socio – economic status of a woman, the more likely the woman will deliver a LBW baby. They further discovered that the proportion of women with LBW babies is significantly higher among women who lived in households with one or two rooms and those whose source of drinking water is well or surface water. All these are indicators of low socio – economic status. Garba et al (2016) in Kano found out that most of the pregnant adolescents were of low socio – economic status due to their no formal education status, which ultimately influences their ANC initiation, hence, giving rise to different unfavourable maternal and perinatal outcomes.

In the study by Adeyinka et al (2010), they found out that women of low socio – economic status were more likely to give birth to LBW and small for gestational age (SGA) infants compared to women of higher socio – economic status. This can be linked to the ability of the women in the latter group to be able to afford nutritious diet which will help in the normal growth of the foetus and even the mother. Also, a high socio – economic status affords the women the ability to access ANC early and at the right time.

Guimaraes et al (2013) found out in their study in Northeast Brazil that family income was a statistically significant factor for infant LBW. This invariably translates to the socio – economic status of the pregnant women. Since most adolescents are of low educational level, unmarried and unemployed, hence, of low socio – economic status, they end up having a higher rate of infant LBW compared to adults.

Nkwo et al (2014) in their study aimed at estimating the association between perinatal mortality and socio – demographic and reproductive characteristics using the Nigeria Demographic and Health Survey, 2008, found out that those women in the richest and middle wealth quintiles were less likely to experience adverse perinatal outcomes than those in the poor and poorest quintiles.

2.3.10.1 LATE ANTENATAL CARE INITIATION

In a study by Guimaraes et al (2013) in Northeast Brazil, it was discovered that inadequate prenatal care was a significant risk factor for infant LBW. This is linked to late ANC initiation, which was significantly higher among adolescents compared to older women. Khairani et al. (2010), in their study carried out to assess the outcomes and risk factors of adolescent pregnancy in Malaysia, discovered that late ANC registration (after 28 weeks of gestation i.e. 2nd trimester) was significantly higher among adolescents (aged 15 – 19 years) compared to adults (aged 20 – 35 years).

In the study by Isiugo – Abanihe and Oke (2011) in Ibadan, Southwestern Nigeria, aimed at investigating the influence of maternal and environmental factors on infant birth weight, found out 26.7% of LBW babies were born to mothers who initiated ANC in their third trimester (7 – 9 months) compared to about 20% and 9% of women who initiated in their second and first trimester respectively.

Ayuba and Owoeye (2012) in their study in Bayelsa State found that majority (57.8%) of the adolescents were un – booked, and as a result, didn't attend ANC at all compared to the adults. Similar to the study in Bayelsa State, Garba et al (2016) in their study in Kano State found that a high proportion (36.0%) of the pregnant adolescent were un – booked during

delivery, which ultimately shows that most of them didn't register for ANC. Mombo – Ngoma et al (2016) in their study also found out that late ANC initiation was significantly associated with delivery of LBW infants.

In the study by Kassa et al (2019) in Northwest Ethiopia, it was discovered that the average gestational age to start ANC follow – up was almost three weeks late for adolescents than adult women. Butali et al (2016) in a study in Lagos found out that those not registered for ANC were more at risk of preterm delivery than those registered for ANC.

2.3.10.2 POOR QUALITY ANTENATAL CARE

Kongnyuy et al (2008), in a study carried out in Cameroun among adolescents aged ≤ 19 years as the study group and adults, 20 – 29 years as the control group; to determine adverse foetal outcomes associated with adolescent pregnancies, it was found out that adolescents made use of ANC less frequently (< 4) compared to the control group. This is also in line with findings by Khairani et al. (2010) in their study to assess the outcomes and risk factors for adolescent pregnancy by comparing adolescents and adults (aged 20 – 35 years). They found out that adolescents had an insufficient number of antenatal visits and most were unsure of their expected dates of delivery compared to the adults mothers (Khairani et al., 2010). This insufficient ANC visits by the adolescents could be due to their late initiation of ANC. Torvie et al (2015) in their study also found out that young adolescents (aged 11 – 14 years) were less likely to have adequate prenatal care compared to older adolescents (aged 15 – 19 years) and young adults (aged 20 – 24 years); and this could be one of the reasons for the high prevalence of various adverse pregnancy outcomes among the age group. Similarly, Ganchimeg et al (2013) also found out in their study that adolescents were more likely to have fewer ANC visits than the adult

women, and this could be one of the reasons for the higher risk of adverse pregnancy outcomes in the group in the study.

Adane et al (2014) in their study in Northwest Ethiopia found out that lack of ANC follow up was a risk factor for stillbirth. Kassa et al (2019) also found out from their study that adolescents with no ANC attendance had higher percentage of preterm birth and LBW babies compared with those who adequately utilized ANC. Similar to this finding was the one by Isiugo – Abanihe and Oke (2011) in Ibadan, where they discovered that women with < 4 ANC attendance were more likely to have LBW babies compared to those with a greater number of ANC attendance.

Najim et al (2015) in their study in Baghdad, Iran found out that early adolescents (aged 11 – 14 years) had the least regular ANC visits compared to late adolescents (aged 15 – 19 years) and adult women (aged 20 – 29 years). Similarly, Rexhepi et al (2019) in their study in Republic of Macedonia found out that pregnant adults (20 – 24 years) were more likely to have ANC visits < 4 than pregnant adolescents.

Yeshialam et al (2017) in a study in Ethiopia aimed at identifying determinants of adverse pregnancy outcomes among deliveries found out that pregnant women who adequately attend ANC (> 4) were 83% less likely to experience any adverse pregnancy outcomes than those who do not attend.

2.3.11 PREVIOUS SMOKING HISTORY AND SMOKING IN PREGNANCY

Guimaraes et al (2013) in their study aimed at evaluating whether adolescent pregnancy was a risk factor for LBW babies, they found out that one of the persistent factors after adjusting for confounding variables was smoking during pregnancy.

2.3.12 ANAEMIA IN PREGNANCY

Khairani et al (2010) in a case – control study carried out in Malaysia, to assess the outcomes and risk factors of adolescent pregnancies, with pregnant adolescents (10 – 19 years) as the cases, and adults (20 – 35 years) as the control; it was discovered that more adolescents were anaemic (Hb < 10g/dL) compared to the adult mothers. Similar to the above findings, Socolov et al (2017) in their study in Romania, Europe, to determine pregnancy and delivery outcomes among adolescents, found out that the incidence of anaemia was significantly higher among adolescent mothers compared to the adult mothers (Socolov et al., 2017).

A six – year retrospective review of all teenage pregnancies delivered in UNTH Enugu State, Southeastern Nigeria, carried out by Ezegwui et al (2011) found out that anaemia (PCV < 30%) was found in 32.4% of the teenagers, compared to 24.8% of the adult mothers (aged 20 – 34 years). Garba et al (2016) in their study in Kano State, Nigeria, discovered that 33.5% of the pregnant adolescents in their study were anaemic. This is comparable to that found by Ezegwu et al (2011) in their study in Enugu State, Nigeria. In Bayelsa State, Ayuba and Owoeye (2012) found higher prevalence of anaemia in pregnancy among adolescents (22.9%) compared to adult women (6.1%). This high rate of anaemia could be attributed to poor nutrition and diet and high rate of non – ANC attendance among the adolescents. In a WHO multi – country study by Ganchimeg et al (2014), the proportion of mothers with severe anaemia and coincidental conditions was significantly higher among adolescents compared to older women.

In a study in Baghdad, Iran, Najim et al., 2015 found out that anaemia in pregnancy was statistically significant among pregnant adolescents, aged 11 – 19 years old compared to their adult counterparts. Similarly, Yuce et al (2015) in their study in Ankara, Turkey, found out that

anemia in pregnancy was significantly higher among adolescents than adult women. This is similar to findings by Rexhepi et al (2019) in their study in Republic of Macedonia. They found out that anaemia in pregnancy was significantly higher among adolescent mothers than the adults.

In a study in Northwest Ethiopia by Adane et al (2014) among pregnant women delivering in Gondar Hospital, 10% of the women were found to be anaemic during current pregnancy. Yeshialem et al (2017) found out in their study in Ethiopia that mothers who were anaemic in pregnancy were seven times less likely to have adverse pregnancy outcomes than non – anaemic pregnant mothers.

2.3.13 URINARY TRACT INFECTIONS (UTIs)

These are infections that affect any part of the urinary system; i.e. the kidneys, bladder or urethra. Women are more likely to get UTI than men, as the female anatomy makes it easy for bacteria from the vagina and rectal areas to get in the urinary tract, due to their close proximity. Pregnant women are more vulnerable to developing UTIs because the growing fetus can put pressure on the bladder and urinary tract, this traps bacteria or causes urine to leak. Between 2 – 10% of pregnant women experience a UTI, and it tends to reoccur frequently during pregnancy. Women who have had UTIs before are more likely to have them during pregnancy than those who have not (Delzell et al., 2000; Chen et al., 2010; Matusziekwics – Rowinska et al., 2015).

In a study carried out in Romania, Europe, aimed at determining pregnancy and delivery outcomes among adolescents, a higher incidence of lower urinary tract infections was observed among adolescents that young adults (aged 20 – 24 years old) (Socolov et al., 2017).

2.3.14 ANTEPARTUM HAEMORRHAGE

In a study in Malaysia by Khairani et al (2010), with adolescents (aged 10 – 19 years) as cases and adults (aged 20 – 35 years) as controls, it was discovered that no significant association was found between adolescent pregnancy and antepartum haemorrhage. Findings by Ezegwui et al (2011) in Enugu, Southeastern Nigeria, was in line with the above findings. It was discovered that there was no significant difference in the rate of antepartum haemorrhage between teenage mothers and their adult counterparts (20 – 34 years). Similar to findings from the previous studies above, Adeyinka et al (2010) also found out that obstetric haemorrhage was not higher among adolescents than older women.

In a study by Ayuba and Owoeye (2012) in Bayelsa State, a greater number of adolescents (34.9%) experienced post – partum haemorrhage compared to the adult women (12.7%).

2.3.15 HYPERTENSION AND PRE - ECLAMPSIA

Khairani et al (2010) in their study to assess outcomes and risk factors of adolescent pregnancy in Malaysia, they found out that there was no significant association between adolescent pregnancy and the rates of pregnancy – induced hypertension. In line with this, Althabe et al (2015) in their study to compare the risk of maternal and perinatal outcomes between adolescents and adult mothers aged 20 – 24 years, also found out that hypertensive disorders were significantly lower among both early and older adolescents compared to adults. Findings by Socolov et al (2017) in their study in Romania, Europe, aimed at determining pregnancy and delivery outcomes among adolescents found out that compared to adults, the adolescents had no risk for chronic and gestational hypertension.

Similarly, Ezegwui et al (2011) in their study in Enugu State, Southeastern Nigeria, they observed no significant difference in the incidence of preeclampsia and eclampsia between teenage mothers (11 – 19 years) and adult mothers (20 – 34 years). Garba et al (2016) in Kano State, Nigeria found an incidence of 12.4% preeclampsia / eclampsia among pregnant adolescents.

Contrary to findings from the above studies, Adeyinka et al (2010) in the study in Ibadan, Southwestern Nigeria, found an incidence of preeclampsia and eclampsia among adolescents was 20%, relative to 3.33% found in the older controls. In line with the above findings in Ibadan, Ayuba and Owoeye (2012) in a study in Bayelsa State, aimed at evaluating the risk factors associated with teenage pregnancy and comparing the obstetric and foetal outcomes to older parturient, they found out that a higher proportion of adolescents (14.5%) presented with preeclampsia during pregnancy than the older parturient (1.6%). It can be observed that incidence of preeclampsia / eclampsia in the study in Ibadan was higher than that of Bayelsa State. This observed difference could be attributed to the fact that the study setting in Ibadan is a referral centre, hence, most cases treated are usually complicated already.

Ganchimeg et al (2014) in their study found out that eclampsia was the most frequent severe maternal outcome. They found a prevalence of 75%, 47.8%, 41.1% and 33.8% among mothers aged ≤ 15, 16 – 17, 18 – 19 and 20 – 24 years old. This shows that eclampsia increases with decreasing maternal age in this study. It can also be seen that the rate of eclampsia was significantly higher among adolescents than older women.

2.3.15 GESTATIONAL DIABETES

Abnormal maternal glucose regulation occurs in 3 – 10% of pregnancies, and gestational diabetes mellitus (GDM), which is defined as glucose intolerance of variable degree with onset of first recognition during pregnancy, accounts for 90% of cases of diabetes mellitus (DM) in pregnancy (Baptiste-Robert et al., 2009; Wilmot et al, 2014; McIntyre, 2016).

Khairani et al (2010) in their study in Malaysia, to assess outcomes and risk factors of adolescent pregnancy, they found no significant association between adolescent pregnancy and gestational diabetes. This shows that most pregnant adolescent are not at risk of developing gestational diabetes. Similarly, Socolov et al (2017) also found out in their study, to determine pregnancy and delivery outcomes among adolescents, in Romania, Europe, that diabetes and obesity was common in young adult mothers aged 20 – 24 years than the adolescent mothers.

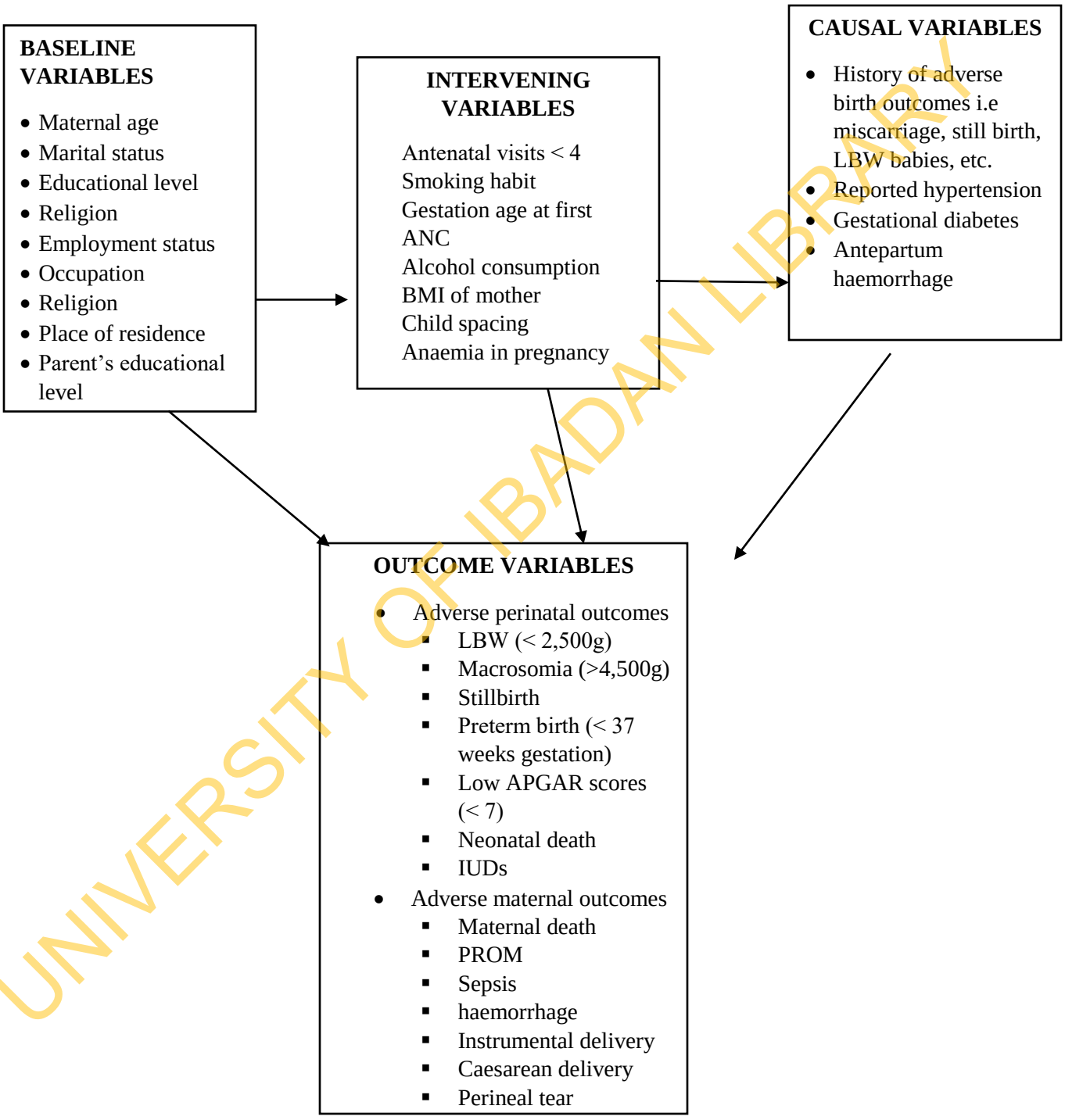
In Iran, Mohammadbeigi et al., 2015, carried out a study to determine the relationship between maternal characteristics and macrosomic births, they found out that gestational diabetes increases the likelihood of giving birth to macrosomic newborns by 11.9 folds. As a result, their study found that gestational diabetes is the primary predictor of macrosomic births.

2.3.17 HISTORY OF COMPLICATIONS IN PREVIOUS PREGNANCY

Adane et al (2014) in their study to determine the prevalence and associated factors of adverse birth outcomes among deliveries at Gondar Hospital in Northwest Ethiopia, found out that 6.7% of the women reported history of prenatal death in the preceding birth. They also found out that history of preterm delivery, and hypertension were significantly associated with low birth weight infants and preterm delivery in current pregnancy (Adane et al., 2014). Yeshialem et al (2017) in a study in Ethiopia found out that more of the women who had history of recorded

complications in previous pregnancies were more likely to experience adverse pregnancy outcome in current pregnancy. Mohammadbeigi et al (2015) found out from their study on foetal macrosomia, that macrosomic birth history increases likelihood of macrosomic newborns by 3.8%, compared to those without macrosomic history.

2.4 CONCEPTUAL FRAMEWORK FOR RISK FACTORS ASSOCIATED WITH ADVERSE BIRTH OUTCOMES AMONG ADOLESCENTS



CHAPTER THREE

METHODOLOGY

3.0 STUDY LOCATION / AREA

This study was conducted in Ibadan, the capital city of Oyo State, located in the South – Western part of Nigeria. The National Population Commission (NPC) 2009 estimate of the population of Ibadan puts it at 2.559 million. There are 11 Local Government Areas (LGAs) for administrative purposes: five situated within the city and six surrounding LGAs.

3.1 STUDY SETTINGS

This study made use of several health facilities in Ibadan; one state owned secondary health facility, one private secondary health facility, and various primary health care facilities.

Adeoyo Maternity Hospital, Yemetu, Ibadan, is one of the settings to be used for this study. Adeoyo Maternity Hospital is located in Ibadan North Local Government Area of Oyo State and was founded in 1928. The hospital provides maternal and childcare services to people in Ibadan and its environs. It is made up of antenatal clinic, labour ward, antenatal ward, gynecological ward, lying in ward, children's ward, immunization clinic, post – caesarean section ward, gynecological clinic and family planning clinic.

Oluyoro Catholic Hospital is situated in Oluyoro community, Oke offa, Ibadan Northeast Local Government Area. The hospital was founded in May 1959. It is the biggest private hospital in Ibadan. The hospital provides health services in two sections; the private wing and the general side. The private section of the hospital caters to the more affluent in the community. The general section on the other hand caters to the people of the low income cadre. This is the section this study will mainly focus as most of the target population for this study are people of low socio economic status.

Oje Primary Health Care facility is situated in Oje community, Ibadan North East LGA. It caters to the primary health needs of the people in the community.

Alafara Primary Health Care Facility also in Ibadan North east

Molete PHC, Ibadan North east LGA.

3.2 STUDY DESIGN

The study was a **DESCRIPTIVE CROSS – SECTIONAL STUDY.**

3.3 STUDY POPULATION

The study population was adolescent mothers (10 – 19 years) who put to bed within 3 months of the commencement of the study.

3.4 ELIGIBILITY CRITERIA

3.4.1 INCLUSION CRITERIA: Adolescent mothers who gave birth, at most 3 months to the commencement of the study in any of the selected health facilities was recruited into the study.

3.4.2 EXCLUSION CRITERIA: Adolescent mothers who didn't give birth in any of the selected health facilities, those who has given birth more than 3 months prior to the commencement of the study, and those who didn't consent to participate in the study was excluded from the study.

3.5 SAMPLE SIZE DETERMINATION

The sample size was determined using the Leslie Kish formula for single proportion with a two sided confidence level of 95% and a precision of 5%. A prevalence (12.4%) of low birth weight children born to adolescent mothers was used (Kassa et al., 2019). The formula below was used:

$$n = \frac{(Z_{\alpha/2})^2 pq}{D^2}$$

Where,

n = minimum sample size

$Z_{\alpha/2}$ = standard normal deviate at 95% confidence level (1.96)

P = prevalence of low birth weight children born to adolescent mothers

Q = 1 – P

D = the desired precision (5%).

This gave a sample size of 167, adjusting for 10% non – response gave a final sample size of 186 participants.

3.6 SAMPLING TECHNIQUE: A convenience sampling method was used to recruit the adolescent mothers.

3.7 DATA COLLECTION PROCEDURE: Data was obtained from the participants using an author formulated semi – structured questionnaire that was interview – administered immediately after the adolescent has put to bed, and when they adolescent mothers come for immunization and post – natal care in the health facilities. Data on pregnancy outcomes were collected from the case notes of the respondents by the nurses who were recruited as research assistants in the health facilities. The nurses recruited as research assistants were trained on what the research is all about and the importance of the data to be collected. Pretest of the questionnaire was done so as to ascertain the validity and reliability of the questions. Also, the obstetric and perinatal records of the participants was reviewed so as to obtain data concerning obstetric and perinatal outcomes of the participants after delivery. The questionnaire was divided into four sections as follows:

SECTION A: Socio – demographic characteristics

SECTION B: Knowledge of adolescent mothers on adverse pregnancy outcomes related risk factors.

SECTION C: Adverse pregnancy outcomes

SECTION D: Factors associated with pregnancy outcomes

3.8 VALIDITY OF INSTRUMENT

There was extensive review of relevant literatures to ensure content and face validity. Construct validity was also ensured by making sure that variables in the conceptual and theoretical frameworks were well represented in the instrument. The instrument was given to my supervisor as well as an expert in the Faculty of Public Health to help ascertain the quality of the instrument.

3.9.1 OUTCOME VARIABLES: The outcome variable to be collected include various adverse pregnancy outcomes both on the part of the mother as well as the new born infant. These include:

1. Preterm birth: defined as birth not up to 37 weeks gestation.
2. Still birth

3. Low birth weight: defined as baby weight below 2500g
4. Low 1 minute and 5 minutes APGAR score: < 7

3.9.2 EXPLANATORY VARIABLES: These are the possible risk factors that could lead to the various adverse pregnancy outcomes outlined above. They include:

1. Maternal age: Early teens (≤ 15 years), late teens (16 – 19 years), and young adults (20 – 24 years).
2. Marital status
3. Antenatal visits < 4
4. Late ANC initiation: 1st trimester (0 – 13 weeks), 2nd trimester (14 – 26 weeks), and 3rd trimester (27 – 40 weeks).
5. Level of education
6. Employment status
7. Income (< ₦18, 000, ₦18, 000 – ₦30, 000, > ₦30, 000)
8. Lifestyle behaviours (i.e., smoking habit and alcohol consumption)
9. BMI of the mother
10. Anaemia in the mother
11. Reported hypertension
12. Educational level of the parents of adolescent mother
13. Place of residence (rural or urban)

3.10 DATA MANAGEMENT AND ANALYSIS

Data collected was checked for completeness and accuracy. The data wasmanaged, i.e., cleaned, sorted and coded. Data was processed and analyzed using statistical packages SPSS version 20. Result outputs includes frequencies, percentages, mean, bivariate and multivariable logistic regressions, and other appropriate test statistics. Knowledge of pregnancy risk factors was scored and categorized into good knowledge and poor knowledge. Those that scored below the mean had poor knowledge of the pregnancy risk factors while those that scored above the mean had good knowledge. The age of the respondents were categorized as early teens (≤ 15 years), late teens (16 – 19 years) and young adults (20 – 24 years). ANC initiation variable was categorized according to trimester of ANC registration, i.e., first trimester (0 – 13 weeks), second trimester

(14 – 26 weeks), and third trimester (27 – 40 weeks). Income of respondents was categorized according to the state minimum wage, i.e., < ₦18, 000, ₦18, 000 – ₦30, 000, and > ₦30, 000. Chi – square analysis was used to test the association between risk factors and adverse pregnancy outcomes, of which, those that were statistically significant at 0.05 p – value were further analyzed using logistic regression.

TABLE 3.0 DATA ANALYSIS MATRIX

S/N	SPECIFIC OBJECTIVES	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	TOOLS FOR DATA ANALYSIS
1.	To assess the knowledge of adolescent mothers regarding pregnancy related risk factors	Knowledge	Previous smoking habit, alcohol consumption, child spacing, etc.	Mean
2.	To identify various adverse pregnancy outcomes found among adolescents	Adverse pregnancy outcomes		Proportion, percentages.
3.	Identification of factors associated with adverse pregnancy outcomes in adolescents	Low birth weight (LBW), preterm birth, low Apgar scores, perineal tears.	Non – prescription drug usage, ANC <4 times, late ANC initiation, maternal age < 15, PIH, gestational diabetes, etc.	Bivariate (χ^2) and multivariable logistic regression,

3.11. ETHICAL CONSIDERATIONS

Ethical approval was sought and obtained from the Oyo State Ministry of Health Research Ethics Committee Board before going to the field for data collection. Verbal and written informed consent was obtained from participants after providing them with information and benefits of the research. They were also assured that information provided by them will be kept confidential, so as to ensure sincere responses were provided by them. They were also assured that they were

free to withdraw from the research if the need arises. Permissions from the appropriate authorities in the various health facilities was also obtained before commencement of the study. Autonomy, Non – maleficence, and beneficence were three laws of ethics that were strictly adhered to during the course of this study.

CHAPTER FOUR

RESULT

Table 4.1 shows the socio – demographic characteristics of a total of 186 adolescent women who responded to the questions asked during the interview with a response rate of 100%. Majority (87.6%) of the respondents were adolescent mothers aged 16 – 19 years old, and very few of the respondents were less than 15 years old. Just one of the respondent was underweight, with 2.7% being over – weight. Few of the respondents (5.4%) had tertiary education while 2.7% of them are still in the university.

TABLE 4.1: Socio – Demographic Characteristics

VARIABLE		FREQUENCY (n = 186)	PERCENTAGE (%)
Age (in years)			
	≤15 (early teen)	2	1.1
	16 – 19 (late teen)	163	87.6
	20 – 24 (young adults)	21	11.3
Religion			
	Christianity	100	53.8
	Islamic	83	44.6
	Traditional	3	1.6
Marital status			
	Single	101	54.3
	Married	77	41.4
	Separated	8	4.3
Employment status			
	Unemployed	69	37.1
	Employed	117	62.9
Educational level of adolescent			
	No formal education	11	5.9
	Primary	68	36.6
	Secondary	97	52.2
	Tertiary	10	5.4
Occupation			
	Trader	79	57.7
	Housewife	3	2.2
	Self employed	34	24.8
	Apprentice	16	11.7
	Student	5	3.6
Family income			
	<18,000	13	7.0
	18,000 – 30,000	92	49.5
	≥ 30,000	81	43.6
Educational level of parents			
	No formal education	98	52.7
	Primary	77	41.4
	Secondary	10	5.4
	Tertiary	1	0.5
Residence			
	Rural	18	9.7
	Urban	168	90.3
BMI before delivery:			
	< 18.5	1	0.5
	18.5 – 24.9	180	96.8
	25.0 – 29.9	5	2
Parity			
	Primiparous	131	70.4
	Multiparous	55	29.6

Table 4.2 shows the knowledge score of adolescent mothers to various adverse pregnancy risk factors. Various knowledge variables were analyzed and later scored to test the overall degree of knowledge of the respondents concerning pregnancy risk factors. Those that scored above the mean (21.17) were categorized as having good knowledge, those that scored between 14 – 20 were categorized as having fair knowledge of risk factors while those that scored 13 and below had poor knowledge of the adverse pregnancy risk factors.

TABLE 4.2: Knowledge Score of Adolescents on Adverse Pregnancy Related Risk Factors

VARIABLE	FREQUENCY (n = 186)	Percentage (%)
Good	101	54.3
Fair	65	34.9
Poor	20	10.8

Table 4.3 shows the various adverse pregnancy outcomes observed among the respondents. Perinatal death, still birth and caesarean delivery were all negligible among the respondents. Low Apgar score at one minute had the highest prevalence (34.4%), followed by preterm delivery (28.0%) and then low birth weight (23.1%). Other outcomes observed were post – partum haemorrhage (11.83%), and cord around the neck of the babies (1.6%).

TABLE 4.3: Experience of Adverse Pregnancy Outcomes among Adolescents in Ibadan

VARIABLE	FREQUENCY (n = 186)	PERCENTAGE (%)
Perinatal death	1	0.5
Still birth	2	1.1
Premature rupture of the membrane	19	10.2
Perineal tears	179	96.2
Low Apgar scores		
1 minute: < 7	64	34.4
5 minutes: <7	3	1.6
LBW (2500g)	43	23.1
Preterm birth (< 37 weeks)	52	28.0
Others: Post – partum haemorrhage	22	11.83
Cord around the neck	3	1.6

Table 4.4 shows the prevalence of the risk factors for adverse pregnancy outcomes among the adolescents. Sixty – nine percent (69.0%) of the multiparous women has experienced LBW, 43.7% experienced preterm birth, PROM, 29.6%. A high proportion (72.4%) of the women were ill during pregnancy, the highest of which suffered from malaria (82.5%). The highest antenatal complication observed was anaemia (95.2%). Majority of the respondent attended ANC (96.8%) and 80.6% of them had spontaneous vaginal delivery.

TABLE 4.4: Prevalence of the Risk Factors for Adverse Pregnancy Outcomes among the Adolescents

VARIABLES		FREQUENCY (n = 186)	PERCENTAGE (%)
Reproductive and Obstetric History			
Experiences in Previous Pregnancy			
Still Birth:		5	7.0
Perinatal Death		4	5.6
Preterm Birth		31	43.7
Miscarriage		7	9.9
LBW		49	69.0
PROM		21	29.6
Current Obstetric History			
Illness in pregnancy		134	72.4
Type of illness			
Malaria		113	82.5
Typhoid		31	22.8
Flu		41	30.1
Antenatal Complications			
Anaemia		177	95.2
Pregnancy Induced Hypertension		41	22.0
Antepartum Haemorrhage		67	36.0
Gestational Diabetes		25	13.4
Alcohol Consumption			
Alcohol consumption 3 months prior to pregnancy		37	19.9
Alcohol consumption during pregnancy		3	1.6
Local Remedies			
Herbal mixture usage		112	60.5
Pregnancy Care			
How many times did you attend ANC before delivery?			
	< 4 times	68	37.8
	≥ 4 times	112	62.2
ANC initiation:			
	0 – 13 weeks (1st trimester)	27	15.0
	14 – 26 weeks (2nd trimester)	66	36.7
	27 – 40 weeks (3rd trimester)	87	48.3
Counselling on diet in ANC:	Yes	176	98.3
	No	3	1.7
Tetanus toxoid :	Yes	151	84.4
	I don't know	28	15.6
Vitamin supplement:	Yes	176	97.2
	No	5	2.8
History of Delivery			
Mode of delivery:	Spontaneous vagina delivery	150	80.6
	Instrumental delivery	34	18.3
	Caesarean section	2	1.1
Type of labour:	Spontaneous	183	98.4
	Induced	3	1.6
Duration of labour:	≤ 6 hours	89	47.8
	> 6 hours	97	52.2

Table 4.5.1 shows the factors associated with preterm delivery and some adverse pregnancy risk factors. Table 4.5.2 shows the likely association between low birth weight and some of its risk factors. Table 4.5.3 shows the association between Apgar score (< 7) and its associated factors. Table 4.5.4 shows the association between PROM and associated risk factors. Table 4.5.5 shows the association between instrumental delivery and associated risk factors.

TABLE 4.5.1: Factors Associated with Preterm Birth (< 37 weeks)

	PRETERM BIRTH			
	Yes	No	χ^2	p - value
Age (in years)				
≤ 15	2	1		
16 – 19	50	113	13.901	0.001
20 – 24	3	21		
Family Income				
< 18,000	8	5		
18, 000 – 30, 000	37	55		
> 30, 000	7	74	30.200	0.000
Parity				
Primipara	46	85		
Multipara	6	49	11.268	0.001
Antepartum haemorrhage				
Yes	29	38		
No	23	96	12.214	0.001
Non – prescription drugs				
Yes	37	32		
No	15	102	35.877	0.000
Herbal mixture				
Yes	41	71		
No	11	62	10.146	0.001
Mode of delivery				
SVD	31	119		
Instrumental delivery	20	14		
Caesarean section	1	1	20.52 4	0.000
ANC attendance				
< 4 times	35	33		
≥ 4 times	13	99	34.583	0.001
Duration of labour				
≤ 6 hours	16	73		
> 6 hours	36	61	8.438	0.004

TABLE 4.5.2: Factors Associated with Low Birth Weight (< 2500g)

	LOW BIRTH WEIGHT			
	Yes	No	χ^2	p – value
Age (in years)				
≤ 15	2	1		
16 – 19	40	122		
20 – 24	1	20	10.818	0.004
Parity				
Primipara	42	89		
Multipara	1	54	19.934	0.000
Alcohol consumption				
Yes	1	2		
No	42	141	10.831	0.001
Antepartum haemorrhage				
Yes	27	40		
No	16	103	17.391	0.000
Non – prescription drugs				
Yes	31	38		
No	12	105	29.355	0.000
Mode of delivery				
SVD	28	122		
Instrumental delivery	15	19	10.709	0.005
ANC attendance				
< 4 times	30	82		
≥ 4 times	9	59	36.550	0.000
ANC initiation (in weeks)				
0 – 13	4	7		
14 – 26	7	102		
27 – 40	28	32	11.174	0.004
Gestational age (in weeks)				
22 – 27	3	1		
28 - 36	32	16		
≥ 37	8	126	79.299	0.000

TABLE 4.5.3: Factors Associated with Low 1 Minute APGAR Scores

	LOW 1 MINUTE APGAR SCORE (< 7)			
	Yes	No	χ^2	p - value
Age (in years)				
≤ 15	2	1		
16 – 19	62	100	15.286	0.000
Illness during pregnancy				
Yes	55	73		
No	4	46	8.672	0.003
Antepartum haemorrhage				
Yes	37	29		
No	27	91	20.541	0.000
Gestational age (in weeks)				
22 – 27	3	1		
28 - 36	24	13		
≥ 37	37	106	44.363	0.000
Herbal mixture				
Yes	50	60		
No	14	59	13.322	0.000
Birth weight (g)				
< 2500	32	10		
≥ 2500	32	110	41.136	0.000
ANC attendance				
< 4 times	34	71		
≥ 4 times	23	48	19.866	0.000

TABLE 4.5.4: Factors Associated with Premature Rupture of the Membrane (PROM)

	PROM			
	Yes	No	χ^2	p – value
Age (in years)				
≤15	7	146		
16 – 19	12	21	11.699	0.001
Non – prescription drugs				
Yes	7	57		
No	11	110	6.773	0.034
Gestational diabetes				
Yes	19	19		
No	148	118	6.889	0.032
Pregnancy induced hypertension (PIH)				
Yes	33	33		
No	134	134	6.046	0.049

A Logistic Regression analysis was carried out on the adverse pregnancy risk factors that were statistically significant in the bivariate analysis (χ^2) of some the adverse pregnancy outcomes, the results obtained from these are shown in Table 4.6 below:

TABLE 4.6.1: Logistic Regression showing the Association between Preterm Birth and some Adverse Pregnancy Risk Factors

VARIABLES	ODDS RATIO	C.I (O.R)	p – value
Age (in years)			
16 - 19			
≤ 15	7.926	1.682 – 37.336	0.009***
Duration of labour			
≤ 6 hours			
> 6 hours	0.945	0.358 – 2.494	0.910
Mode of Delivery			
SVD			
Instrumental Delivery	0.727	0.197 – 2.679	0.632
ANC Attendance			
≥ 4 times			
< 4 times	3.224	1.209 – 8.595	0.019***
Herbal mixture usage			
Yes			
No	1.335	0.428 – 4.158	0.619
Non – prescription drugs			
Yes			
No	0.297	0.096 – 0.920	0.035***
Antepartum Haemorrhage			
Yes			
No	0.568	0.218 – 1.474	0.245
Illness in pregnancy			
Yes			
No	1.666	0.484 – 5.734	0.418
Parity			
Primipara			
Multipara	0.324	0.79 – 1.330	0.118
Family income			
< 18,000			
18, 000 – 30, 000	0.613	1.22 – 3.086	0.553
≥ 30,000	1.055	0.162 – 6.865	0.955

(***) – Statistically significant at p < 0.05

TABLE 4.6.2: Logistic Regression showing the Association between Low Birth Weight and some Adverse Pregnancy Risk Factors

VARIABLES	ODDS RATIO	C.I (O.R)	p – values
Age (in years)			
≤ 15			
16 - 19	4.359	0.782 – 24.300	0.093
ANC Initiation (in weeks)			
0 - 13			
14 – 26	8.559	0.872 – 84.073	0.065
27 – 40	8.067	0.557 – 116.751	0.126
ANC Attendance			
≥ 4 times			
< 4 times	5.150	1.042 – 24.443	0.044***
Parity			
Primipara			
Multipara	0.024	0.002 – 0.0285	0.003***
APH			
Yes			
No	0.276	0.081 – 0.938	0.039***
Tetanus toxoid			
Yes			
No	0.265	0.057 – 1.235	0.091
Mode of delivery			
Spontaneous Vaginal Delivery			
Instrumental delivery	4.026	0.788 – 20.560	0.094
Gestational age at delivery			
≥ 37 weeks			
< 37 weeks	15.886	4.474 – 56.410	0.000***

(***) – Statistically significant at p < 0.05

TABLE 4.6.3:Logistic Regression showing the Association between 1 minute Apgar score and some Adverse Pregnancy Risk Factors

VARIABLES	ODDS RATIO	C.I (O.R)	p – values
Age (in years)			
≤ 15			
16 – 19	7.559	0.807 – 70.827	0.076
ANC Attendance			
< 4 times			
≥ 4 times	1.161	0.408 – 3.308	0.779
Antepartum Haemorrhage			
Yes			
No	0.289	0.114 – 0.732	0.009***
Gestational age at delivery			
≥ 37 weeks			
28 – 36 weeks	3.439	1.057 – 11.192	0.040***
Birth weight			
≥ 2500g			
< 2500g	2.309	0.688 – 7.748	0.175
Duration of labour			
≤ 6 hours			
> 6 hours	0.632	0.249 – 1.607	0.333
Herbal mixture usage			
Yes			
No	0.642	0.241 – 1.712	0.378
Malaria in pregnancy			
Yes			
No	0.377	0.102 – 1.391	0.143

(***) – Statistically significant at p < 0.05

TABLE 4.6.4: Logistic Regression showing the Association between Premature Rupture of the Membrane and some Adverse Pregnancy Risk Factors

VARIABLES	ODDS RATIO	C.I (O.R)	p – values
Age (in years)			
≤ 15			
16 – 19	0.139	0.029 – 0.670	0.014***
Herbal mixture usage			
Yes			
No	0.231	0.042 – 1.262	0.091
Pregnancy induced hypertension			
No			
Yes	4.434	1.132 – 17.377	0.033***
Non – prescription drugs			
Yes			
No	5.164	1.038 – 25.695	0.045***
Gestational diabetes			
Yes			
No	2.375	0.598 – 9.435	0.219

(***) – Statistically significant at p < 0.05

CHAPTER FIVE

5.0 DISCUSSION

This was an analytical cross – sectional study aimed at determining the knowledge of adolescents on adverse pregnancy risk factors, identification of adverse pregnancy outcomes, and the risk factors associated with adverse pregnancy outcomes among adolescents in Ibadan. In this facility based study, the adolescent mothers were found to have high knowledge of some of the adverse pregnancy related risk factors like cigarette smoking, alcohol consumption, etc.; also, adverse outcomes like low birth weight, preterm delivery, cord around the neck, low Agar scores, PROM, still birth, instrumental delivery, caesarean delivery, etc. The results of this study shows an association between some of the adverse pregnancy related risk factors and adverse pregnancy outcomes, especially among adolescent mothers.

A total of 186 adolescent mothers were recruited into the study and their socio – demographic information was also taken (Table 4.1). The highest number (87.6%) of mothers recruited into the study were in the age group 15 – 19 years, with more Christians (53.8%). Majority of the respondents were single (54.3%) and still lived with their parents and some separated from their partners (4.3%). Most of the respondents were primiparous (70.4%), with the rest of them being multiparous.

5.1 KNOWLEDGE OF ADOLESCENT MOTHERS WITH REGARDS TO PREGNANCY RELATED RISK FACTORS

The adolescent mothers in this study were also interviewed to test their knowledge on adverse pregnancy related risk factors (Table 4.2). Various knowledge variables were used to test their knowledge of the pregnancy risk factors. Such variables include child spacing, non –

prescription drug usage, use of herbal mixture in pregnancy, lifestyle factors like smoking cigarette, drinking alcohol, not exercising in pregnancy, etc, antenatal care initiation and attendance, etc. a mean score of 21.17 was observed after scoring the knowledge variables. Those that scored above the mean were categorized as having good knowledge of the pregnancy risk factors while those that scored below the mean were termed as having poor knowledge of the pregnancy risk factors. Although, a high percentage of the respondents (54.3%) had a very good knowledge of various pregnancy related risk factors, few of them (10.8%) still had poor knowledge of the risk factors associated with adverse outcomes of pregnancy. Also, some were fairly knowledgeable when it comes to pregnancy risk factors (34.9%). These findings are in line with a study carried out in Tanzania to determine the factors influencing pregnancy outcomes by Theobald and Napendaeli (2010). They observed from their study that most of the pregnant women had high knowledge of most of these risk factors, although, the exact outcome of each of the factors on the mother and baby is unknown.

5.2 ADVERSE PREGNANCY OUTCOMES

The various adverse pregnancy outcomes identified from this study were categorized into; maternal adverse outcomes and adverse perinatal outcomes (Table 4.3). Adverse maternal outcomes identified in the study include: PROM (10.2%), caesarean delivery (1.1%), instrumental delivery (15.6%), perineal tears (96.2%), and post – partum haemorrhage (11.83%). It was observed that almost all the respondent had different degrees of perineal tears. This could be attributed to the fact that most of them were primipara. These outcomes were similar to those observed in previous studies carried out in places like Ibadan, Kano, Bayelsa States of Nigeria; Cameroun, Turkey, and Europe (Kongyuy et al., 2008; Adeyinka et al., 2010; Ezegwui et al.,

2011; Ayuba and Owoeye, 2012; Yuce et al., 2015; Garba et al., 2016; Socolov et al., 2017). In a study to determine the prevalence and associated factors of adverse birth outcomes among deliveries at Gondar Hospital, Northwest Ethiopia, a PROM rate of 22.5% was observed among the respondents aged 10 – 34 years old (Adane et al., 2014). Comparing these rates to those observed from the findings of this current study, it can be seen that this one is higher than that of the current study. This could be attributed to the fact that our study was limited to adolescents aged 10 – 19 years, unlike their own study that encompassed a larger age range (10 – 39 years). Garba et al. (2016) in their study carried out in Aminu Kano Teaching Hospital, Kano State, to assess the obstetric outcome of teenage pregnancy, its current trends, socio – demographic determinants, and incidence, found out a caesarean section prevalence of 18.9%, and 2.2% vacuum delivery prevalence among adolescent mothers. In Enugu State, a study found out that caesarean section delivery among adolescent mothers (18.9%) was significantly higher than adult mothers (10.5%) (Ezegwui et al., 2011). Ayuba and Owoeye, (2012) found out in their study in Bayelsa State, that adolescent mothers (31.3%) had a higher rate of caesarean delivery than older parturient, and an instrumental delivery prevalence of 2.5%. Socolov et al. (2017) in their study in Romania, Europe found no significant difference in instrumental delivery rate among adolescent mothers and adult mothers. It was discovered in their study that post – partum haemorrhage was significantly higher in the teenage age group than the adults. Kongyuy et al (2008) found a significantly higher rate of perineal tears among adolescent mothers than in the adult age group, and no significant difference in the caesarean delivery rate, Prom and instrumental delivery between adolescents and the adult mothers, in their study in Cameroun. Most of these previous studies shows similarities with our study in some of their maternal

outcomes observed, although, there are differences in their prevalence which could be as a result of differences in study design, location, and some other cogent factors.

Perinatal outcomes observed in this study includes: perinatal death (0.5%0, still birth (1.1%), low 1 minute Apgar score (34.4%), low 5 minutes Apgar score (1.6%), low birth weight (23.1%), preterm delivery (28.0%), and cord around the neck (1.6%) (Table 4.3). Comparing these findings with those by Adane et al (2014) in their study in Northwest Ethiopia, they found a still birth rate of 7.1% and preterm delivery rate of 14.3%. Several studies carried out previously in Nigeria by different researchers have also shown varying degrees of adverse perinatal outcomes among adolescents. One of such studies by Adeyinka et al (2010) in Ibadan, Southwestern Nigeria, found still birth prevalence of 22.2% among adolescents, although, compared with adult mothers, the difference was not statistically different. When this finding is compared to findings in this present study, the rate of still birth is higher, despite the fact that both study locations is same (Ibadan). This difference could be attributed to the fact that the study by Adeyinka et al (2010) was carried out in a tertiary level hospital (UCH), which is also a referral centre, compared to the one in our study which was predominantly in different primary health care centres. Ezegwui et al (2011) in their study in Enugu State, South eastern Nigeria, found perinatal deaths (16.2%), preterm delivery (25.7%), LBW (23.0%), low 1 minute Apgar scores (35.1%) of babies born to teenage mothers. In Kano State, Northwestern Nigeria, Garba et al (2016) in their study found still birth (2.5%), preterm delivery (11.5%) and LBW (17.8%). From previous studies, especially those in Nigeria, it can be seen that most of the perinatal outcomes observed in these studies are the same as those found in our current study. Although, the prevalence and incidences varies, it can still be comparable. Most of the disparities in the prevalence has to do with study designs, facilities in which the studies were carried out, which

were mainly tertiary health facilities, unlike in this study, in which the main source of data was from primary health care facilities.

5.3 RISK FACTORS ASSOCIATED WITH THE ADVERSE PREGNANCY OUTCOMES

A bivariate (Chi, X^2) analysis was carried out to test the associations between the adverse pregnancy outcomes observed in this study and some of the explanatory variables. Table 4.5.1 shows some of the explanatory variables that were statistically significant for preterm birth. Age, family income, parity, illness during pregnancy, antepartum haemorrhage, usage of non – prescription drugs in pregnancy, usage of herbal mixtures in pregnancy, antenatal care (ANC) attendance (< 4), mode of delivery, and hours in labour (≥ 9 hours) were all statistically significant as factors that could give rise to preterm delivery. Low birth weight (Table 4.5.2) on the other hand, had factors like: age, parity, antepartum haemorrhage, alcohol consumption, non – prescription drug usage, ANC attendance, ANC initiation (> 20 weeks), preterm delivery and mode of delivery, to be statistically significant. Factors like; age, ANC attendance (< 4), hours in labour (≥ 9 hours), preterm delivery, low birth weight, herbal mixture usage in pregnancy, illness during pregnancy and antepartum haemorrhage were all statistically significant in X^2 analysis for low Apgar scores at 1 minute and 5 minutes (Table 4.5.3). Premature Rupture of the Membranes had statistically significant factors which include; age, non – prescription drug usage in pregnancy, pregnancy induced hypertension and gestational diabetes (Table 4.5.4).

Logistic regression was further used to test the association between the outcome variables and their statistically significant explanatory variables (Table 4.6.1 – 4.6.4). Factors that were significantly associated with preterm birth were age, ANC attendance and non – prescription

drug usage in pregnancy. It can be seen in table 4.6.1 that young adolescent mothers aged ≤ 15 years were 7.926 times more likely to deliver preterm (< 37 weeks) than their older counterparts aged ≥ 16 years. Also, those that attended ANC < 4 times throughout their pregnancy were 3.224 times more likely to deliver preterm than those that add ≥ 4 times attendance. Non – prescription drug usage in pregnancy showed that those who used non – prescription drug in pregnancy were 29% more likely to deliver preterm compared to those that didn't use non – prescription drugs during their pregnancy. Comparing these findings with previous studies, young maternal age (11 – 14 years), ANC attendance < 4, and parity were factors that were found to be significantly associated with preterm delivery (Torvie et al., 2015; Mombo – Ngoma et al., 2016; Kohei et al., 2019; Kassa et al., 2019).

For low birth weight (LBW) (Table 4.6.2), factors like ANC attendance, parity, antepartum haemorrhage and preterm delivery were significantly associated. It was found out that adolescent mothers who attended ANC < 4 times were 5 times more likely to deliver low birth weight babies compared to those that attended ≥ 4 times. Also, multiparous women were found to be 2.4% less likely to deliver low birth weight babies compared to primiparous women. Those of the women that did not experience bleeding in pregnancy (antepartum haemorrhage) were 28% less likely to give birth to low birth weight babies than their counterpart that experienced it. In addition, those babies that were delivered preterm were also found to be 15 times more likely to be low birth weight than the term births. Similarly, previous studies also found factors such as, young maternal age, ANC attendance < 4, parity, and preterm delivery, to be significantly associated with low birth weight (Isiugo – Abanihe and Oke, 2011; Guimaraes et al., 2013, Taiwo et al., 2014; Althabe et al., 2015).

Factors which were significantly associated with low Apgar score at 1 minute upon further analysis were antepartum haemorrhage and preterm delivery. It was observed that adolescent mothers who did not suffer bleeding from the vagina in pregnancy (antepartum haemorrhage) were 71% less likely to deliver babies with low Apgar score at their first minute of life than those that suffered from antepartum haemorrhage. Also, babies who were born preterm were 3 times more likely to have Apgar score < 7 than those born at term, after adjusting for other variables like antepartum haemorrhages. In contrast, Kohei et al. (2019) in their study found young maternal age (11 – 14 years) to be significantly associated with low Apgar scores at 1 minute.

Associated risk factors of premature rupture of the membranes (PROM) that were statistically significant upon further analysis using logistic regression were age, pregnancy induced hypertension, and non – prescription drug usage in pregnancy. After adjusting for non – prescription drug usage and pregnancy induced hypertension, it was found out that adolescent mothers aged ≥ 16 years were 76% times less likely to have PROM compared to those in the ≤ 15 years age group. Also, those adolescent mothers that had hypertension in pregnancy were 4 times more likely to have PROM than those without pregnancy induced hypertension after adjusting for other variables (Table 4.6.4).

Despite the fact that several studies have been carried out in the area of adolescent reproductive health across Sub – Saharan Africa, risk factors of adolescent pregnancy outcomes have not really been explored despite the fact that a large percentage of maternal and child mortalities is within the adolescent age group. Findings from this study will help in policy making, especially in the education of the adolescents about pregnancy related risk factors that could give rise to adverse pregnancy outcomes. Also, this study can be a basis, a foundation of some sorts towards doing more research in order to mitigate against some of this risk factors

especially among the adolescent age group, which is usually overlooked, or mudded up with adult women. Also, pregnancy among young adolescents (i.e., < 15 years) should be treated as high risk, as this study already points to the fact that young maternal age is a risk factor of various adverse pregnancy outcome.

5.4 LIMITATION OF THE STUDY

One limitation encountered in this study was selection bias, which is usually associated with most facility based studies. This was mitigated against by using a purposive sampling technique of those that fall within the inclusion criteria of the study. For further studies on the topic, a follow – up study would be more ideal as this would enable all the outcomes to be encompassed even up to the birth and perinatal periods. Also, more health facilities should be included so as to provide a more generalizable outcome. Despite this cross – sectional study design used in this research, it provided a snapshot of the whole research at a glance.

5.5 GAPS REMAINING TO BE EXPLORED

This study discovered some perinatal outcomes which was not fully explored due to the time constraint of the study. As a result, further studies should be carried out to follow up the adolescent mother right from pregnancy until after birth so as to observe further outcomes on both the mother and the child especially in the perinatal stage of the child. Also, studies on the effect of herbal mixture usage on pregnancy outcomes can be further studied.

5.6 CONCLUSION

This research has been able to show that adolescent mothers, though, have good knowledge of the adverse pregnancy risk factors, only few of them know the main outcomes of most of these risk factors. Their knowledge is mainly attributed to different old wives tales in their environment concerning the dos and don'ts of pregnancy, not necessarily the main impact of some of these factors on pregnancy.

Also, it was found out that most of these adolescents don't see anything wrong in taking herbal mixtures in their pregnancy as they see it as aiding them in having better pregnancy outcomes. Further studies should be done to test the effects of some of these herbal concoctions on the pregnancy outcomes.Other outcomes observed in the study apart from the outcomes expected were cord around the neck and post – partum haemorrhage. Future research could be geared towards checking if both outcomes were only associated with adolescents alone, or if it also affects adult mothers. Adverse pregnancy outcomes observed in this study were preterm delivery, low birth weight, cord around the neck, perineal tears, low Apgar scores, PROM, and post – partum haemorrhage. Age, Antepartum haemorrhage, parity, pregnancy induced hypertension, preterm delivery, non – prescription drug usage in pregnancy, gestational diabetes, etc. were some of the risk factors found to be statistically significant in the study. This shows that all these factors are to be avoided by pregnant women. Summarily, it can be said that most adolescent mothers recruited into the study that had ANC attendance > 4, early ANC initiation (16 weeks), did not use non – prescription drugs or herbal mixtures, did not bleed in pregnancy or have gestational diabetes, that was not anaemic, that is aged between 15 – 19 years, had better pregnancy outcomes than those that were younger < 15, anaemic, bled in pregnancy, < 4 times ANC attendace, etc.

5.7 RECOMMENDATION

It would really not be out of place to include sex education as part of the school curriculum, even right from primary school levels. This is so as to ensure that the young adolescents who have been shown by the findings of this study to be more at risk of the various adverse pregnancy outcomes, are protected. Also, it will enable them to know the dangers of unprotected sexal relationships, even apart from pregnancy and its outcomes, some of which could be various deadly sexually transmitted infections. Also, parents should be able to discuss sex with their children and wards. Pregnant adolescents should also be treated with love and not just as problems. They should be encouraged to seek antenatal care services and other health benefits without health workers being judgmental, so as not to discourage them. Parents should also give the utmost support to their pregnant teenagers.

A safe environment should also be provided for the adolescent to discuss, without fear of censure, their sexual health and needs with people who are older and more experienced. Especially in the area of culturally acceptable behavior and morals, adolescents should be free to ask questions, without fear of being castigated for their preferences. Pregnant adolescents should also be shown the utmost love and care, especially by their parents and the society at large. From this study, it was observed that most of the adolescent mothers recruited into the study were of low educational and socio – economic status, hence, the need for education, especially for the girl child should be emphasized, and free education should also be provided if possible. In situations where formal education is not attainable, then the female child should be equipped with vocational skills that will help improve the financial situation of the child. Antenatal care facilities should also be made readily available and affordable for the populace. Though, going by the findings from this study, massive work has been done in this regard as most of the

respondents attended ANC in various primary level health facilities around them. Despite this, the mothers should be advised to initiate ANC early enough, so that the progress of their pregnancy can be well monitored. Also, since the study is about adolescent mothers and pregnancy related, antenatal care should be provided in a special setting where non – judgmental professionals and staff members are interested and skilled in relating to pregnant teenagers as people rather than problems.

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APPENDIX 1

QUESTIONNAIRE

RISK FACTORS ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES AMONG ADOLESCENTS IN IBADAN METROPOLIS

My name is AYOOLA, Ayobami Esther, a postgraduate student of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria. I am carrying out a research work on the factors that poses risk of adverse birth outcomes among adolescent mothers here in Ibadan. This study will help identify and mediate against these factors so as to make pregnancy safe for young mothers. I seek truthful response to the questions. The interview will take about 30 minutes, at most, of your time

Your cooperation is highly appreciated and recognized.

Thanks.

SECTION A: SOCIO – DEMOGRAPHIC CHARACTERISTICS

Identification Number: _____

Date of interview: _____

1. Age of mother at delivery: _____
2. Religion: a). Christianity b). Islam c). Traditional d). None
3. Marital status: a). Single b). Married c). Divorced d). Widowed e). Separated
4. Educational level: a). No formal education b). Primary c). Secondary d). Tertiary
5. Employment status: a). Employed b). Unemployed
6. Occupation: a). Trader b). Housewife c). Government employee d). Self – employed e). Others (specify): ……
7. Family income: a). < ₦20,000 b). ₦20,000 - ₦39,000 c). ₦40,000 - ₦79,000 d). ₦80,000 - ₦100, 000 e). > ₦100,000
8. Place of residence: a). Rural b). Urban
9. Educational level of parents of adolescent mother: a). No formal education b). Primary c). Secondary d). Tertiary
10. Weight of the adolescent mother before delivery: _____
11. Height of adolescent mother:_____
12. Weight of adolescent mother after delivery:_____
13. BMI before delivery: _____
14. BMI after delivery:_____

SECTION B: KNOWLEDGE OF PREGNANCY RELATED RISK FACTORS

15. Is the smoking of cigarette during pregnancy good? A). Yes b). No c). I don't know
16. Is it good to sniff, chew or smoke any other form of tobacco during pregnancy? A). Yes b). No c). I don't know
17. Is it good to drink alcohol during pregnancy? A). Yes b). No c). I don't know
18. Does smoking and drinking during pregnancy have any effect on the foetal outcome? A). Yes b). No c). I don't know
19. Is it important for pregnant women to attend antenatal care clinic? A). Yes b). No c). I don't know
20. At what stage of pregnancy do you think pregnant women should register for antenatal care? A). 1st trimester b). 2nd trimester c). 3rd trimester
21. Should pregnant women take additional diet to supplement their nutrition? A). Yes b). No c). I don't know
22. Does birth spacing affects pregnancy outcome? A). Yes b). No c). I don't know
23. How old should a child be before the mother gets pregnant again? A). 12 months b). 24 months c). 36 months d). 48 months
24. Does the number of children a mother gives birth to affect subsequent pregnancy outcome? A). Yes b). No c). I don't know
25. Does the use of drugs without the prescription of the doctor affect pregnancy? A). Yes b) No c). I don't know
26. Are you aware that some drugs are not to be taken by pregnant women due to their effects on the foetus? A). Yes b). No c). I don't know
27. Is it important for a pregnant woman to know her HIV status? A). Yes b). No

SECTION C: ATTITUDES TOWARDS PREVENTION OF PREGNANCY RELATED RISK FACTORS

28. Did you do any form of physical activity e.g. mild exercise during the course of your pregnancy? A). Yes b). No
29. Were you involved in any stressful or strenuous activity that you think could harm the baby in any way during the course of your pregnancy? A). Yes b). No
30. Did you drink alcohol while you were pregnant? A). Yes b). No
31. Did you smoke cigarette during the course of your pregnancy? A). Yes b). No
32. Why do you think smoking during pregnancy is bad? (tick as appropriate)

It affects the foetus ☐

It causes different pregnancy complications ☐

It makes the baby small ☐

It has no effect on the baby ☐

It affects the mother ☐

SECTION D: ADVERSE PREGNANCY OUTCOMES

To be filled by the medical practioner in charge of the patient

33. Which of the following birth outcomes was experienced?

Tick box as appropriate for the following birth outcomes.

BIRTH OUTCOMES	**YES**	**NO**
Foetal outcomes		
Neonatal death		
Perinatal death: Fresh: Still birth Macerated		
Maternal outcomes		
Maternal death		
PROM		
Caesarean delivery		
Instrumental delivery		
Episiotomy		
Perineal tears		

Others (specify):_____

APGAR scores: 1 minute _____

5 minutes _____

Birth weight (g) of neonate: _____

Gestational age at delivery: _____

SECTION E: FACTORS ASSOCIATED WITH PREGNANCY OUTCOMES

34. How many full term babies have you ever had?_____
35. During the course of this pregnancy, did you attend antenatal care (ANC)? A). Yes b) No
36. How many times did you attend ANC before delivery of this baby? A). 1 time b). 2 – 3 times c). ≥ 4 times
37. At what week of your pregnancy did you register for ANC? _____
38. During ANC visits, were you counselled on the type of diet that is good for you and the baby? A). Yes b). No
39. Were you given any tetanus toxoid injection at least once during your attendance for antenatal care? A). Yes b). No c). I don't know
40. Did you use any form of contraceptive before this immediate pregnancy? A). Yes b). No
41. What type of contraceptive did you use? A) Injectibles b). Pills c) Others (specify): _____
42. Did you experience any bleeding or cramping during the course of this pregnancy? A). Yes b). No
43. What was the mode of delivery for this baby? A). Spontaneous vaginal delivery b). Instrumental delivery c). Caesarean section
44. Was the labor spontaneous or induced? A). Spontaneous b). Induced
45. How many hours did your labour last? _____
46. History of tobacco use:

a) Before this current pregnancy, have you ever smoked cigarette or any other form of tobacco? A). Yes b). No

b) If yes, how many cigarettes per day? _____

c) In 3 months before you got pregnant, did you smoke, sniff or chew any form of tobacco? A). Yes b). No c). I can't remember

d) Did you use any other form of tobacco? A). Yes b). No

47. Alcohol Consumption:

a) In the three months before your current pregnancy, did you use any form of alcohol? A). Yes b). No c). Can't remember

b) During the course of this pregnancy, did you use any form of alcohol? A). Yes b). No c). Can't remember

c) Since pregnancy, on average, how many days a week did you take one or more bottles of alcohol?

48. Is this your first child? A). Yes b). No

49. If NO, how many children have you had? _____

50. Did you experience any of the following in your previous pregnancies? (tick the appropriate box(es))

Still birth ☐ Caesarean section ☐

Preterm birth ☐ Miscarriage ☐

LBW babies ☐ PROM ☐

Perinatal death ☐

51. Which of the following antenatal complication did you experience during the course of this pregnancy before birth? (Tick appropriate box(es)).

Anaemia ☐

Pregnancy induced hypertension ☐

Antepartum haemorrhage ☐

Gestational diabetes ☐

APPENDIX 2

INFORMED CONSENT FORM

My name is AYOOLA, Ayobami Esther, a postgraduate student of the department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan. We are interviewing adolescent mothers who just delivered their baby so as to find out the factors which may be responsible for various unfavourable outcomes of pregnancy in order to help in their prevention. I will be asking you some questions about your habits and experiences especially related to the period of your pregnancy. Please, be assured that your answers will be kept confidential and none of your response to the questions will be disclosed to a third party. Also, your name will not be written on the form, instead, a number will be given to you, so that information given by you will not be traceable to you. Information provided by you and all other participants in this research will be given to the government so as to provide amenities to help in reducing these factors that leads to unwanted pregnancy outcomes.

During the course of the study, your delivery and antenatal record will be accessed so as to get your delivery reports, in addition to your being interviewed. The information extracted from your record will not be used against you in any way or form. No harm will come to you via the information gotten from you. Your honest answers to the questions will go a long way in helping other adolescent mothers to better take care during pregnancy, hence reduce, unfavourable outcomes.

- You are free to refuse to take part in this programme. You have a right to withdraw at any given time you choose to. Your help will be highly appreciated in responding to the survey and taking part in the study.
- Consent: Now that the study has been well explained to me and I fully understand the content of the process, I will be willing to take part in the programme.

_____ _____

Signature / thumbprint of participant Interview date

APPENDIX 3

Ìwé-ìbéèrè

ÀWỌN OKÙNFÀ EWU TÍ Ó RỌ̀MỌ́ ỌMỌ BÍBÍ LÁÀRÍN ÀWON ỌDỌ́MỌBÌRIN NÍ ÌLÚ ÌBÀDÀN

Orúkọ mi ni Omidan AYÒỌLÁ, Ayọ̀bámi Esther, akẹ́ẹ̀kọ́ àgbà ní Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, Unifásitì ilẹ Ibàdàn.

Mo n ṣe ìwádìí lórii àwọn okùnfà ewu tí ó rọ̀mọ́ ọmọ bíbí láàrín àwọn ọdòọ́mọbìrin ní ìlú Ìbàdàn. Ìwádìí yìí á ràn mí lọ́wọ́ láti tan ìmọ́lẹ̀ sí ọ̀nà àtidẹ́kun àwọn okùnfà ewu yìí kí àláfià lè túnbò wà pẹ̀lú ìyá àti ọmọ tuntun. Mo fẹ́ kí ẹ ṣọ ìdáhùn tòótọ́ sí àwọn ìbéérè wọ̀nyí. N kò ní gbà ju ìṣẹ́jù ọgbọ̀n lọ lọ́wọ́ yín.

Ìfọ̀wọ́sowọ́pọ̀ yín ni ó jẹmí lógún, mo sì dúpẹ́ púpọ̀ lọ́wọ́ yín.

Ẹ ṣeun

SECTION A: SOCIO – DEMOGRAPHIC CHARACTERISTICS

Nọ́mbà Ìdánimọ̀

Ọjọ́ ìfọ̀rọ̀wánilẹ́nuwò

1. Ọmọdún ìyà ọmọtuntun ní àsìkò ìbímọ: _____
2. Èsìn: a) Onígbàgbó b) Mùsùlùmí d) Àbáláyé e) Kòsí nkankan
3. Ìgbéyàwó ṣíṣe: a) Rárá b) Bẹ́ẹ̀ni d) Ìyapa e) Ọkọ ti kú
4. Ìwé kíkà: a) Kòsí Rárá b) Ilé-ẹ̀kọ́ ọmọ kékeré d) Ilé-ẹ̀kọ́ Sẹ́kọ́ndírì e) Ilé-ẹ̀kọ́ gíga
5. Iṣẹ́ ṣíṣẹ: a) Ówà b) Kòsí
6. Iṣẹ́: a) Òntajà b) Ìyàwó-ilé d) Òṣìṣẹ́-ìjọba e) Aládani ẹ) Òmíràn (Ṣàlàyé)_____
7. Owó tó n wọlé sí àpò ìdílé: a). < ₦20,000 b). ₦20,000 - ₦39,000 c). ₦40,000 - ₦79,000 d). ₦80,000 - ₦100, 000 e). > ₦100,000
8. Ibùgbé: a) Abúlé b) Ìlú
9. Ilé-ẹ̀kọ́ tò gajù tí àwọn òbì ìyá ọmọ kà: a) Kòsí Rárá b) Ilé-ẹ̀kọ́ ọmọ kékeré d) Ilé-ẹ̀kọ́ Sẹ́kọ́ndírì e) Ilé-ẹ̀kọ́ gíga
10. Ìwúwo ìyá ọmọ kó tó bímọ:_____
11. Gíga ìyá ọmọ:_____
12. Ìwúwo ìyá ọmọ lẹ́hìn ìbímọ:_____
13. BMI kó tó bímọ:_____
14. BMI lẹ́hìn ìbímọ:_____

SECTION B: KNOWLEDGE OF PREGNANCY RELATED RISK FACTORS

15. Ṣé sìgá fífà dára nínú oyún? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
16. Ṣé tábà fífà, jíjẹ tàbí mímu dára nínú oyún? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
17. Ṣé ọtí mímu dára nínú oyún? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
18. Ṣé ọtí mímu àti sìgá fífà ní àlébù lórí oyún? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
19. Ṣé ó dára kí obìrin olóyún maa lọsí ilé-ìwòsàn fún antenatal? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
20. Àsìkò wo lẹ ròpé ó dára fún obìrin olóyún láti fi orúkọ sílẹ̀ fún antenatal? a). 1st trimester b). 2nd trimester c). 3rd trimester
21. Ṣé ó dára kí obìrin olóyún maa jẹ púpọ̀ tó ṣe ara loore? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
22. Ṣé ìfàyè sílẹ̀ láàrín ọmọ bíbí ma n nípa lórí oyún? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
23. Ọdún mélo ló da kí ọmọ jẹ́ kí ìyá tó lóyún miràn? a) Ọdún kan b) Ọdún méjì d) Ọdún méta e) Ọdún mẹ́ẹ̀rin
24. Ṣé iye ọmọ tí ìyá bá ti bí tẹ́lẹ̀ ma n ní ipa lórí oyún tó bá tún ní? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
25. Ṣé lílo ògùn tí dókítà kò sọ ma n ṣe àkóbá fún oyún? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
26. N jẹ́ ẹ mọ̀ pé àwọn ògùn kan wà tí kò da fún olóyún láti lò tí ó lè ṣe ìjàmbá fún oyún? a) Bẹ̀ẹ̀ni b) Rárá d) Èmi kò mọ̀
27. Ṣé ó ṣe pàtàkì fún ìyá olóyún láti mọ ipò HIV rẹ̀? a) Bẹ̀ẹ̀ni b) Rárá

SECTION C: ATTITUDES TOWARDS PREVENTION OF PREGNANCY RELATED RISK FACTORS

28. Ṣé ẹ eré ìdárayá rámpé nígbàtí ẹ wà nínú oyún? a) Bẹ̀ẹ̀ni b) Rárá
29. Ṣé ẹ ṣe isẹ́ alágbára tó lè ṣe àkóbá fún oyún nígbàtí ẹ wà nínú oyún? a) Bẹ̀ẹ̀ni b) Rárá
30. Ṣé ẹ mu ọtí nígbàtí ẹ wà nínú oyún? a) Bẹ̀ẹ̀ni b) Rárá
31. Ṣé ẹ fa sìgá nígbàtí ẹ wà nínú oyún? a) Bẹ̀ẹ̀ni b) Rárá
32. Kí lẹ rò pé sìgá fífà tàbí egbògi olóró má n fà fún oyún? (Ẹ fà ìlà sí ìdáhùn nísàlẹ̀)

Ó ma n nípa lórí ọmọ inú oyún ☐

Ó ma n fà orísiríṣi ìdíwọ́ fún oyún ☐

Ó ma n jẹ́ kí ọmọ kéré ju bí ó ti yẹ lọ ☐

Kìí nípa lórí ọmọ ☐

Ó ma n nípa lórí ìyá ☐

SECTION D: ADVERSE PREGNANCY OUTCOMES

To be filled by the medical practioner in charge of the patient

33. Which of the following birth outcomes was experienced?

Tick box as appropriate for the following birth outcomes.

BIRTH OUTCOMES	**YES**	**NO**
Foetal outcomes		
Neonatal death		
Perinatal death: Fresh: Still birth Macerated		
Maternal outcomes		
Maternal death		
PROM		
Caesarean delivery		
Instrumental delivery		
Episiotomy		
Perineal tears		

Others (specify):_____

APGAR scores: 1 minute _____

5 minutes _____

Birth weight (g) of neonate: _____

Gestational age at delivery: _____

SECTION E: FACTORS ASSOCIATED WITH PREGNANCY OUTCOMES

34. Ọmọ melo ni ẹ ti bí tí ọṣù ẹ̀ pé? _____
35. Nígbàtí ẹ wà nínú oyún yìí, ṣé ẹ lọ fún àyẹ̀wò oyún? a) Bẹ̀ẹ̀ni b) Rárá
36. Ìgbà melo ni ẹ wá fún àyẹ̀wò oyún ọmọ yìí? A). 1 time b). 2 – 3 times c). ≥ 4 times
37. Oyún ọ̀ṣẹ̀ melo ni ẹ wà nígbàtí ẹ forúkọ sílẹ̀ fún àyẹ̀wò oyún? _____
38. Nígbàtí ẹ wá fún àyẹ̀wò oyún, ṣé wọ́n ṣàlàyé àwọn ónje tó dára fún ẹ̀yin àti ọmọ?
    a) Bẹ̀ẹ̀ni b) Rárá
39. Ṣé wọ́n fún yín ní abẹ́rẹ́ tẹ́tánọ́sì fún ókéré jù, ìgbà kan nígbàtí ẹ wá fún àyẹ̀wò oyún? a) Bẹ̀ẹ̀ni b) Rárá
40. Ṣé ẹ lo èyíkéyìí ìfètò sí ọmọ bíbí kí ẹ tó ní oyún yìí? a) Bẹ̀ẹ̀ni b) Rárá
41. Irú ìfètò sí ọmọ bíbí wo ni ẹ lò? A) Abẹ́rẹ́ b) Òogùn c) Òmíràn (Ṣàlàyé)_____
42. Ṣé ẹ ní ìrírí ẹ̀jẹ̀ yíyọ nígbàtí ẹ wà nínú oyún yìí? a) Bẹ̀ẹ̀ni b) Rárá
43. Ìlànà wo ni ẹ fi bí omọ yìí? A) Spontaneous vaginal delivery b) Instrumental delivery c) Caesarean section
44. Ṣé gbígbẹ̀bí wọ́rọ́wọ́ tàbí ìrànwọ́ a) Wọ́rọ́wọ́ b) ìrànwọ́
45. Bíi wákàtí melo ni ẹ fi gba ẹ̀bí? _____
46. Ìtàn nípa lílo tábà
    A) Kí ẹ tó ní oyún yìí, ṣé ẹ ma n fa sìgá/tábà? a) Bẹ̀ẹ̀ni b) Rárá
    B) Tí ó bá jẹ́ bẹ̀ẹ̀ni, melo ni ẹ ma n fà lójúmọ́? _____
    C) Ní ọṣù mẹ́ta kí ẹ tó ní oyún yìí, ṣé ẹ fa tàbí jẹ tàbí mu tábà? a) Bẹ̀ẹ̀ni b) Rárá c) Mi kò rántí
    D) Ṣé ẹ lo èyíkéyìí tábà ní ọ̀nà míràn? a) Bẹ̀ẹ̀ni b) Rárá
47. Ọtí mímu:
    A) Ní ọṣù mẹ́ta kí ẹ tó ní oyún yìí, Ṣé ẹ mu/lo ọtí ní ọ̀nàkanà? a) Bẹ̀ẹ̀ni b) Rárá c) Mi kò rántí
    B) Nínú oyún ọmọ yìí, ṣé ẹ mu/lo ọtí ní ọ̀nàkanà? a) Bẹ̀ẹ̀ni b) Rárá c) Mi kò rántí

C) Láti ìgbà tí ẹ ní oyún ọmọ yìí, bii ìgbà melo ni ẹ ti mu ìgò ọtí kan tàbí jùbẹ̀ lọ? _____

48. Ṣé ọmọ àkọ́kọ́ yín ni èyí? a) Bẹ̀ẹ̀ni b) Rárá
49. Tí ó bájẹ́ bẹ́ẹ̀kọ̀, ọmọ melo ni ẹ ti ní tẹ́lẹ̀? _____
50. Ìrírí irú èwo nínú àwọn wọ̀nyí ni ẹ ti ṣe alábapàdé rí nínú oyún tí ẹ ti ní tẹ́lẹ̀?

Still birth	☐	Caesarean section	☐
Preterm birth	☐	Miscarriage	☐
LBW babies	☐	PROM	☐
Perinatal death	☐		

51. Èwo nínú àwọn ìdíwọ́ fún oyún títọ́jú wo nínú àwọn wọ̀nyí ni ẹ ṣe ìrírí rẹ̀?

Anaemia	☐
Pregnancy induced hypertension	☐
Antepartum haemorrhage	☐
Gestational diabetes	☐

APPENDIX 4

INFORMED CONSENT FORM

Orúkọ mi ni Omidan AYÒỌLÁ, Ayọ̀bámi Esther, akẹ́ẹ̀kọ́ àgbà ní Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, Unifásitì ilẹ̀ Ibàdàn.

Mo n ṣe ìwádìí lórii àwọn okùnfà ewu tí ó rọ̀mọ́ ọmọ bíbí láàrín àwọn ọ̀dọ́ọmọbìrin ní ìlú Ìbàdàn. Ìwádìí yìí á ràn mí lọ́wọ́ láti tan ìmọ́lẹ̀ sí ọ̀nà àtidẹ́kun àwọn okùnfà ewu yìí kí àláfíà lè túnbọ̀ wà pẹ̀lú ìyá àti ọmọ tuntun.

N ma bèrè àwọn ìbéèrè nípa àwọn ìhùwàsí àti ìrírí kan ní pàtàkì tí ó rọ̀mọ́ àsìkò oyún tí ẹ fi bí ọmọ yìí. Mo fi dáa yín lójú wípé àwọn ìdáhùn yín kò ní bọ́sí ẹnikẹ́ta létí. Bákan nà, n kò ní kọ orúkọ yín sílẹ̀ lórí fọ́mù yìí ṣùgbọ́n màá fún yín ní nọ́mbà ìdánimọ̀ tí a fi mọ̀ pé èyin ni. Gbogbo àwọn àlàyé tí ẹ bá ṣe yìí ma dé ọ̀dọ̀ ìjọba kí wọ́n tún lè ṣe àníkù sí àwọn ohun amáyédẹrùn tí ó ma dékun àwọn òkùnfà ewu fún oyún.

Láàrín àsìkò ránpẹ́ yìí, gbogbo àkọsílẹ̀ ìtójú oyún àti gbígbẹ̀bí ní n ma yẹ̀wò tí n ma mú mọ́ ìfọ̀rọ̀jomítoro ọ̀rọ̀ yìí. Gbogbo Ìwádìí yìí n kò ní lòó fún ìjàmbá yín. Ẹ ní àyè láti sọ pé ẹ kò ní ìfẹ́ láti kópa nínú ìfọ̀rọ̀wọ́rọ̀ yìí.

Mo fẹ́ kí ẹ sọ ìdáhùn tòótọ́ sí àwọn ìbéérè wọ̀nyí. N kò ní gbà ju ìṣẹ́jù ọgbọ̀n lọ lọ́wọ́ yín.

Ìfọ̀wọ́sowọ́pọ̀ yín ni ó jẹmí lógún, mo sì dúpẹ́ púpọ̀ lọ́wọ́ yín.

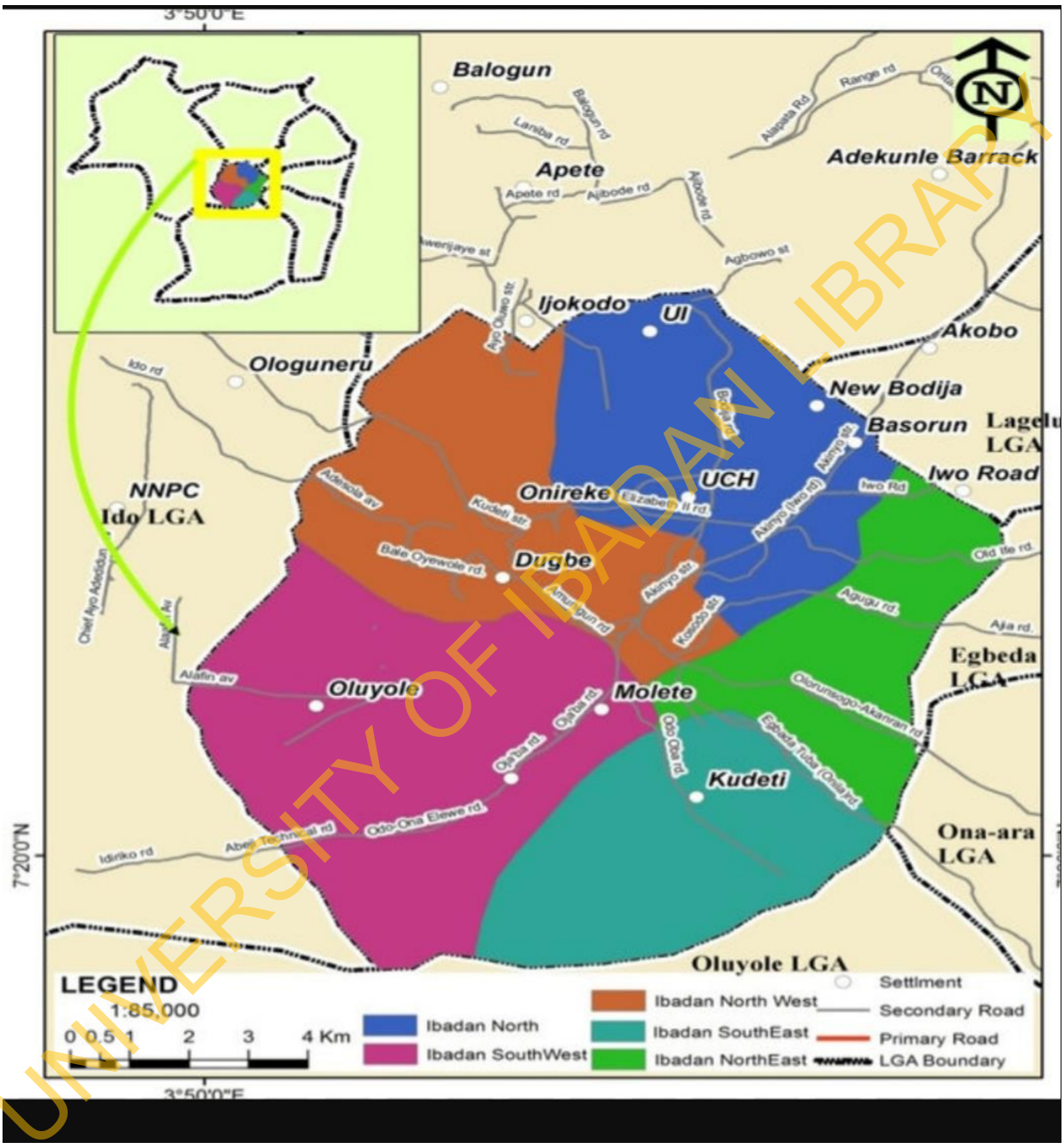
- Ẹ ní àyè láti sọ pé ẹ kò ní ìfẹ́ láti kópa nínú ìfọ̀rọ̀wọ́rọ̀ yìí. Bákan nà, nígbà kúgbà, ẹ lè sọ pé ẹ kò ṣe mọ́. Ṣùgbọ́n ìfọwọ́sowọ́pọ̀ ni mo bèrè fún.
- Ìfọwọ́sí: Ní báyìí tí mo ti gbọ́ gbogbo àlàyé lékúnrẹ́nrẹ́n àti tí òye ti yé mi, mo fi tọ̀kàntọ̀kàn kópa nínú ìfọ̀rọ̀wọ́rọ̀ yìí

_____ _____

Signature / thumbprint of participant Interview date

APPENDIX 5

MAP OF THE FIVE URBAN LGAs IN IBADAN METROPOLIS



APPENDIX 6

TELEGRAMS.....

TELEPHONE.....

OYO STATE: THE PACESETTER

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....

All communications should be addressed to the Honorable Commissioner quoting

Our Ref. No. AD 13/479/1551

27th November, 2019

The Principal Investigator,
Department of Epidemiology and Medical Statistics,
Faculty of Public Health,
College of Medicine,
University of Ibadan,
Nigeria.

Attention: Ayoola Ayobami

ETHICS APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "Risk Factors Associated with Adverse Pregnancy Outcomes among Adolescents in Ibadan Metropolis." has been reviewed by the Oyo State Ethics Review Committee.

2. The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

4. Wishing you all the best.

O.Y.S. STATE RESEARCH ETHICAL REVIEW COMMITTEE
MIN. OF HEALTH

Signature & Date

Dr. Abbas Gbolahan
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethics Review Committee