RISK FACTORS ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES AMONG WOMEN OF REPRODUCTIVE AGE IN SOBA L.G.A, KADUNA STATE

By

ABUBAKAR-SADIQ AISHATU

DEPARTMENT OF COMMUNITY MEDICINE
AHMADU BELLO UNIVERSITY, ZARIA
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ABUBAKAR-SADIQ AISHATU M.B.B.S (ABU 2005)
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DECLARATION

I declare that the work in the thesis entitled ‘’Risk factors associated with adverse pregnancy outcomes among women of reproductive age’’ has been performed by me in the Department of community medicine under the supervision of Prof K. Sabitu and Dr A.A Gobir.

The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another diploma or degree at any university.

Abubakar-Sadiq Aishatu	_____	December, 2014
Name of student	Signature	Date

CERTIFICATION

This thesis entitled ‘’RISK FACTORS ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES AMONG WOMEN OF REPRODUCTIVE AGE’’ by Abubakar-Sadiq Aishatu meets the regulations governing the award: Masters Degree of Public health in Field Epidemiology of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

---------- Date----------
Major supervisor
Prof Kabir Sabitu
MBBS, MAID, FWACP
Department of Community Medicine

---------- Date----------
Minor Supervisor
Dr A.A. Gobir
Department of Community Medicine

---------- Date----------
Head of Department
Dr M.N Sambo
MBBS, MAID, FWACP
Department of community medicine

---------- Date----------
Dean, Post-graduate School
Prof A.Z. Hassan
DVM, M..sc, PhD(ABU),FCVSN

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Dr Aishatu Abubakar-Sadiq
Abuja-Nigeria
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SUMMARY

Adverse outcomes of pregnancy include: miscarriages, preterm delivery, low birth weight babies, stillbirth, maternal morbidity and maternal mortality. The most severe adverse outcome of pregnancy is the death of the mother or the offspring. Poor pregnancy outcomes are influenced by a myriad of biological, social and environmental factors. Maternal mortality In Nigeria is currently 545-630/100,000 live births. According to the World Health Organization 75% percent of the maternal deaths in Africa are attributable to direct obstetric complications, such as hemorrhage, obstructed labor, infection, toxemia, and unsafe induced abortion. However it is now clear that these complications are not necessarily fatal; they cause deaths only because they occur within the context of the severe socioeconomic deprivations that are present in these countries.

This study was conducted to identify the risk factors associated with adverse pregnancy outcomes and measure their effect on maternal health. One research assistant and six data collectors were recruited and trained. We conducted a case control study using a structured pre-tested questionnaire involving 138 respondents (69 cases and 69 controls). Information was obtained on demographic, pregnancy outcomes, risk factors and current health status. Anthropometric measurements were obtained using weighing scales and standiometers. Body mass indices were subsequently calculated. Blood pressure measurements were taken using aneroid sphygmomanometers. Qualitative data was also obtained using six focus group discussions (FGDs) comprising grandmothers, mothers and teenagers. Univariate, bivariate and multivariate analysis was done using Epi-info version 3.5.3. Qualitative data were analyzed by thematic fields using a coding sheet in Microsoft excel software.

The median age of cases: 25 years (Range: 16-43), controls: 27 years (Range: 16-44). Compared with controls, the cases did not differ significantly in terms of residence and income. Bivariate analysis showed Cases were more likely to: number of pregnancies ≥4 (OR: 5.6; 95% CI: 2.6-12.6), commence early antenatal (ANC) attendance <4months (OR: 0.4; 95% CI: 0.2-0.99) and height <1.52 meters (OR: 0.2; 95% CI 0.1-0.7) compared with controls. Unconditional logistic regression revealed: ANC attendance <4 months: (aOR: 0.32; 95%CI: 0.12-0.81) and Number of pregnancies ≥4: (aOR: 5.02; 95% CI: 1.97-12.82) to be protective and increase risk of adverse outcomes respectively. No respondent 0(0.0%) had ever received pre-conception care or counseling. Cases were more likely to have ongoing health problems (OR: 2.1; 95% CI: 0.8-5.4) though insignificant. Qualitative findings identified hypertension, bleeding and eclampsia as the commonest adverse pregnancy outcomes. Majority of respondents believed early antenatal care; delayed marriage and improved girl child education would improve outcomes.

Risk factors significantly associated with adverse outcomes are multiple pregnancies and delayed antenatal care. We recommended introduction of pre-conception care and counseling, frequent community health talks, early antenatal care, and improvement of maternal care facilities at the rural hospital, girl child education and utilization of family planning services.

KEY WORDS: Adverse, Hypertension, Miscarriage, Outcome, Pregnancy

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LIST OF ACRONYMS

ANC	Ante-natal care
APH	Ante-partum Heamorrhage
BMI	Body mass index
CD	Caesarean delivery
CPD	Cephalopelvic disproportion
CVS	Chorionic villus sampling
FMCH	Free maternal and Child healthcare
GDM	Gestational diabetes mellitus
GWG	Gestational weight gain
LGA	Local government area
LMP	Last menstrual period
MDG	Millennium development goals
MMR	Maternal mortality rate
PEC	Pre-eclampsia
PHC	Primary healthcare
PIH	Pregnancy induced hypertension
PPH	Post-partum heamorrhage
SES	Socio-economic status
SLE	Stressful life events
WHO	World health organization

DEFINITION OF TERMS

Ante-natal care: Comprehensive preventive healthcare with the goal of providing regular check-ups that allow Doctors and trained midwives to treat and prevent potential health problems throughout the course of pregnancy while promoting healthy lifestyles that benefit both the mother and child. The world health organization currently recommends a minimum of 4 visits during pregnancy, with one during the first trimester (3 months).

Body mass index: A measure of relative weight based on an individual's mass and height, it is calculated by dividing the weight in kilograms by height in meters. Values are presented in Kg/m^2

Cephalopelvic disproportion: This exists when the capacity of the pelvis is inadequate to allow the fetus negotiate the birth canal during delivery, this may be due to various factors such as a small pelvis and large fetus.

Eclampsia: An acute and life-threatening complication of hypertension in pregnancy characterized by the appearance of tonic-clonic seizures (convulsions). Eclampsia includes convulsions and coma that happen during pregnancy but are not due to pre-existing or organic brain disorders.

Obesity: This is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health, leading to reduced life expectancy and/or increased health problems. The body mass index value associated with obesity is $>30kg/m^2$

Pregnancy: This is a maternal condition of having one or more offspring, known as an embryo or fetus developing in a woman's uterus.

Pregnancy induced hypertension: This is a condition of high blood pressure during pregnancy; it affects 6-8% of all pregnant women globally and can lead to eclampsia. It is also known as gestational hypertension.

Seizures: Brief episodes of abnormal excessive or synchronous neuronal activity in the brain, the outward effect can vary from uncontrollable jerking movement to subtle loss of consciousness. Seizures are colloquially known as ‘’fits’’.

Socio-economic status: This is an economic and sociological combined total measure of a person's work experience and of an individual's or family’s economic and social position in relation to others, based on income, education, and occupation.

Spontaneous abortion: Also known as miscarriage is the un-induced loss of a pregnancy before the age of viability i.e. before the fetus can survive on its own. The age of viability varies between countries and is considered as <28 weeks of gestation in Nigeria.

CHAPTER ONE

INTRODUCTION

Adverse outcomes of pregnancy include: miscarriages, preterm delivery, low birth weight babies, stillbirth, maternal morbidity and maternal mortality. These outcomes are far more frequent in the developing world. The most severe adverse outcome of pregnancy is the death of the mother or the offspring. Maternal death has become an extremely rare event in the developed world, with many countries reporting maternal mortality ratios of 5-10 per 100,000 live births. In the least developed countries, the ratios are 100 times higher. Wide disparities probably exist in the rate of late fetal deaths (stillbirths), although fetal deaths in underdeveloped countries are grossly underreported. Even if both mother and infant survive, pregnancy complications or problems at delivery or during the neonatal period can lead to severe maternal or infant morbidity.[1] Maternal mortality In Nigeria is currently 545-630/100,000 live births and is ranked 10th in the world by the United Nations. Maternal deaths are those occurring during pregnancy, childbirth and within 42 days of termination pregnancy irrespective of duration and site of pregnancy in a specified year. According to the world health organization (WHO) Nigeria had the highest estimated number of maternal deaths (37,000) in Africa, second only to India (136,000) globally. 75% percent (27,750) of these maternal deaths are attributable to direct obstetric complications, such as hemorrhage, obstructed labor, infection, toxemia, and unsafe induced abortion.

However it is now clear that these complications are not necessarily fatal; they cause deaths only because they occur within the context of the severe socioeconomic deprivations that are present in these countries. In most developed countries, pregnancies are planned, Complications are few and outcomes are generally favorable for both mother and infant.[2]

Poor pregnancy outcomes are influenced by a myriad of biological, social and environmental factors. A hospital based study showed the greatest risk of maternal mortality ratio was among young teenagers (>15 years) and older women (<40 years). Parity specific maternal mortality ratio was highest in the grand multiparous women. Unbooked as well as illiterate were associated with very high maternal mortality ratio.[3] Unlike in the developed world where a woman's life time risk of dying during or following pregnancy is 1 in 3800, the risk of maternal death is very high at 1 in 39 in developing countries. Increasing numbers of women are now seeking care during childbirth in health facilities and therefore it is important to ensure that quality of care provided is optimal.[4] Abortion is the termination of pregnancy by the removal or expulsion from the uterus of a fetus or embryo prior to viability (<24 weeks of gestation). An abortion can occur spontaneously, in which case it is usually called a miscarriage, or it can be purposely induced. Most miscarriages are caused by chromosome problems that make it impossible for the baby to develop. Usually, these problems are unrelated to the mother or father's genes. [5]Other possible causes for miscarriage include: Drug and alcohol use, exposure to environmental toxins, hormone problems, infection, obesity, physical problems with mother's reproductive organs, problems with body's immune response, systemic diseases in the mother and smoking. It is estimated that up to half of all fertilized eggs die and are lost (aborted) spontaneously, usually before the woman knows she is pregnant. Among those women who know they are pregnant, the miscarriage rate is about 15-20%. Most miscarriages occur during the first 7 weeks of pregnancy. The rate of miscarriage drops after the baby's heart beat is detected. The risk for miscarriage is higher in women >30 years, becoming greater at 35-40 and highest after 40 years also higher in those with a history of previous miscarriages.[6] Hypertensive disorders are among the most common causes of maternal and perinatal mortality .High blood pressure (BP) complicates

approximately 10% of all pregnancies. Hypertension in pregnancy falls into four categories: (1) preeclampsia-eclampsia, (2) chronic hypertension of whatever cause, (3) preeclampsia-eclampsia superimposed to chronic hypertension or renal disease, and (4) transient or late hypertension (gestational hypertension). Preeclampsia, the association of hypertension, proteinuria, and edema, accounts for more than 50% of all the hypertensive disorders of pregnancy and is a major cause of fetal and maternal morbidity and mortality. Unfortunately, distinguishing between preeclampsia and other causes of hypertension on clinical grounds can be difficult because of the lack of specific tests for differential diagnosis.[7]

Stillbirth is defined as a child born after the 24th week of pregnancy that did not, at any time after delivery, breathe or show any other signs of life. Stillbirth remains a major problem worldwide, with disparities both between and within nations. Evaluation In lower income/higher risk groups, basic improvements in antenatal/obstetric care including targeted prevention/treatment of infections, induction after 41 weeks, skilled attendants at delivery and availability of emergency obstetric care can result in very significant risk reduction, whereas in higher income/lower risk groups, further research, more complex interventions and attention to societal risk factors such as obesity are required for further improvements.[8,9] Factors which increase the likelihood of developing these outcomes are categorized into modifiable and non-modifiable risk factors. They include advanced age, parity, poverty and interval between pregnancies, availability and utilization of healthcare services, existing pre-morbid conditions, drug and alcohol use and education. A risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury. Some examples of the more important risk factors resulting in adverse pregnancy outcomes include overweight, advanced maternal age, high blood pressure, Diabetes, poor ante-natal care, short interval

between pregnancies, alcohol consumption, smoking, occupation and exposure to environmental contaminants. Risk factors or determinants are correlation and not necessarily causal, because correlation does not prove causation. These factors do not operate in isolation. They often coexist and interact with one another.

1.1 Classification of Risk Factors for Adverse Pregnancy Outcomes

Behavioral risk factors: Risk factors that can be eliminated or reduced through lifestyle or behavioral changes include: tobacco smoking, excessive alcohol consumption, poor diet and nutrition, physical inactivity, excessive sun exposure and insufficient vaccination.

Biomedical risk factors: Biomedical risk factors may be influenced by a combination of genetic, lifestyle and other broad factors. Biomedical risk factors include: Overweight and obesity, high blood pressure, high blood cholesterol and impaired glucose tolerance.

Environmental risk factors: Environmental determinants of health cover a wide array of topics, and can be divided into two broad categories: Category 1; social, economic, cultural, political and Category 2; Physical, chemical and biological.

Genetic risk factors: Some diseases, such as cystic fibrosis and muscular dystrophy, result entirely from an individual's genetic make-up whereas many others reflect the interaction between that make-up and environmental factors.

There are three broad groups of genetic diseases / disorders: Single gene (monogenic) disorders, for example hemophilia, chromosomal abnormalities e.g. Down syndrome and multifactorial diseases such as asthma.

Demographic risk factors: Demographic factors include age and population subgroups

Pregnancies occurring soon after a previous delivery have an increased risk for preterm birth. Increased birth spacing is seen more commonly in communities with higher median incomes. In contrast, poverty and decreased educational engagement is associated with closely spaced second births in young women. An interpregnancy interval less than 6 months confers a twofold-increased risk of preterm birth. Furthermore women whose first birth was preterm were far more likely to have a short interval than were women who had a term first birth, thus compounding the risk. Although the mechanism for preterm birth is not clear, one potential explanation is that the uterus requires time to return to its normal state, including resolution of the inflammatory status associated with the previous pregnancy. Maternal depletion may be another cause because pregnancy consumes maternal stores of essential vitamins, minerals, and amino acids. A short interval decreases the opportunity to replenish nutrients. [10] during the last century; a substantial improvement in many pregnancy outcome statistics, including maternal and infant mortality and stillbirth has been achieved. However this trend is not the same in most developing countries which still maintain high maternal morbidity and mortality rates.

Poverty as a discrete entity has proven difficult to measure. Socioeconomic status (SES), often assessed by educational level, income, occupation, and housing conditions is used as a surrogate measure of poverty. Lower SES is generally associated with poorer health outcomes for all causes of mortality, with particular diseases more affected by SES than others.[11] Recently examination of data from the United States women's Health Initiative cited reason for the rich-poor disparity in pregnancy outcomes is that poorer women receive less antenatal care. [12]Women who receive prenatal care are appropriately screened for conditions, such as hypertension, diabetes, anemia, Rhesus disease, and syphilis; and are appropriately treated have reduced rates of stillbirth and of neonatal and maternal mortality. Poor women are less connected with the

obstetric care system than are wealthier women, and connection to a health care provider in case of an obstetric emergency can be crucial. Barriers to receiving prenatal care for lower-SES women may include inability to pay for otherwise available services, as well as failure to seek services because of prior negative experiences (receiving culturally inappropriate and unsatisfying services, reproach and sanctions for poor health habits), lack of transportation and depression. [13]Antenatal care (ANC) provides an important opportunity for pregnant women with a wide range of interventions including education, counseling, screening, treatment, monitoring and promoting the well-being of mother and fetus. Evidence of the effectiveness of ANC interventions exists around the world when sought early in pregnancy and quality care continues until delivery.

1.2 Problem Statement

The lack of strong vital registration systems has resulted in a large number of maternal deaths being unreported in developing countries. The actual extent of the maternal mortality problem is unknown and good information on which to base programmes to reduce maternal mortality and improve maternal health is lacking.[14] Preventive medicine through the identification and control of behavioral and other risk factors has been recognized as an effective strategy in the control and prevention of adverse pregnancy outcomes. Northern Nigeria has consistently recorded the worst maternal health indices in the country MMR 600-630/100,000 Live births. Maternal death which is the most severe adverse outcome of pregnancy has occurred largely secondary to pregnancy induced hypertension. In a recent report from Maiduguri North eastern Nigeria, eclampsia accounted for 46.4% of all maternal deaths (Adamu et al). Other adverse outcomes of pregnancy also prevail due to cultural practices leading to early child bearing in the wake of poor maternity care services that are grossly under-utilized. The occurrence of these adverse outcomes

has resulted in poor state of maternal health and high healthcare costs to families unable to afford basic healthcare services. Local government areas in the northern part of Kaduna state including Soba have the worst maternal health indices; maternal mortality ratio (MMR 630/100,000 live births). Kaduna State government instituted the "free maternal and child healthcare program" (FMCH) in 2009. Designed to provide free antenatal and delivery services to all pregnant women, however it has proven unsustainable. Inconsistent drug supply, inadequate personnel and poor commitment by the government has resulted in a return to poor healthcare delivery.

Studies on pregnancy outcomes done locally have been hospital based and have never involved multiple risk factor assessment. Therefore existing interventions are geared towards control and not prevention. Globally Identification of high risk groups and risk factor modification has proven vital in reducing the incidence of the disorder in areas with limited healthcare facilities. This case-control study will provide information on specific risk factors among traditional northern women in a typical rural setting. It will examine the role of these factors in pregnancy outcomes both desirable and adverse. Study findings will be disseminated to community leaders, local government health authorities and the state government. For use in planning evidence based preventive interventions to improve maternal health.

1.3 Justification of the Study

To generate region specific data on risk factors through analytical studies which are critical to appropriate prevention and reduction of adverse pregnancy outcomes. By considering the most influential factors mediating the relationship between poverty and adverse outcomes we can take meaningful action to narrow the divide seen in maternal health amongst countries. Planning and implementation of interventional programmes in addition to enhanced prenatal care has been effective for control in certain countries.[15,16] An integrated approach which includes gaining

essential support, identifying and controlling risk factors, developing solutions, setting priorities and making sure the comprehensive conception care instituted will not lead to delays in achieving targets of health care delivery is essential. Achieving this will include designing region specific control efforts and establishment of an effective national conception care model. This study will serve to generate necessary region specific data.[3]

Baseline information on the role of economic status and employment in pregnancy outcomes among rural women will be generated for use in future studies. Much research in urban areas reports that pregnant women who experience stressful life events (SLEs) have worse birth outcomes than similar women without such stressors. Maternal stress has been implicated in fetal loss as well as in premature delivery (i.e., 37 completed weeks of gestation) and attendant low birth weight (i.e., 2500g).[17,18] Empirical works also finds that economic contraction (i.e. a reduction in the ability of the economy to provide secure employment for those who desire it) precedes increased incidence of stressful events. Economic change at the national, regional and individual level has also been examined in relation to several aspects of mental and somatic health.[19,20] A subset of this literature focuses on the association between stress due to adverse economic change and the outcomes of gestation. This study will also serve to investigate the high prevalence of maternal morbidity and mortality shown in numerous hospital based studies in the Northern part of the country. The use of a rural setting and investigation of both pre-conceptional and pregnancy history will generate information at the community level thus contributing to evidence which shows most determinants of birth outcomes exist prior to conception. The results of this study will provide the local government with information for use in planning intervention strategies to improve maternal health.

The Millennium summit of the United Nations in 2000 identified eight international development goals: The Millennium Development goals (MDGS) were adopted with an achievement date of 2015. MDG 5 is the improvement of maternal health. Recent progress towards this Goal is promising and, if the latest improvements can be sustained at the same rate, Nigeria will reach the target by 2015. This study will aid towards achievement of the set targets in maternal healthcare by promoting preventive practices.[3]

1.4 Research Question

Do the selected risk factors have an effect on adverse pregnancy outcomes in this community? What is the effect of these selected risk factors on maternal health?

1.5 Objectives of the Study

1.5.1 General objective

The aim of this study is to identify the major risk factors associated with adverse pregnancy outcomes in Soba local government area of Kaduna state

1.5.2 Specific objectives

1. To obtain the proportion of reproductive aged women who had received pre-conception care
2. To determine risk factors associated with adverse pregnancy outcomes
3. To assess the influence of adverse pregnancy outcomes on current maternal health status

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview and Outcomes of Pregnancy

Pregnancy (gestation) is the maternal condition of having a developing fetus in the body. The human conceptus from fertilization through the eighth week of pregnancy is termed an embryo; from the eight week until delivery, it is a fetus. For obstetric purposes, the duration of pregnancy is based on gestational age: the estimated age of the fetus calculated from the first day of the last menstrual (normal) menstrual period (LMP), assuming a 28-day cycle. Gestational age is expressed in completed weeks. The term gravid means pregnant, and gravidity is the total number of pregnancies (normal or abnormal). Parity is the state of having given birth to an infant or infants weighing 500g or more, alive or dead. In the absence of known weight, an estimated duration of 20 completed weeks or more (calculated from the first day of the LMP) may be used. Fetal viability based on gestational age varies based on regional healthcare abilities to cope with post-natal requirements of the expelled fetus and chances of survival. In the United States and United Kingdom age of viability ranges from 20-24 weeks of gestation. The age of viability in Nigeria is 28 weeks across all regions. Live birth is the complete expulsion or extraction of a product of conception from the mother, regardless of the duration of pregnancy which, after such separation, breathes or shows other evidence of life (such as pulsation of the umbilical cord, beating of the heart or definite movements of the involuntary muscles) whether or not the cord has been cut or the placenta detached.[21]

Desirable outcomes of pregnancy include: live birth, absence of maternal morbidity and mortality and uncomplicated spontaneous deliveries. Though undesirable adverse outcomes such as miscarriages, preterm delivery, stillbirth, and low birth weight babies and maternal morbidity

and mortality still occur at an alarming rate. Globally the highest number of cases of adverse outcomes is seen among the poorest countries of the world with the worst maternal healthcare systems.[22] Developing countries bear a disproportionate share of maternal deaths: 99 percent occur in developing countries compared to 1 percent in more developed nations. Sub-Saharan Africa and South Asia accounted for 87 percent of global maternal deaths in 2008 and 50 percent of all deaths occurred in six nations: India, Nigeria, Pakistan, Afghanistan, Ethiopia, and the Democratic Republic of Congo. For the poorest nations, such as Afghanistan and Somalia, the lifetime risk of dying as a result of pregnancy or childbirth is 1 in 11 and 1 in 14, respectively, whereas in the industrialized nations of Northern Europe, the lifetime risk ranges from 1 in 7600 to 11,400. Recently experienced declines in maternal mortality have been associated with improved access to education, higher incomes, increased availability of skilled birth attendants, and decreased pregnancy rates.[23]

Although pregnancy is a relatively short time period, exposures can and often do vary considerably from month to month. The biologic consequences of those exposures are also expected to vary because the timing of critical embryonic and fetal events is so specific. Exposure at one time in pregnancy may have quite different consequences from exposures several weeks earlier or later, most widely recognized for congenital anomalies, but quite possibly also true for other outcomes.[24]

The first systematic review approach analyzing causes of maternal mortality showed hemorrhage and hypertensive disorders accounting for the largest proportion of maternal deaths in developing countries. The results of the review are based on an analysis of 160 datasets, or studies, that came from a multiplicity of sources including general and specialized databases, reference lists from

studies produced by a search of these databases, personal contacts with WHO country representatives, nongovernmental organizations, journal articles and vital registry data.[25]

Hypertensive disorders are among the most common causes of maternal and perinatal mortality .High blood pressure (BP) complicates approximately 10% of all pregnancies. Hypertension in pregnancy falls into four categories: (1) preeclampsia-eclampsia, (2) chronic hypertension of whatever cause, (3) preeclampsia-eclampsia superimposed to chronic hypertension or renal disease, and (4) transient or late hypertension (gestational hypertension). Preeclampsia, the association of hypertension, proteinuria, and edema, accounts for more than 50% of all the hypertensive disorders of pregnancy and is a major cause of fetal and maternal morbidity and mortality. Unfortunately, distinguishing between preeclampsia and other causes of hypertension on clinical grounds can be difficult because of the lack of specific tests for differential diagnosis.[26]

Preeclampsia remains to be a serious perinatal complication and early screening for this disease to identify the high risk population before the first symptoms develop constitutes a considerable clinical challenge. Modern methods of screening for preeclampsia and pregnancy-induced hypertension include patients' history biochemical serum markers and foetal DNA and RNA in maternal serum. Unfortunately the limited availability of these screening procedures in developing countries has hindered effective management. Identification of high risk groups and risk factor modification has proven vital in reducing the incidence of the disorder in areas with limited healthcare facilities. [27] For the purpose of improved prediction and prevention in 2007 a meta-analysis was conducted by Cnossen et al on the accuracy of body mass index (BMI) in predicting pre-eclampsia. The median incidence of pre-eclampsia was 3.9% (interquartile range

1.4-6.8). Pooled estimates (95% CI) for all studies with a BMI > or = 25 were 47% (33-61) for sensitivity and 73% (64-83) for specificity; and 21% (12-31) and 92% (89-95) for a BMI > or = 35. Corresponding LRs (95% CI) were 1.7 (0.3-11.9) for BMI > or = 25 and 0.73 (0.22-2.45) for BMI < 25, and 2.7 (1.0-7.3) for BMI > or = 35 and 0.86 (0.68-1.07) for BMI < 35.[28]

In a retrospective study by Adamu et al on pregnancy outcomes in females with eclampsia at a tertiary center in northern Nigeria over a ten year period. They found patients to be mainly primigravidae (76%, N=778) with no antenatal care (93.4%, N=959); mean age was 21 years. Intrapartum eclampsia accounted for 62.6%, (N=643). About 45% (N=643) delivered spontaneously, 28.7% (N=277) had instrumental delivery while 19.6% (N=189) had caesarean section. Of the 621 maternal deaths for the period, eclampsia contributed to 29.4% (184) with a case fatality rate of 17.9%. Case fatality in the two years (2006/2007) Maternal deaths were significantly more amongst the multiparous women with eclampsia (23.3%) than the primigravidae (16%); mortality was also more in eclamptics who had no antenatal care (18.7%) than those with care (5.9%). Perinatal mortality ratio was 406/1000 live births.[29]

In Kano, Nigeria a study conducted at the Aminu Kano teaching hospital on maternal and fetal outcome among patients with eclampsia involving prospective collation and analysis of data showed the following findings: The incidence of eclampsia was 1.2% of deliveries. Most (69.2%) of the patients had no antenatal care. In 93 (77.5%), the convulsions were controlled with diazepam, and 22.5% magnesium sulphate. Maternal complications rate was 39.2%, and use of Diazepam for control of convulsions increased complications (RR 3.12, 95% CI = 1.23–7.92, p= 0.02). Case fatality rate was 11.7%, diazepam use failed to achieve significant association with maternal death (RR 8.64, 95% CI = 0.53–140.29, p= 0.13). Stillbirth rate was 22.5% with

significant association with diazepam use (RR 7.55, 95% CI= 1.07–3.09, p=0.04). Birth asphyxia was recorded in 39.1% and low birth weight in 25.8%.[30] In Northern Nigeria reports from different parts have cited eclampsia as the leading cause of maternal mortality.[31] This is variously attributed to cultural practices 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.[31,32]

A miscarriage is defined as un-induced loss of a fetus before the 20th week of pregnancy. (Pregnancy losses after the 20th week are called preterm deliveries.). These are naturally occurring events and also described as spontaneous abortions. Clinical classifications include complete abortion, incomplete abortion, and inevitable abortion and missed abortion. Most miscarriages are caused by chromosome problems that make it impossible for the baby to develop. Usually, these problems are unrelated to the mother or father's genes. Other possible causes include: drug and alcohol abuse, exposure to environmental toxins, hormone problems, infection, obesity, pre-existing maternal morbidity and smoking. The risk of miscarriage is higher in women with previous miscarriages and older women increasing from age 30 and being highest after age 40.[33,34]

The loss of a pregnancy following conception is a common event, occurring in over 20 percent of pregnancies, but is notoriously difficult to identify with accuracy in the early stages of gestation. Pregnancy can be detected by monitoring hormone levels (biochemical pregnancy) before it can reliably be identified through clinical means, such as missed menstrual period (clinical pregnancy). Prospective studies, whether assessing biochemical or clinical pregnancy, allow measurement of the probability of loss specific to the time in gestation. Given survival to a

specific day or week of gestation, we can assess the probability of fetal survival to some later day or week of gestation. Early pregnancy losses that require biochemical monitoring may well differ in etiology from clinically identifiable losses that occur later, and there may be etiologic differences between earlier and later losses within the clinically recognized range.

A distinct logistic challenge in research on spontaneous abortion is that prenatal care is initiated at various times throughout the pregnancy, while recognized spontaneous abortions occur primarily in the second and third months. The timing of the initiation of prenatal care depends on a range of factors, including health status, cultural milieu, previous reproductive experience, insurance status and extent, provider accessibility, and so on. Although pregnancy is recognized before prenatal care onset, there is no centralized resource for identifying large numbers of pregnant women at such an early point in gestation. As noted above, self-selected women who identify pregnancy earlier may well differ in their subsequent risk of pregnancy loss from those who identify pregnancy later[4]. The pattern of delayed presentation for ante natal care common in developing countries therefore results in loss of data on a large subset of cases with early pregnancy loss.[33]

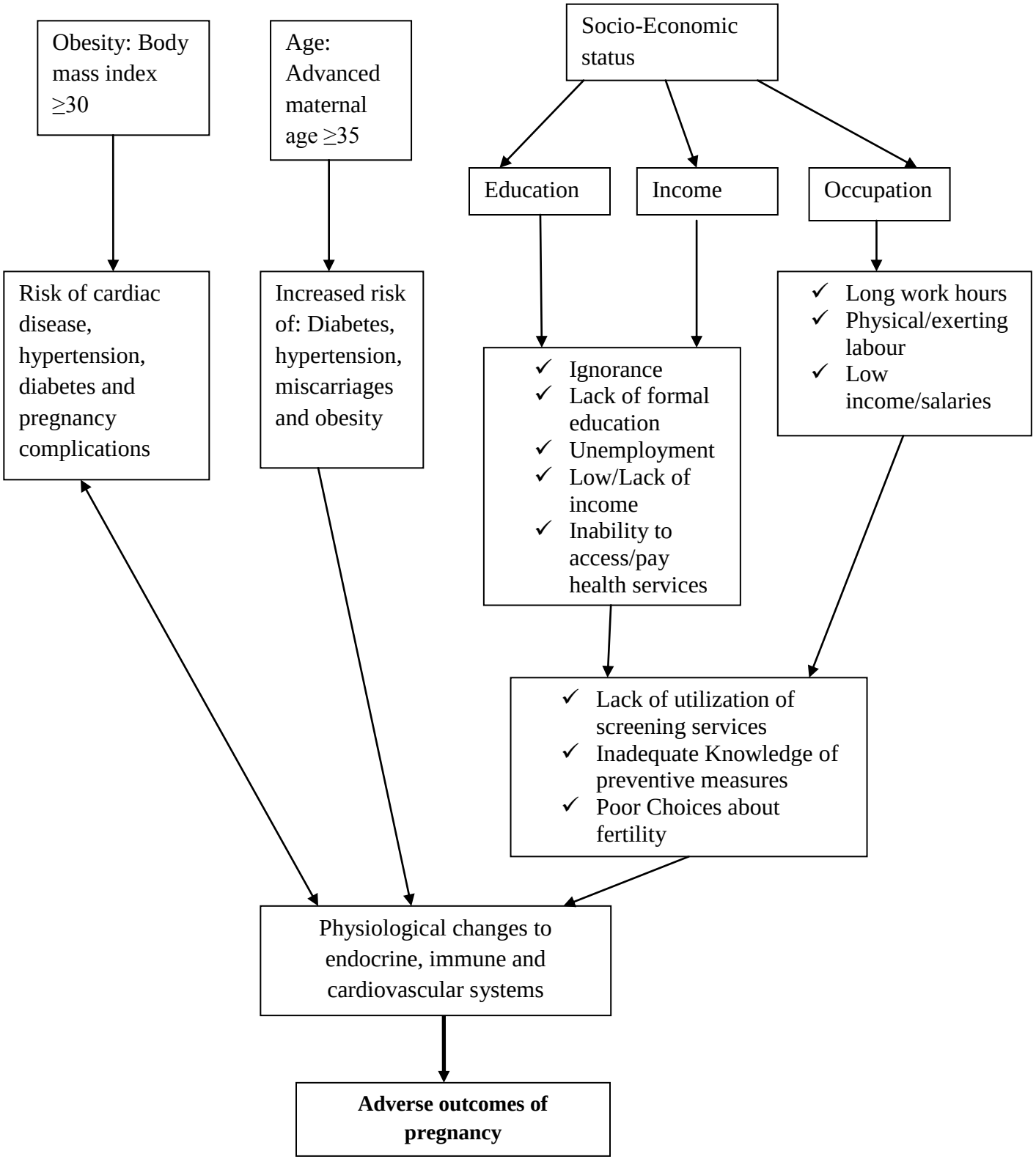

Figure 1: Conceptual framework for risk factors leading to adverse pregnancy outcomes

2.2 Risk Factors

Various factors affect pregnancy and subsequently determine its outcome. Those factors which increase the risk of disease or infection are known as risk factors. Poor pregnancy outcomes have a significant impact on maternal morbidity, mortality and healthcare costs. Conditions associated with poor pregnancy outcomes include host/maternal factors, fetal factors, environmental and social factors. Maternal factors include existing morbid conditions such as obesity and hypertension. Fetal conditions encompass structural and genetic abnormalities. Although it is widely agreed that maternal and fetal health are determined by multiple forces Surprisingly little is known about how those forces combine in certain subpopulations. For example environmental exposures often occur in communities facing multiple social stressors such as deteriorating housing, inadequate access to healthcare, poor schools, high unemployment, high crime rates, and high poverty rates-all of which may compound the effects of physical environmental exposures. This phenomenon is especially severe for low income and minority pregnant women as seen in various developed country studies with significant implications for the fetuses they carry.[35]

2.3 Socio-Economic Status/Poverty

To understand the complex of black birth outcomes relative to those of whites Geronimo's proposed the ''weathering hypotheses'' which postulates that poor birth outcomes for African Americans are in part due to the cumulative and interactive effects of negative material and psychological stressors on the physical health and general well being of black women: the weathering hypothesis argues that cumulative insults to the physical and emotional health of African American women accelerate their biological aging (as evidenced by earlier onset of chronic degenerative health problems such as hypertension, diabetes and heart disease)

compromising their ability to carry fetuses to term. [36-39]. the figure below depicts environmental, social and host factors as 3 sides of an integrated triangle differences arise when forces exerted by the triangle sides are asymmetrical for population groups. These differences are also seen between countries with differing income and healthcare infrastructure.

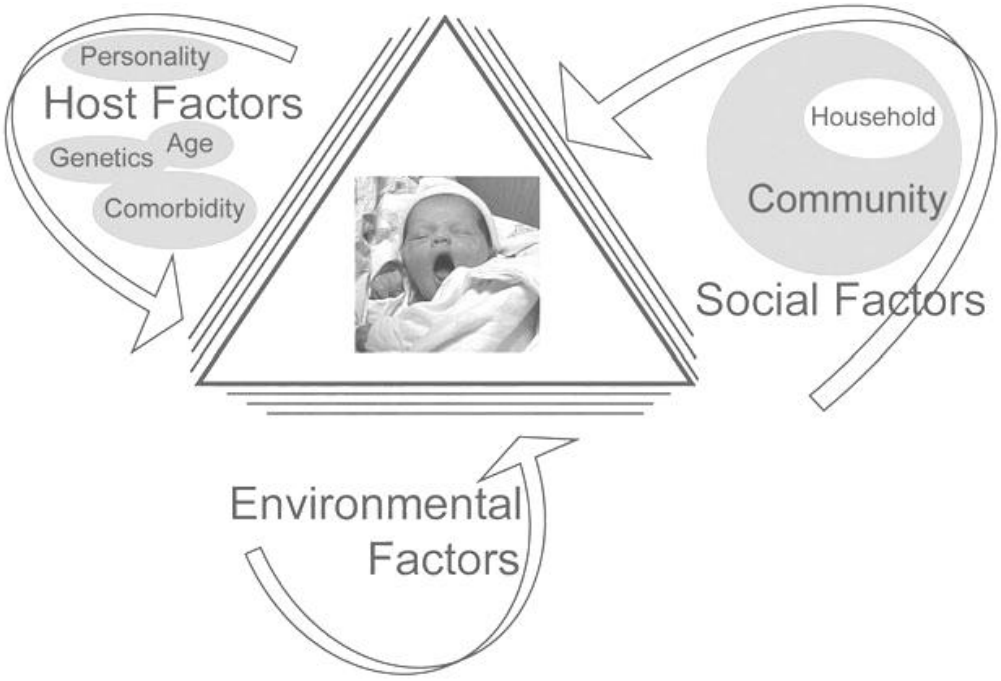

Figure 2: Forces shaping pregnancy outcome

Numerous studies have found that socioeconomic status and income inequality are correlated with birth outcomes.[40-43] A variety of other social factors have been linked to poor birth outcomes, including maternal education, marital status, pregnancy intention and teenage pregnancy.[34-41] In addition, host factors such as maternal obesity, maternal co morbid and genetic vulnerabilities,[42-44] have also each been linked to poor pregnancy outcomes. Pregnancies occurring soon after a previous delivery have an increased risk of preterm birth. Increased birth

spacing is seen more commonly in communities with higher median incomes. In contrast, poverty and decreased educational engagement is associated with closely spaced second birth in young women. An inter-pregnancy interval less than 6 months confers a twofold increased risk of preterm birth.[45-47]

Poverty status can act as an indicator of a whole suite of risk factors for poor pregnancy outcomes, as well as a measure of potential resiliency to other stressors. Mothers living in poverty have higher rates of clinical depression, are more likely to suffer from chronic stress, and experience more negative life events than do non poor mothers. They are nearly 3 times as likely to suffer from domestic violence and have more negative health behaviors.[48,49] Loss of resources and increased psychosocial stress may, in individuals lead to worsened nutrition or decreased attention to personal health or to negative coping behaviors, such as smoking. Evidence links these intermediary factors to physiological changes in the immune, endocrine and cardiovascular systems of pregnant women that may affect gestation and subsequent birth outcomes. Maternal nutrition and weight gain during pregnancy affect birth weight and length of gestation and corticotrophin releasing hormone, thought to be an indicator of psychosocial stress, and has been implicated as a factor in preterm delivery. Maternal stress may also increase hypertension, which can affect fetal growth or increase susceptibility to infections implicated in at least 20-30% of preterm deliveries.[50-52]

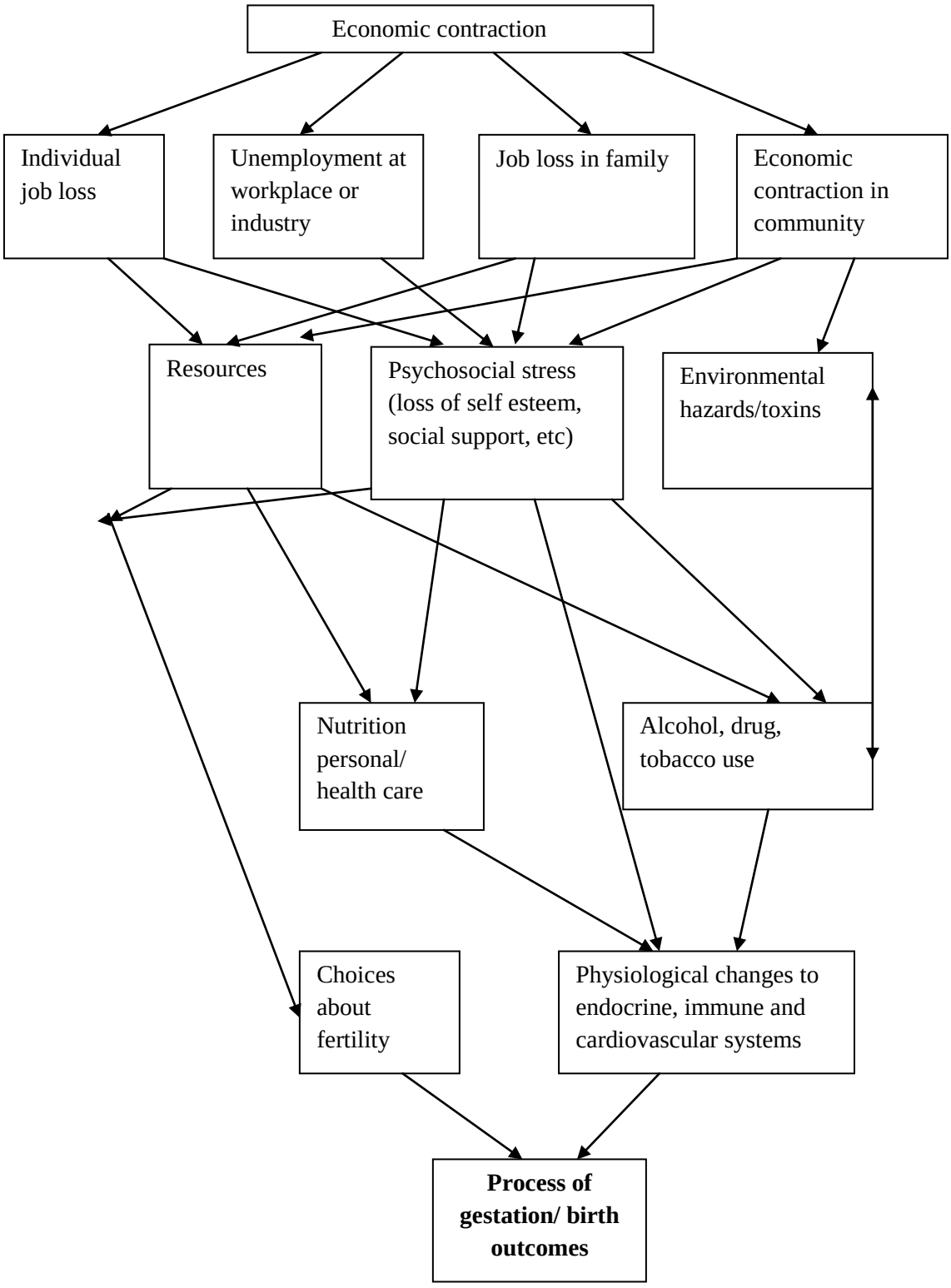

Figure 3: Plausible mechanisms connecting economic contraction to pregnancy outcome

The schematic on the previous page illustrates how changes in individual and community resources, opportunities and employment lead to a reduction in availability of resources, increased psychosocial stress and a corresponding increase in environmental hazards/toxins. This results to a reduction in good nutrition and personal healthcare with a subsequent tendency to increase alcohol and drug use among community members. The interplay of all these factors and relationship dynamics culminate in fertility choices and associated physiological changes to various organ systems. These changes ultimately have a negative effect on the process of gestation and birth outcomes leading to adverse outcomes of pregnancy.

2.4 Obesity

Obesity is defined globally as a body mass index BMI: weight (Kg)/Height (m_2) of greater than 30kg/m_2, while overweight is defined as BMI 25-29.9kg/m_2. Worldwide obesity exists at a prevalence of 15-20% and contributes significantly to total health costs.[53] The national health and nutrition examination survey, 2009-2010 in the United States showed 35.7% of US men and women were obese. There was no significant difference in prevalence between men and women at any age. Overall, adults aged 60 and over were more likely to be obese than younger adults. In Nigeria the national prevalence of obesity is 8%. Changing lifestyles, increasing urbanization, high calorie food consumption and reduced physical activity are responsible for increasing obesity in developing countries. [54] Obese women have an increased risk of complications during pregnancy, which include hypertension (CHTN), preeclampsia (PEC), gestational diabetes (GDM), stillbirth, abnormal labor and cesarean delivery (CD), and postpartum infection. Neonatal complications include congenital malformations, macrosomia, late fetal death, and early neonatal death.[55-56]

A retrospective cohort study was conducted in Australia 2005-2010 using total participants n(6138) to determine Maternal body mass index (BMI), prevalence of overweight and obesity, prevalence of pregnancy complications and their association with BMI class. Results showed a total of 65.6% of all women were overweight or obese. Only 32.7% of the women were of normal/healthy weight; 1.6% were underweight, 33.0% were overweight, 18.6% were obese class I, 8.3% obese class II and 5.7% were obese class III. Increased BMI was associated with increased rates of induction of labour, gestational diabetes mellitus, pregnancy-induced hypertension, operative vaginal deliveries, and caesarean sections, invasive fetal monitoring, increase gestational age at delivery, increased birth weight, and increased maternal length of stay ($P < 0.01$ for all).[57] A study in 2009 to investigate the relationship between gestational weight gain (GWG) and adverse outcomes in New Zealand was conducted in a contemporary nulliparous cohort (n=1950). Participants were classified into GWG categories (low, normal and high) according to pre-pregnancy BMI. Maternal characteristics and pregnancy outcomes were compared between weight gain categories. Results were 17.2% (n=335) achieved the recommended GWG, 8.6% (n=167) had low and 74.3% (n=1448) had high GWG. Women with high GWG had increased rates of LGA infants [adjusted OR 4.45 (95% CI 2.49-7.99)] and caesarean delivery in labour [aOR 1.46 (1.03-2.07)]. SGA was increased in women with low GWG [aOR 1.79 (1.06-3.00)].[58]

A prospective observational study of fetal and maternal outcome in a cohort of pregnant women recruited to a universal screening programme conducted in Ireland. Maternal outcomes included glucose, delivery mode, pregnancy induced hypertension (PIH), preeclampsia (PET), ante partum hemorrhage (APH) and postpartum hemorrhage (PPH). Fetal outcomes included birth weight, congenital malformation, fetal death, neonatal jaundice, hypoglycemia and respiratory

distress. Increasing maternal BMI was associated with adverse pregnancy outcomes: higher cesarean section rates, pre-eclamptic toxemia, and pregnancy induced hypertension, increased birth weight and congenital malformation.[59]

In a USA study to evaluate the association between maternal BMI and birth defects in a population-based registry covering ~1.6 million births maternal BMI was calculated using self-reported pre-pregnancy weight and height from the vital record and categorized as follows: underweight (BMI <18.5), normal weight (BMI 18.5-24.9), overweight (BMI 25-29.9), class I obese (BMI 30-34.9), class II obese (BMI 35-39.9) and class III obese (BMI ≥40). Risk for certain birth defects increased with increasing BMI (i.e., Atrial and ventricular septal defects, pulmonary valve atresia, patent ductus arteriosus, and clubfoot). Risk for birth defects was substantially increased among some obese mothers (BMI ≥30) (e.g., spina bifida, tetralogy of Fallot, cleft lip with or without cleft palate, hypospadias, and epispadias). Conversely, mothers with higher BMI had a lower risk for having an infant or fetus with gastroschisis (aPR = 0.35; 95 % CI = 0.12, 0.80).[60]

Similar results were obtained from an Australian cohort study to assess the prevalence and impact of mothers being overweight and obese in early to mid-pregnancy on maternal, peri-partum and neonatal outcomes. Of the 1661 women included, 43% were overweight or obese. Obese women were at increased risk of pre-eclampsia (relative risk (RR) 2.99 [95% confidence intervals (CI) 1.88, 4.73], p < 0.0001) and gestational diabetes (RR 2.10 [95%CI 1.17, 3.79], p = 0.01) compared with women with a normal BMI. Obese and overweight women were more likely to be induced and require a caesarean section compared with women of normal BMI (induction - RR 1.33 [95%CI 1.13, 1.57], p = 0.001 and 1.78 [95%CI 1.51, 2.09], p < 0.0001,

caesarean section - RR 1.42 [95%CI 1.18, 1.70], p = 0.0002 and 1.63 [95%CI 1.34, 1.99], p < 0.0001). Babies of women who were obese were more likely to be large for gestational age (LFGA) (RR 2.08 [95%CI 1.47, 2.93], p < 0.0001) and macrosomic (RR 4.54 [95%CI 2.01, 10.24], p = 0.0003) compared with those of women with a normal BMI.[61]

In a United kingdom study involving retrospective analysis of data to examine the maternal and foetal risks of adverse pregnancy outcome in relation to maternal obesity, expressed as body mass index (BMI, kg/m(2)). Results obtained from a total 287,213 completed singleton pregnancies were studied including 176,923 (61.6%) normal weight (BMI 20--24.9), 79 014 (27.5%) moderately obese (BMI 25--29.9) and 31,276 (10.9%) very obese (BMI> or =30) women. The following outcomes were significantly more common in obese pregnant women (odds ratio (99% confidence interval) for BMI 25--30 and BMI> or =30 respectively): gestational diabetes mellitus (1.68 (1.53--1.84), 3.6 (3.25--3.98)); proteinuric pre-eclampsia (1.44 (1.28--1.62), 2.14 (1.85--2.47)); induction of labour (2.14 (1.85--2.47), 1.70 (1.64--1.76)); delivery by emergency caesarian section (1.30 (1.25--1.34), 1.83 (1.74--1.93)); postpartum haemorrhage (1.16 (1.12--1.21), 1.39 (1.32--1.46)); genital tract infection (1.24 (1.09--1.41), 1.30 (1.07--1.56)); urinary tract infection (1.17 (1.04-1.33), 1.39 (1.18--1.63)); wound infection (1.27 (1.09--1.48), 2.24 (1.91--2.64)); birth weight above the 90th centile (1.57 (1.50--1.64), 2.36 (2.23--2.50)), and intrauterine death (1.10 (0.94--1.28), 1.40 (1.14--1.71)).[62]

Research conducted in developing countries though limited have yielded similar results. A study done in Taiwan on 860 women involving data extraction from a delivery room information bank on singleton deliveries provided concurring results. Pregnant women were categorized according to their pre-pregnant BMI and GWG to evaluate the impacts of pre-pregnant BMI and maternal weight gain on the risk of pregnancy complication. Analysis showed the following results: Pre-

pregnancy BMI>=24 kg/m2 increased the risks of gestational diabetes mellitus, preeclampsia, and preterm labor. Preeclampsia and Cesarean delivery were positively associated with high weight gains (>18 kg), whereas a low birth weight and preterm labor were strongly associated with low weight gains (<10 kg). A higher birth weight was found with a GWG of >14 kg in women who were underweight and normal weight before pregnancy.[63]

Multiple South African studies have shown comparable findings to that obtainable in developed countries. A study to determine the prevalence of obesity and its effect on maternal and fetal outcomes among pregnant women at the Johannesburg Hospital involved 767 pregnant women. The retrospective study divided the pregnant women into BMI groups. Complications such as pregnancy-induced hypertension (PIH), gestational diabetes mellitus (GDM), urinary tract infection (UTI), preterm labor, preterm rupture of membranes (PROM), induction of labor (IOL), postdates, fetal weight, and fetal outcome were compared among the BMI groups. Seasonal variation in BMI was measured. Among the study population, 337 (44%) were obese or morbidly obese. The complications of GDM (P<0.001), UTI (P=0.002), and failed IOL (P=0.003) were significantly more common among morbidly obese women. There was no seasonal variation in BMI.[64]

In a case control study to determine whether morbidly obese women are at increased risk of adverse outcomes, compared to women with a normal body mass index in the same study area. The cases in this study comprised the first 100 morbidly obese women seen at the Obstetric Special Care Clinic, in Tygerberg Hospital (TBH), a secondary and tertiary referral centre. The controls (n = 209) were women with normal BMI's and singleton pregnancies who booked as low-risk patients at the Bishop Lavis Midwife Obstetric Unit during the same calendar period. A

minimum ratio of 2:1 controls-to-case was used, with controls also matched for primi- or multiparity. **:** Women in the morbidly obese group were significantly older ($p < 0.001$) and of higher parity ($p < 0.001$) than those with normal BMI's. There was no difference in the numbers of primigravidae. Significantly more women in the morbidly obese group had experienced at least one miscarriage ($p = 0.002$). In similar fashion, significantly more of the previous deliveries in the morbidly obese group had been by caesarean section ($p < 0.001$). Again, significantly more of women in the morbidly obese group had previously experienced pregnancies complicated by hypertension ($p < 0.001$). In the index pregnancies studied, morbidly obese women experienced more hypertension ($p < 0.001$), diabetes ($p = 0.02$) and urinary tract infections ($p < 0.001$) than controls. They underwent induction of labour more often ($p < 0.001$) and had a higher rate of caesarean delivery ($p < 0.001$). Epidural anesthesia was planned for all morbidly obese patients, but only 14% received it. During delivery, perineal damage was more common in morbidly obese women ($p < 0.001$) and their babies were significantly larger ($p < 0.001$).[65]

In Nigeria a study to determine the prevalence of obesity and associated risk factors among women in an Out-Patient clinic also provided similar results to previous studies on the topic. A pre-tested structured questionnaire was administered on women at the General Outpatients' Department (G.O.P.D.) of the University College Hospital (U.C.H.), Ibadan. The prevalence of obesity was 41.8%. Age was significantly associated with obesity, p=0.001. Majority of the obese participants (68.9%) in comparison to non obese (46.4%) were traders, p=0.001. Many of the obese respondents were married (82.6%) in comparison to non obese respondents who were widowed (67.4%), p=0.001. Many of the obese respondents were multiparous (44.3 %) having more than 4 children in comparison to the non obese respondents with the highest proportion of

women with no children (36.1%), p=0.001. Fewer of the obese women had no formal education (28.1%) and no primary education (26.4%), in comparison to the non obese with 32.2% having secondary education and 27% having post-secondary education, p=0.015. Majority of the obese women (62.3%) were pre-menopausal in comparison to the non obese with 79.0% being pre-menopausal, p=0.001. Multivariate analysis done using logistic regression showed that risk factors for obesity included age group 50-59 years (Odds Ratio 15.914, 95% CI=1.389-182.26, p=0.026), and being menopausal (Odds Ratio 1.452. 95%CI=0.587-3.594,p=0.017). Having greater than five children was also found to be a risk factor for obesity (OR=3.321, 95%CI=1.236-8.921, p=0.017).[66]

Another study which investigated the prevalence of obesity and Body Mass Index (BMI) percentile and quartiles in accordance with sex and age in adult residents of the historic ancient semi-urban community of Ile-Ife, South-West, Nigeria provided additional information. 2097 adults aged 21 years and above were recruited into the door-to-door survey through a multi-stage cluster sampling technique. The mean age and BMI of the participants were 44.2 years and 24.2 Kg/m2 respectively. Although age-matched; the females had higher BMI values compared to males (23.8 vs. 24.5 Kg/m2). The overall crude prevalence of overweight (25.0-29.9 Kg/m2) and obesity (>30 Kg/m2) were 20.3% and 12.5% respectively. The rates of overweight (17.9 vs. 22.1 Kg/m2) and obesity (9.7 vs. 14.5 Kg/m2) were both higher in women than men. Obesity increased across age gradient from young to old adults; peaking in the 60-69-year age group. The first to fourth BMI quartiles were = 20.4 Kg/m2, 20.5-24.1 Kg/m2, 24.2-25.2 Kg/m2, = 25.3 Kg/ m2 respectively in the study population. At all ages; more females (32.4%) than males (24.7%) were placed within fourth BMI quartile. The 95th percentile BMI in the study population was 33.4 Kg/m^2.[67]

A screening survey was carried out among randomly selected 998 civil servants, 581 men and 417 women, in Ibadan, a major Nigerian city. Biographical data were collected using standardized questionnaires, and measurements of anthropometric indices, blood pressures and plasma glucose concentration. Obesity and overweight were defined by body mass index based on international criteria. Prevalence of obesity was 8.82% (confidence interval [CI]=7.13%, 10.75%), overweight 17.45% (CI=15.12%, 19.95%), and overweight plus obesity=26.18% (CI=23.47%, 29.03%). Prevalence of obesity among the women was 17.27% (CI=13.76%, 21.24%) and for men 2.75% (CI=1.58%, 4.43%). Among the women 42% were obese or overweight compared with 15% of the male population. Obesity and overweight were associated with higher socioeconomic status. Prevalence of obesity and overweight in the study population is comparable to rates seen in many industrialized countries, and rapidly emerging urbanized populations in Africa.[68]

In south eastern Nigeria a study to determine the prevalence and characteristics of obesity during pregnancy, recruited 3,167 women who registered for antenatal care in their first trimester of pregnancy. The prevalence of obesity in pregnancy was 10.7%. Obesity was significantly more prevalent amongst women residing in urban areas. Only 15.1% of participants knew their pre-pregnancy weight. Education, employment, parity and age did not have significant relations with obesity in pregnancy. Majority of women in this setting do not know their pre-pregnancy weights. There is need to begin to consider obesity in pregnancy as a problem that does exist in resource-poor settings and specific guidelines on the management of obese pregnant women in resource-poor settings would be needed to reverse the trend.[69]

A case-control study was conducted to determine the prevalence of maternal obesity in early pregnancy and compare the subsequent pregnancy outcome between 201 women with obesity

and 201 non-obese controls in a University Teaching Hospital in Nigeria. The prevalence of obesity in early pregnancy was 9.63%. Obesity was significantly associated with advanced maternal age and parity > or =1. It was also a risk factor for pregnancy induced hypertension, admissions during pregnancy, caesarean delivery and associated with 5th minute Apgar score < or =3 (0.044). Obesity in early pregnancy is a risk factor for adverse pregnancy outcome among pregnant Nigerian women.[70]

2.5 Advanced Maternal Age

Advanced maternal age, in a broad sense, is the instance of a woman being of an older age at a stage of reproduction, although there are various definitions of specific age and stage of reproduction. The variability in definitions regarding age is in part explained by the effects of increasing age occurring as a continuum rather than as a threshold effect. The most commonly used definition of advanced maternal age is 35 years or more at the time of childbirth. Advanced maternal age, defined as age 35 years and Older at estimated date of delivery, has become increasingly common. From 1970 to 2000, live births among women aged 35 years and older in the United States increased from approximately 5% to approximately 13% of all live births Effective birth control, advances in Assisted Reproductive Technology (ART), delayed marriage, increasing rates of divorce followed by remarriage, and women's higher education all may contribute to this trend. In Africa early age at first marriage and extended reproductive period sometimes into >40years have been implicated in deliveries within an advanced age bracket. [71-73]

Pregnant women 35 years old face various risks including genetic disorders, prenatal medical and obstetric complications, intrapartum complications, and perinatal and neonatal morbidity and mortality. With each passing year, the risk of chromosomal abnormality such as Down's syndrome increases. Physicians perform chorionic villus sampling (CVS) between 9-11 weeks

gestation and amniocentesis between 16-18 weeks to detect chromosomal abnormalities. CVS carries the higher risk of spontaneous abortion (1-2%). 35-year old pregnant women are more likely to suffer from hypertension and gestational diabetes than younger women. Yet their incidence remains at an acceptable level. Older pregnant women tend to also be at risk of several ante-partum obstetric complications such as gestational bleeding, abruptio placentae, and placenta preavia. The likelihood of cesarean section and dysfunctional labor is greater among 35-year old pregnant women. Between 1974 and 1978, older mothers were 4 times more likely to die than young mothers. The main causes of death among older mothers were hemorrhage, embolism, and hypertensive conditions. Advanced maternal age tends not to effect neonatal outcome other than chromosomal anomalies.[74]

A retrospective population-based cohort study was conducted in Australia to compare the pregnancy outcomes for women aged 35-39 years and ≥40 years with women aged 25-29 years, analyzing 34 695 records from the South Australian Perinatal Database between 1998 and 2008.Pre-existing hypertension [relative risks (RR) 1.98 and 2.94 for women aged 35-39 years and ≥40 years, respectively], placenta preavia (RR 2.88 and 3.68), suspected intrauterine growth restriction (RR 1.33 and 1.77) and gestational diabetes (RR 1.97 and 2.53) increased with age. Women of advanced maternal age were more likely to have not laboured prior to birth (RR 2.19 and 3.28), be induced (RR 1.12 and 1.27) and have a breech presentation (RR 1.57 and 1.60). The likelihood of fetal distress increased with advancing maternal age (RR 1.15 and 1.24). Regression analyses revealed women of advanced maternal age were significantly more likely to have small for gestational age infants [adjusted odds ratios (AOR) 1.26 and 1.50], preterm birth (AOR 1.26 and 1.43), elective caesarean [relative risk ratios (RRR) 2.55 and 4.52], emergency caesarean (RRR 1.59 and 2.21) and experience a perinatal death (RRR 1.94 and 2.18).[75]

In the United Kingdom a study examined changes in the distribution of maternal age in England and Wales from 1938 to 2010. The live birth prevalence of Down's syndrome in the absence of screening and subsequent termination was estimated using the numbers of babies born in England and Wales according to maternal age and the maternal age-related risk of a birth with Down's syndrome. The proportion of women age 35 years or older at the time of giving birth reached a peak of 20% in 1945, declined to 5.5% in 1977 and rose to 20% in 2007. In the absence of screening and subsequent termination, the estimated live birth prevalence of Down's syndrome would have mirrored these changes (2.5 per 1000 births in 1945, 1.3 per 1000 in 1976 and 2.4 per 1000 in 2007). The observed live birth prevalence (recorded by the National Down Syndrome Cytogenetic Register) was1.0 per 1000 from 1989 to 2010, due to screening and subsequent termination. In conclusion since the 1980s there has been an increase in the mean maternal age and in the expected prevalence of Down's syndrome.[76]

In British Columbia a retrospective cohort study to examine the effect of parity on the association between older maternal age and adverse birth outcomes, specifically stillbirth, neonatal death, preterm birth, small for gestational age, and neonatal intensive care unit admission was conducted in 1999 and 2004. In the cohort, 69 023 women were aged 20 to 29, 25 058 were aged 35 to 39, and 4816 were aged 40 and over. Perinatal risk factors, obstetric history, and birth outcomes were abstracted from the British Columbia Perinatal Database Registry. Compared with younger control subjects, women aged 35 to 39 years had an aOR of stillbirth of 1.5 (95% CI 1.2 to 1.9) and women aged 40 years also had an aOR of 1.5 (95% CI 1.0 to 2.4). The aOR for Neonatal intensive care unit (NICU) admission was 1.2 (95% CI 1.0 to 1.3) in women aged 35 to 39 years and 1.4 (95% CI 1.1 to 17) in women aged 40years compared with younger control subjects. The risk of preterm birth and SGA differed by parity. The aOR for

preterm birth compared with younger primiparas was 1.5 (95% CI 1.4 to 1.7) for women aged 35 to 39 years and 1.6 (95% CI 1.3 to 2.0) for women aged 40 years. In multiparas the aOR for preterm birth was 1.1 (95% CI 1.1 to 1.2) in women aged 35 to 39 and 1.3 (95% CI 1.1to 1.5) in women 40 years. The aOR for SGA in primiparas was 1.2 (95% CI 1.1 to 1.4) for women aged 35 to 39 and 1.4 (95% CI 1.1 to 1.7) for women aged 40 years.[77]

In a retrospective cross-sectional study conducted in Mexico to determine the perinatal outcomes in women giving birth at age 40 or older during a year in a concentration hospital located at Monterrey, Nuevo León.163 women and 170 newborn were included. A newborn death (5.8 x 1000 RN) and no maternal death were observed. The most frequent maternal associated disease was gestational diabetes (16%) followed by the hypertensive disorders (10%). The cesarean section rate was 71.1% and the most frequent indication was previous cesarean. The most frequent hospitalization cause was early premature labour (4.2%). Premature rupture of membrane was observed in 11% of patients. The mean delivery time was at 38 weeks with a mean body weight of 3032 g. There were 5 newborn with congenital malformations (2.9%). 21 newborns were hospitalized (12%) and the most frequent indication was prematurity.[78]

A Korean study to investigate the risks of increasing maternal age on the perinatal and obstetric outcomes of singleton pregnancies provided comparable results. Information about 29,760 singleton pregnancies delivered between 2005 and 2008 was extracted from the national database. Patients were categorized into four groups according to age: 20-29 years, 30-34 years, 35-39 years, and ≥40 years. Multivariable logistic regression analysis was used to evaluate the adjusted odd ratios (AORs) of adverse pregnancy outcomes according to maternal age after adjusting for parity, body mass index, medical history and use of in vitro fertilization. The majority of adverse perinatal outcomes were associated with a maternal age ≥35 years as

follows: low birth weight (AOR 1.2 and 1.6 for women aged 35-39 years and ≥40 years, respectively); Apgar score < 7 at 1 minute (AOR: 1.7 and 1.8); and chromosomal anomaly (AOR: 2.7 and 12.3). However, women aged ≥30 years also had greater risks for adverse maternal outcomes such as: gestational diabetes (AOR: 2.0, 3.6 and 5.1 for women aged 30-34 years, 35-39 years and ≥40 years, respectively); placenta preavia (AOR: 1.6, 2.1 and 3.6); and cesarean delivery (AOR: 1.5, 2.3, and 4.1), as well as adverse fetal outcomes such as: preterm delivery (AOR: 1.2, 1.4 and 1.8) and neonatal intensive care unit transfer (AOR: 1.1, 1.2, and 1.6).[79]

CHAPTER THREE

METHODOLOGY

3.1 Study Area

Soba local government area (LGA) one of 23 LGAs within the state is located in the northern part of Kaduna state (Appendix 1). It was created in 1989 within the former Zaria province. The local government area is bordered by sabon gari in the west, Kauru local government in the south, Kubau local government area to the east and Ikara local government area to the north. It covers an area of 2,955km^2 and lies between latitude 90° and 110° north and longitude 7° and 8° northeast. It has a total population of 238,719(2006 census) comprising predominantly traders, cattle rearers and farmers. There are 8 administrative districts divided into 4 health districts. These are Soba A, Soba B, Maigana A and Maigana B health districts. The LGA also houses the Kaduna state agricultural development project office (KADP).

There are no tertiary health facilities or specialist hospitals in this LGA, however there are 2 primary health care (PHC) centers, 2 private clinics and multiple patent medical stores. Majority of inhabitants are Hausas by tribe with a few settlers of other ethnic groups. Islam is the main religion practiced by the inhabitants. It consists of 11 political wards namely: Danwata, Garun Gwanki, Gamagira, Gimba, Kinkiba, Kwasallo, Maigana, Rahama, Richifa, Soba and Turawa. Maigana is the headquarters of Soba local government area with an estimated population of 40,490(Estimated population of reproductive age females: 12,000). It is also the district headquarters in addition to its self-esteemed *sarki* status locality; controlling a number of hamlets and wards.

There are two constituencies representing the local government area in Kaduna state house of assembly; they are soba and maigana constituencies. The local government has three developmental areas soba, Turawa and yakassai.

3.2 Scope of Study

This study examined selected risk factors and selected outcomes due to financial limitations and time constraints. Analysis across different age and social groups compensated by providing variability in interpretation of obtained findings.

3.3 Study Design

This was a mixed method study with analytic (case-control) design comparing identified risk factors/independent variables to adverse pregnancy outcomes/dependent variables between selected cases and control groups. Six Focus group discussions (FGDs) comprising mothers, grandmothers and teenagers were used to triangulate findings.

3.4 Study Population

This comprised of all reproductive aged women aged (15-49years) within selected households and resident in the study area during the period of the study.

Inclusion criteria

All reproductive aged women: (15-49yrs) with previous history of one or more pregnancies resident in the area during the survey and permanent residents.

Exclusion criteria

Eligible women found too sick to be interviewed or not permanent residents in the study area.

3.5 Sample Size Determination

The minimum sample size for the study was calculated using an appropriate formula for case control studies in Epi info statistical software 3.5.3. Based on the following assumptions:

1. Two sided confidence interval (1-α) of 95% (95% CI).
2. The power of 80% was chosen to detect an odds ratio (OR) of 3.
3. Ratio of one case to a control.
4. The prevalence of most commonly implicated risk factor/percent exposed 41.8%.

The calculated sample size using Fleiss formula for unmatched case control studies and 41.8% prevalence for obesity in pregnant women from a Nigerian regional study is 110: 55 cases and 55 controls. Adding 20% non-response rate the final sample size is 137.7 approximates to 138. Therefore the final sample size for the study was 138: 69 cases and 69 controls. This is shown below:

Sample size calculation

Sample size for unmatched case control study	
Two sided confidence level (1-α)	95%
Power (% chance of detecting)	80%
Ratio of cases to controls	1
Hypothetical proportion of cases with exposure	68.3%
Hypothetical proportion of controls with exposure	41.8%
Least extreme odds ratio to be detected	3
Sample size	**110**

$$n_1 = \frac{\left[z^{\alpha}/_{2\sqrt{(r+1)\bar{p}\bar{q}}} + z^{\beta}/_{2\sqrt{rp_1q_2 + p_2q_2}} \right]^2}{r(p_1 - p_2)^2}, \; n_2 = r \times n_1$$

$$p_1 = \frac{p_2(OR)}{1 + [p_2(OR - 1)]}$$

$$\bar{P} = \frac{p_1 + r \times p_2}{r+1} \quad ; \quad \bar{q} = 1 - \bar{p}$$

Where:

n_1=number of cases

n_2=number of controls

$Z^{\alpha}/_2$=z-score for two-tailed based on α level

$Z1 - \beta$ =z-score for one-tailed test based on β level

r=cases: controls

P_1=proportion of cases with exposure

q_1=1-p1

p_2=proportion of controls with exposure

q_2=1-p_2

Therefore:

$$P_1 = \frac{0.42 \times 3}{1 + [0.42(3-2)]} = \frac{1.25}{1.8} = 0.68$$

q_1=1-0.68=0.32

p_2= 0.42; q_2=1.0-0.42=0.58

$$\bar{p} = \frac{0.68 + (1 \times 0.42)}{1 + 1} = 0.55$$

$$\bar{q} = 1.0 - 0.55 = 0.45$$

$$n_1 = \frac{\left[1.96\sqrt{2 \times 0.55 \times 0.45} + 0.84\sqrt{(0.68 \times 0.32) + (0.42 \times 0.58)}\right]^2}{(0.68 - 0.42)^2}$$

$$n_1 = \frac{[1.37 + 0.59]^2}{0.07} = \frac{1.96}{0.07} \quad = 55$$

$n_1 = n_2$

Therefore sample size = 55×2 =110

Using a 20% non-response rate and multiplying the adjustment factor $\frac{1}{1-f}$

Total sample size = 110 x 1.25 = 137.5 ≈ 138

r = cases: controls; cases=69: controls=69

3.6 Sampling Method

The study was conducted in selected settlements within Maigana ward of Soba Local Government Area (LGA). The ward was selected randomly from the total wards in the LGA.

Systematic sampling was used to select study units. The sampling interval was calculated by dividing the total ward estimated reproductive age female population of 12,000 by the calculated sample size (k=12,000/138). A random number <k (87) was used to select the first household and respondent; subsequent respondents were obtained by drawing every k unit from the first unit. Respondents were frequency matched by age-groups.

Selection and Definition

Independent variables: Age, Obesity (BMI >30), Education, Income, Occupation and Height

Dependent Variables: Miscarriages (Spontaneous abortion) and Pregnancy induced hypertension/eclampsia

3.7 Selection Criteria

Case: Reproductive aged women (15-49years) with a history of adverse pregnancy outcome in the past 5 years and permanently residing in the study area.

Control: Reproductive aged women (15-49years) with no history of adverse pregnancy outcome in the past 5 years and permanently residing in the study area.

3.2 Definition of variables

Dependent variables

Pregnancy induced hypertension: This was determined based on a history of diagnosis during pregnancies, documentation on ante natal cards or positive history of key clinical indicators such as seizures for eclampsia.

Spontaneous abortions/ miscarriages: This was assessed based on termination or pregnancy loss before term based on history or before age of viability based on ante natal cards documentation.

Independent variables

Socio-demographic characteristics: Age was divided into age groups with five year intervals and educational level divided into formal education; primary, secondary and tertiary plus informal education as a separate subgroup.

Obesity: This was assessed based on history and ante natal records. Current weight will be measured using standiometers and weighing scales to determine body mass index and presence of clinical obesity.

Income: This was assessed using three income bracket group; less than 5,000 naira, 5,000-10,000 and greater than 10,000 monthly incomes.

Occupation: Key occupational groups common to the locality were assessed and a separate group i.e. others used to include skilled labour. These groups will be; farmers, traders, civil servants and others.

Measurement

Height was measured in meters (m) using standiometers and weight in kilograms (Kg) using weighing scales. Blood pressure measurements were taken using manual sphygmomanometers (mmHg).

3.8 Data Management

Preparation for data collection

Advocacy visits to the local government headquarters and Traditional rulers of selected wards was conducted by the researcher, in order to obtain permission and solicit co-operation to carry out research. Research assistants were recruited from the local government area. Following approval for the study two-day training was arranged for support staff/research assistants. Thirty four reproductive aged women were randomly selected from Igabi local government area out of the remaining 22 LGAs in order to pretest the questionnaire for the study.

3.9 Data collection

A pre-structured interviewer administered questionnaire (Appendix 2) consisting of 4 sections (A to D) was used for data collection. Section A of the questionnaire obtained information on respondents' biodata; section B elicited information on pre-selected risk factors and duration of exposure. Section C asked questions regarding pregnancy outcomes of interest (PIH and

Spontaneous abortions) while section D asked questions regarding respondents' current health status.

A pre-structured Focus group discussion guide (Appendix 3) was used to facilitate discussions with mothers, teenagers and grandmothers in 6 groups. Notes were taken and audio records made for transcription.

A standiometer (meters) was used to measure height and weighing scales to measure weight (kilograms) for assessment of body mass index (BMI).

3.9.1 Statistical analysis

Data generated from the study were entered and analyzed using Epi info version 3.6.3 statistical software (CDC Atlanta, Georgia, U.S.A). Univariate, bivariate and multivariate analysis was performed on entered data. Categorical data are presented as percentages, while quantitative data is described using mean, median and standard deviation as appropriate. Odds ratios and 95% confidence intervals were used to assess association between risk factors and pregnancy outcome. A p-value of ≤ 0.05 was considered significant.

Qualitative data were entered and analyzed using thematic analyses in a coding sheet with Microsoft excel software.

3.9.2 Ethical considerations

Ethical clearance was obtained from the ethical committee within the Kaduna state ministry of health before commencement of the study. The provisions of the HELSINKI declaration were respected:

1. Respect for persons and their human rights: informed consent was obtained from all participants and confidentiality was maintained

2. Beneficence: The study had a scientific design(case-control) which answered the study question and The risks to the participants were proportional to the benefits
3. Justice : The benefits and the harms from the research were distributed fairly in the population and All Potential participants had equal chance of benefiting from the research
4. Non-maleficense: No therapies were with-held that are of known benefit and are generally available.

3.9.3 Limitations

Cases are more likely than controls to remember history of pregnancies (Recall bias). Confirmatory information on pregnancies was obtained from care-givers during pregnancy and female relatives where available (Sister-hood method). Attempts were made to review antenatal care cards in cases with hospital deliveries. Study participants may be unable to provide accurate details of unbooked pregnancies. Further information was obtained from spouses where present and co-habitants in large compound houses. We encountered a lack of detailed and accurate Antenatal attendance cards for verification of pregnancy/ delivery information. Supplementary information was however obtained from co-habitants and Traditional midwives. Older women residing in same households and streets who traditionally serve as initial care-givers were used to collaborate ante-natal and delivery information.

CHAPTER FOUR

RESULTS

Table 1: Socio-Demographic Characteristics among women of reproductive age in Maigana Ward, Soba LGA, 10th-26th December 2013

Variable	Case: No (%)	Control: No (%)
Age-group (Years):		
15-24	13 (18.8)	28 (40.6)
25-34	32 (46.4)	33 (47.8)
35-44	21 (30.4)	7 (10.1)
>44	3 (4.4)	1 (1.5)
Occupation:		
Civil servant	3 (4.4)	7 (10.1)
Farmer	2 (2.9)	1 (0.0)
Trader	18 (26.1)	7 (10.1)
Craftswoman	17 (24.6)	19 (27.6)
Unemployed	29 (42.0)	36 (52.2)
Educational level		
Primary	23 (33.3)	24 (34.8)
Secondary	17 (15.9)	8 (11.6)
Tertiary	1 (1.4)	8 (11.6)
Informal	34 (49.3)	29 (42.0)
Marital status		
Married	68 (98.6)	68 (98.6)
Divorced	0 (0.0)	1 (1.4)
Widowed	1 (1.4)	0 (0.0)
Religion		
Islam	68 (98.6)	68 (98.6)
Christianity	1 (1.4)	1 (1.4)
Tribe		
Hausa	69 (100)	67 (97.1)
Other	0 (0.0)	2 (2.9)

***Other Tribes:** Igbira and Igala

The Table above shows majority 46.4% of cases and 47% of controls were in the age-group 25-34 years. The median age of cases is 25 years; range (16-44 years), median age of controls 27 years; range (16-43 years). Most respondents 42% of cases and 52.2% of controls were unemployed. Informal education is seen in 49.3% of cases and 42% of controls, with only 1.4% of cases and 11.6% of controls having attained tertiary education. 98.6% of both cases and controls were Muslims. Only 2.9% of controls were non-Hausas i.e. Igbira and Igala. Majority of both cases and controls 98.6% were married.

Table 2: Mean and standard deviation of Continuous Variables among women of reproductive age in Maigana Ward, Soba LGA, 10th-26th December 2013

Variable	Case: Mean Standard deviation	Control: Mean Standard deviation
Weight (Kg)	59.1 11.7	56.6 10.4
Height (m)	1.6 0.1	1.5 0.1
BMI (Kg/m^2)	25.2 7.0	25.7 5.4
Age first pregnancy (Years)	17.1 2.6	16.6 2.7
Age last pregnancy (Years)	28.8 6.5	24.5 6.1
Number of pregnancies	6.4 2.7	3.6 1.9

The Table above shows mean height of cases was 1.60 meters and controls 1.52 meters (Standard deviation 0.1) both greater than the critical obstetric height of <1.52 meters. Mean values for body mass indices (BMI) were 25.2 kg/m^2 for cases and 25.7 kg/m2 for controls both below the value of 30kg/m2 which define obesity. The average/ mean age at first pregnancy were 17.1 years for cases and 16.6 years for controls, both less than 18 years. Both cases and controls

had age last less than 45 years at 28.8 years and 24.5 years for cases and controls respectively. The mean number of pregnancies among cases was 6.4 vis-à-vis 3.6 pregnancies for controls.

Table 3: Distribution of Obstetric Variables among women of reproductive age in Maigana Ward, Soba LGA, 10th-26th December 2013

Variable	Case: No (%)	Control: No (%)
No of pregnancies		
<4	50 (72.5)	47(68.1)
≥4	19 (27.5)	22 (31.9)
Age first pregnancy		
<18 years	59 (85.5)	55 (79.7)
≥18 years	10 (14.5)	14 (20.3)
BMI grouped		
<30	58 (84.1)	57 (82.6)
≥30	11 (15.9)	12 (17.4)
Age last pregnancy		
≥35 years	10 (14.5)	5 (7.3)
<35 years	59 (85.5)	64 (92.7)
Height Grouped		
<1.52meters	4 (5.8)	16 (23.2)
≥1.52meters	65 (94.2)	53 (76.8)
Income		
<5,000 naira	63(91.3)	57(82.6)
≥5,000	6(8.7)	12(17.4)

The Table above shows obstetric variables in the study, following grouping based on cut-off values of proven clinical significance. Majority of both cases and controls 72.5% and 68.1% respectively had a history of less than four pregnancies. Early age at first pregnancy i.e. less than 18 years was recorded in 85.5% of cases and 79.7% of controls. Only 15.9% of cases and 17.4% of controls had body mass indices of >30kg/m2 (Obesity). Height less than the critical Obstetric

height of 1.52 meters was observed in only 5.8% of cases and 23.2% of controls. Most respondents had an average monthly income of less than 5,000 naira per month seen in 91.3% of cases and 82.6% of controls.

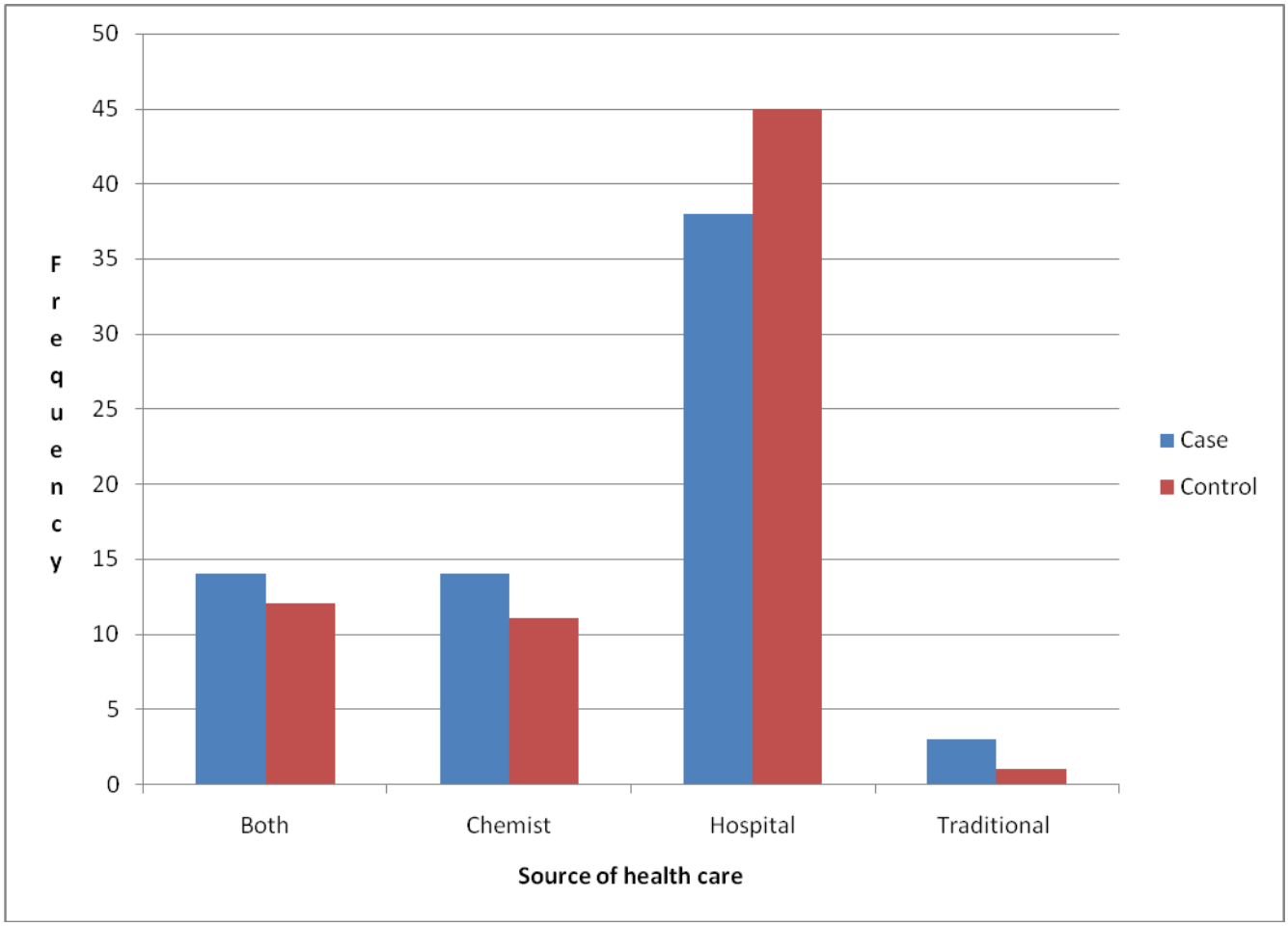

Figure 4: Source of healthcare among women of reproductive age in Soba L.G.A. Kaduna state 10th-26th December 2013

The grouped Bar chart above shows a Comparism of sources of healthcare utilized by both cases and controls during ill-health while pregnant. More controls 45 sought healthcare from hospitals versus 38 controls. More Cases were found to frequent Chemists/Patent medical stores than controls at 14 and 11 respectively. Traditional healers were rarely patronized for healthcare by

respondents with only 4 cases and 2 controls seeking healthcare solely from them. Twenty six cases and controls utilized both orthodox (Hospitals) and traditional healers for treatment of ill-health while pregnant. Overall more cases sought healthcare assistance while pregnant, except for hospital care which shows more controls. The controls utilized hospitals as they only sought care in the presence of severe debilitating health conditions such as seizures.

Table 4: Clinical Variables among women of reproductive age in Maigana Ward, Soba LGA, 10th -26th December 2013

Variable	Case No (%)	Control No (%)	OR (95% CI)	P-Value
ANC attendance				
<4 months	11 (15.9)	22 (31.9)	0.4 (0.2-0.99)	0.03
≥4 months	58 (84.1)	47 (68.1)		
Current health status				
Healthy	51 (73.9)	59 (85.5)	2.1 (0.82-5.37)	0.09
Ill	18 (26.1)	10 (14.5)		
Blood pressure				
Normal	67 (97.1)	68 (98.6)	2.0 (0.14-57.9)	0.56
Abnormal	2 (2.9)	1 (1.4)		
Pre-conception care				
Yes	0 (0.0)	0(0.0)	Undefined	Undefined
No	69(100.0)	69 (100.0)		
History of complicated first pregnancy				
Yes	20 (29.0)	13 (18.8)	1.8 (0.74-4.21)	0.16
No	49 (71.0)	56 (81.2)		
Adverse outcomes				
Miscarriages	53(77)	0 (0.0)	Undefined	Undefined
Pregnancy induced hypertension (PIH)	16(23)	0(0.0)		

Table 4 above shows odds ratios (OR) and P-values of clinical variables studied among cases and controls. Early commencement of Antenatal care <4 months of gestation was significantly

associated with the adverse pregnancy outcomes of interest; OR 0.4 (95% CI 0.2-0.99), P-value 0.03. The presence on ill-health and abnormal blood pressures among cases were not found associated with the outcomes of interest. Comparism of a history of complicated pregnancies among cases and controls showed no significant association with the adverse outcomes studied. There was an absence of pre-conception care among all respondents.

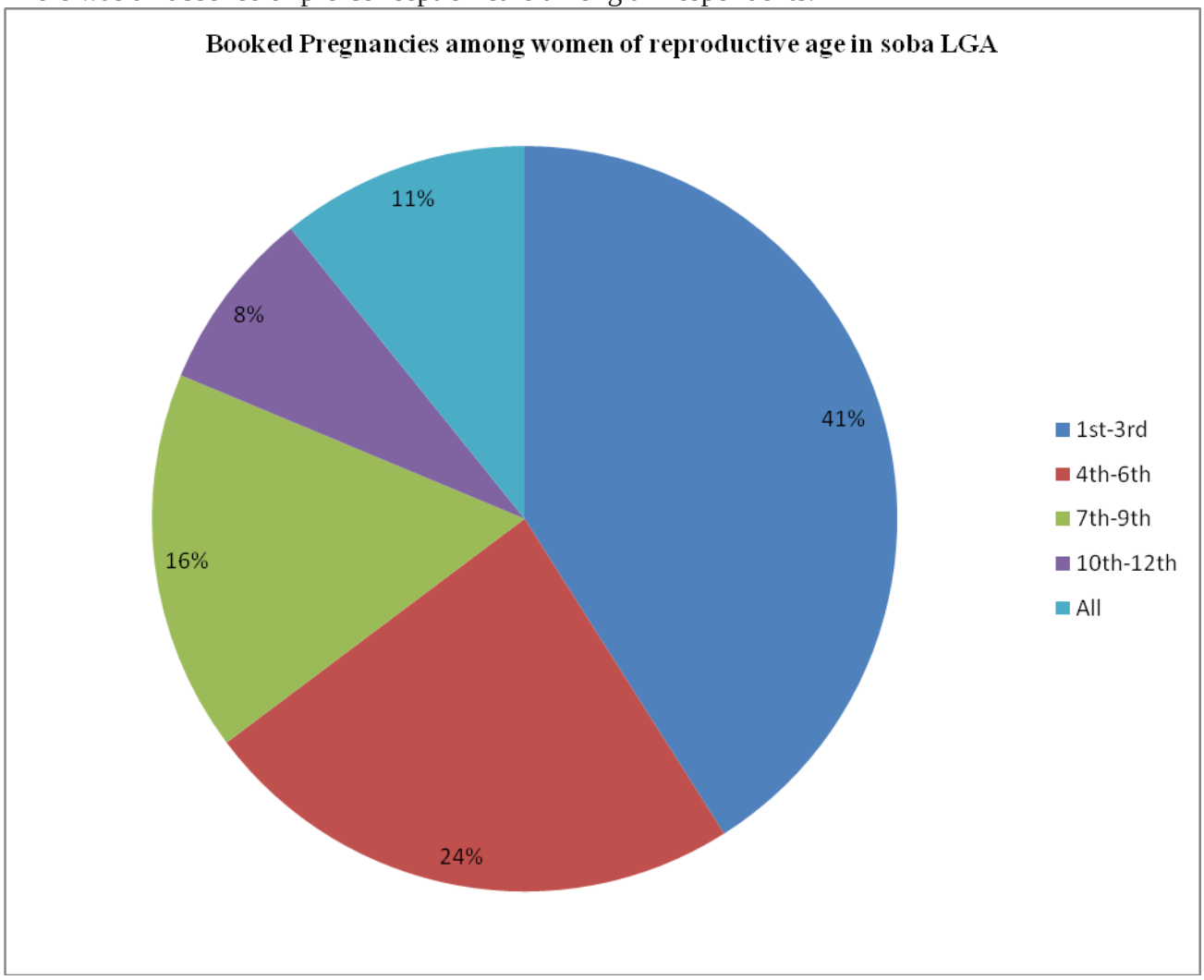

Figure 5: Booked Pregnancies among women of reproductive age in Soba Local Government Area, Kaduna State, 10th-26th December 2013

The Figure above shows 41% of respondents had booked their 1st-3rd pregnancy at health care facilities for ante-natal care. However 24% were found to have only booked their 4th-6th pregnancies at healthcare facilities. Booking of only later pregnancies was observed in both cases and controls with 16% of respondents booking only their 7th-9th pregnancies. Grand-multiparous

respondents showed booking of later pregnancies with 8% of total respondents booking only their 10^{th}-12^{th} pregnancies. Booking and antenatal care attendance for all pregnancies was recorded in only 11% of study respondents.

Table 5: Risk factors for adverse pregnancy outcomes among women of reproductive age in Maigana Ward, Soba LGA, 10^{th}-26^{th} December 2013

Variable	Cases N (Col %)	Controls N (Col %)	OR (95% CI)	P-Value
Age first pregnancy				
<18	59 (85.5)	55(79.7)	1.5 (0.6-4.0)	0.37
≥18	10(14.5)	14(20.3)		
Age last pregnancy				
<35	59 (85.5)	64(92.7)	0.5 (0.1-1.9)	0.17
≥35	10(14.5)	5(7.3)		
BMI				
≥30	11(15.9)	12(17.4)	0.9 (0.3-2.4)	0.82
<30	58(84.1)	57(82.6)		
Height				
<1.52	**4 (5.8)**	**16(23.2)**	**0.2 (0.1-0.7)**	**0.004**
≥1.52	**65(94.2)**	**53(76.8)**		
ANC attendance				
<4mths	**58 (84.1)**	**47(68.1)**	**0.4 (0.2-0.99)**	**0.03**
≥4 months	**11(15.9)**	**22(31.9)**		
Number of pregnancies				
≥4	**50 (74.5)**	**22(31.9)**	**5.6 (2.6-12.6)**	**0.00**
<4	**19(25.5)**	**47(68.1)**		
Education				
Tertiary/secondary/Primary	37 (53.6)	40(58.0)	1.2 (0.6-2.5)	0.61
Informal	32(46.4)	29(42.0)		
Occupation				
Employed	40 (58.0)	34(49.3)	1.4 (0.7-2.9)	0.31
Unemployed	29(42.0)	35(50.7)		
Monthly income				
<5,000	63 (91.3)	57(82.6)	2.2 (0.7-7.1)	0.13
≥5,000	6(8.7)	12(17.4)		
Source of medical care				
Hospital/Clinic	38 (55.1)	45(65.2)	0.7 (0.3-1.4)	0.20
Other	31(44.9)	24(34.8)		

The Table above shows the association of risk factors to adverse pregnancy outcomes. Early ante-natal care attendance < 4 months: OR; 0.4 (CI: 0.2-0.99) and height < 1.52 meters: OR; 0.2 (CI: 0.1-0.7) were found to be protective. Pregnancies ≥ 4: OR; 5.6 (CI: 2.6-12.6) was found to significantly increase the risk of developing the outcomes of interest. Other risk factors such as education, Income, obesity and age showed no significant association with the adverse outcomes of interest.

Table 6: Risk factors (Logistic Regression) for adverse pregnancy outcomes among women of reproductive in Maigana Ward, Soba LGA, 10th-26th December 2013

Variables	Adjusted Odds Ratio (aOR)	95% Confidence interval	P-value
Height grouped			
≥1.52	0.86	0.40-1.80	0.38
<1.52	1 (reference)		
ANC attendance			
Yes(<4months)	0.32	0.12-0.81	**0.02**
No(≥4months)	1(reference)		
Number of pregnancies			
≥4	5.02	1.97-12.82	**0.00**
<4	1(reference)		
Age last pregnancy			
<35 years	0.60	0.13-2.77	0.52
≥35	1(reference)		

Table 6 above shows results of forward unconditional logistic regression controlling for age. Including variables with P-Values <0.25 from bivariate analysis.* Early ante-natal care attendance < 4 months: aOR; 0.32 (CI: 0.12-0.81) was significantly protective while number of pregnancies ≥ 4: aOR; 5.02 (CI: 1.97-12.82) was found to increase the likelihood of developing the adverse outcomes of interest. Other risk factors age last pregnancy and height with P-values of <0.25 from bivariate analysis showed no significant association with the adverse pregnancy outcomes studied.

Source: Advanced Management and Analysis of Data using Epi info for Windows. United States, Centers for Disease control and Prevention, 2006. Reprint 2008

Qualitative Findings

Significant health problems

Majority of participants identified hypertension, malaria and eclampsia as the most significant health problems in the community. Ulcers, leg pain and asthma were also mentioned by some respondents. Most participants stated pregnancy related health problems were common in their community citing poor health facility staffing and financial constraints as obstacles to attaining necessary health care for early symptoms. Some however believed pregnancy complications are more common with primigravidae who have no knowledge of symptoms and signs for known pregnancy problems such as eclampsia. Some participants cited practice of family planning and female economic empowerment via job creation and skills acquisition as ways to reduce outcomes by generating financial resources. A large number of participants expressed the need to train older women in signs and symptoms of commonly encountered pregnancy disorders such as hypertension and bleeding. They can subsequently provide first aid care before presentation to health facilities. Some women expressed a need to have families in the communities investigated for causes of ill health during pregnancy. These families were believed to encounter adverse outcome with all pregnancies. Common ailments experienced in the community such as malaria, typhoid and leg pains were said to worsen with pregnancy and child birth especially among multi-gravid women. Seizures in pregnancy were seen as a problem primarily of primigravidae especially when complicated by small physical stature. Bleeding during pregnancy was believed to occur more commonly with women having more than 5 pregnancies attributable to uterine

laxity as a consequence of multiple pregnancies. Although all the above health conditions in pregnancy were considered common, the predominant opinion was the health conditions were prevalent only due to poor health care delivery and delay in accessing care.

''For the women our worst health problem is fits during pregnancy. Other common ones are raised blood pressure and malaria''

Mother-Maigana ward

''All of us have relations who have had bleeding problems with pregnancy. Some of them died from it.''

Grand-mother- Maigana ward

''Women with many pregnancies especially more than 5 usually have bleeding that won't stop due to their uterus becoming loose, When they stop having many children they won't be bleeding when pregnant.''

Teenager-Maigana Ward

Pregnancy and Delivery

Majority of participants do not attend antenatal clinics for all pregnancies, the commonest response was antenatal care was utilized for either early or late pregnancies. Home delivery was practiced by a larger number of participants as a personal preference and in a few cases due to spousal refusal to pay for health care delivery. The influence of in-laws in the choice of pregnancy and delivery site was identified by majority of participants as an overriding factor in decision making. An absence of pre-conception care was stated by all respondents and pregnancies were believed to be generally unplanned. The pattern of antenatal care admitted to by a majority is to book a pregnancy when it starts to show and only go to the health facility thereafter in the case of ill health. A large number admitted to booking pregnancies and opting for home delivery stating the need for privacy as a motivator. Commonly experienced health problems during pregnancy were hypertension with seizures and miscarriages. Hypertension was believed to simply worsen with pregnancy and not arise as a consequence of it, as most women in the community get hypertensive with or without pregnancy. Seizures in pregnancy were believed by a majority to occur more with first pregnancies and was attributed by some respondents to poor nutrition in girls prior to marriage. Miscarriages were not considered abnormal by most respondents, but rather a rite of passage towards achieving a normal pregnancy. Few participants stated pregnancy loss to arise due to problems with the mother's body or health state. Hospital delivery was not considered to improve outcome as most participants believed the fate of both mother and child is sealed by the point of delivery and therefore not dependant on health care obtained. Some participants however stated health care delivery can help in improving pregnancy outcome based on personal experiences.

''I have had 2 miscarriages. It is normal to have some problems before delivering healthy children.''

Mother-Maigana Ward

''They should go to the hospital only when they have problems with pregnancy. It costs too much to visit regularly''

Grandmother-Maigana ward

''Most of us are willing to go for regular ante-natal visits and deliver in the hospital. But our husbands usually refuse, they say it's too costly''

Mother-Maigana ward

''There are no free drugs in the hospital and no Doctors nearby. If the government provides free maternal health services more of us will go there.''

Grandmother- Maigana ward

Risk Perception

Majority of women believed recurrent pregnancies (multiparity) especially women having more than 5 pregnancies increased the risk of bleeding, hypertension, seizures and miscarriages. Seizures were believed to occur more frequently among young girls and women whose mothers had problematic pregnancies. A minority of participants believed working while pregnant, depression and age can lead to bad outcomes. Extremely young mothers and women older than 40 years having babies were considered by most participants to experience more adverse outcomes than others. Some participants stated the practice of family planning especially by older women was believed to reduce health problems in pregnancy as it give their bodies time to rest following the stress of child birth. Most believed young girls should only be married after the age of 15 years as younger girls would have complications of delivery. Poor nutrition and lack of adequate care were also mentioned as causes of complicated pregnancies. Women who are well fed and well taken care of by spouses were believed to experience better pregnancy outcomes. Women who stayed healthy and kept fit through house hold chores and occasional farming were said to have better pregnancy and delivery outcomes than those with sedentary lifestyles. Some participants also stated the opposite and believed women who rested during pregnancies tended to have better outcomes. A large number of participants believed a lack of income can worsen a woman's pregnancy outcomes, as most husbands in the community do not easily provide funds for hospital care except in severe cases. Some however stated having financial resources by a woman can worsen her health as all financial obligations will be left to her and increase her stress levels.

"Having too many children weakens a woman and leads to problems with pregnancies and child-birth".

Grand-mother-Maigana ward

*"Young girls who marry before they are 15 years always end up with fits and hypertension in pregnan*cy".

Teenager-Maigana Ward

"If you stay lazy and idle while pregnant you will have health problems. A woman should move around and clean her surroundings so her baby can fit well for delivery".

Mother-Maigana ward

"Parents should feed their children well especially the girls, when you eat well in your parents house by the time you are married and pregnant it will keep you healthy".

Teenager-Maigana ward

Preventive Measures

Majority of participants believed preventive measures can improve maternal health and pregnancy outcomes. Delaying early marriage and provision of free maternal health services were considered key preventive measures. Responses on availability and utilization of pre-conception care and counseling were all negative as no participant had ever received pre-conception care and counseling from health personnel. However willingness to use these services if available was all positive with majority stating they would welcome the introduction of pre-conception care into their communities. A large number of participants also stated a need to influence husbands into permitting antenatal visits and providing funds for treatment. They believed if the community leaders made it compulsory for spouses to take wives for health care in pregnancy and delivery the enforcement of home delivery would abate. The teenage participants majorly expressed a need for parental counseling in preparation for pregnancy and childbirth prior to marriage. Most participants also cited the lack of medical Doctors in the local government hospitals and absence of free drugs as modifiable factors for improvement of outcomes. Reducing number of pregnancies especially among women who experience problems in earlier pregnancies was emphasized by a majority as a means of reducing adverse outcomes.

''Our leaders should intervene with husbands who refuse to let their wives attend hospitals for antenatal care and deliveries.''

Grandmother-Maigana Ward

"Girls should be allowed to grow big enough to carry pregnancies before marriage".

Teenager-Maigana Ward

"The government should provide health education and enforce laws on appropriate marriage age at least 16 years".

Mother-Maigana Ward

''Older women should provide young ones with right information about pregnancy and childbirth. Most of us are married off without knowing anything".

Teenager-Maigana Ward

"There is no Doctor in the district hospital and no drugs. Even if you go you meet nasty nurses. If they send a Doctor and provide free drugs more people will go early and not wait till they have problems while pregnant".

Mother-Maigana ward

CHAPTER FIVE

DISCUSSION

Our study showed Women of reproductive age with a history of greater than and equals to four pregnancies were more likely to develop the adverse outcomes of interest i.e. miscarriages and PIH/ eclampsia even when adjusted for age. This finding is disparate with reviewed studies on multiparity and adverse pregnancy outcomes which show parity of >=5 i.e. grand-multiparity increasing the likelihood of developing adverse outcomes of interest. Such studies include: a Nigerian hospital based study to evaluate the outcome of delivery among grand-multiparous patient at a tertiary health facility showed the following: 71.5% of respondents were 30-35 years of age. Results showed grand-multiparity was associated with high perinatal and maternal morbidity and mortality. Our study findings contradict the above as the age distribution showed a median age 20-29years for both cases and controls.[80] Age at last pregnancy show a mean of 28.6 years for cases and 23.5 years for controls. This indicates early and continuous childbearing peaking in the 30s. Both values are less than 35 years (advance maternal age in obstetrics). The average number of pregnancies by respondents is 6.4 for cases and 3.6 for controls. The cases are predominantly multiparas >4 who have a documented increased risk for adverse outcomes.

The findings on multiple pregnancies and deliveries is comparable with a Kenyan cross-sectional study which showed Grand multiparas (>=5 deliveries) had increased likelihood of adverse outcomes: twice the likelihood of mal-presentation and a threefold higher prevalence of meconium-stained liquor and placenta previa compared with lower-parity women even when adjusted for age. Neonates delivered by grand multiparous women (12.1%) were at three-time greater risk of a low Apgar score compared with (5.4%)lower-parity women (Odds ratio (OR), 2.9; 95% confidence interval (CI), 1.5–5.0). Grand multiparity remains a risk in pregnancy and is

associated with an increased prevalence of maternal and neonatal complications.[81] Our qualitative findings showed respondents agree in majority with young age less than 15 years and advanced age greater than 40 years especially in the presence of multiple pregnancies leading to bad pregnancy outcomes especially hypertension and seizures.

A case control study shows findings on multiparity and increased risk of adverse pregnancy outcomes. Grand-multiparity was associated with a significantly higher risk of iron deficiency anemia, diabetes mellitus, ante-partum hemorrhage, postpartum hemorrhage and a high perinatal mortality rate. Grand-multiparas are a high-risk obstetric group of patients liable to develop a number of ante-partum and intrapartum complications with adverse neonatal outcome.[82] although the outcomes of interest vary an increased number of pregnancies is associated with negative outcomes of pregnancy. Qualitative findings also showed women with high parities are believed to have a higher chance of having pregnancy and delivery complications than those with lower parities.

The pattern of early age at first pregnancy, multiparity and prolonged reproductive period extending into the late 30s seen in our study is characteristic of a study on multiparity in rural India: Rural residents comprised 60.4% of the grand-multiparous group versus 27.7% of the control group. A predominance of early marriage as well as an older age profile was noted in the grand-multiparas. ANC attendance was documented to be much lower among grand-multiparas with 26.4% having absolutely no antenatal care. A higher frequency of hypertensive disorders in pregnancy, multiple pregnancy, and premature rupture of membranes, postpartum haemorrhage and retained placenta was noted in the grandmultipara.[83]

The major pattern of ante-natal care attendance (ANC) is to start greater than 4 months gestation seen in 84.06% of cases and 68.12% of controls. This is also a risk factor for negative outcome

in various studies. Findings from FGDs also show most women start antenatal care late, attend ANC inconsistently and do not obtain such care in all pregnancies. The ANC obtained is therefore usually delayed and sporadic and misses the crucial recommended first visit <16 weeks used to screen and implement preventive and future management plans for identified risk factors for adverse outcomes in pregnancy. The monthly income ranged from less than 5,000 naira to greater than 15,000 naira among both cases and controls; there are no significant differences in income between the two groups. Data on multiple pregnancies among young females with no formal education agrees with findings which show poverty and decreased educational engagement being associated multiple pregnancies and inter-pregnancy intervals of < 6 months. This confers a two-fold risk of pre-term delivery and early pregnancy losses.[45-47] only 2.90% of cases currently have abnormal blood pressures. The distribution of adverse outcomes showed: Hypertension 16 (23.19%) and miscarriages 53 (76.81%). Qualitative findings though indicating a belief that a woman's personal income can improve her pregnancy outcomes was unable to substantiate the effect of income groups on pregnancy outcomes in this community due to the homogenous nature of income earned among both cases and controls.

Qualitative findings showed no history of pre-conceptional care or counseling received from health personnel or facilities among respondents. The majority identified hypertension, bleeding and eclampsia as the commonest adverse outcomes in the community. Absence of preconception care and counseling results in failure of Primary preventive measures used to identify relevant risk factors and institute timely interventions such as treatment of co-morbities and dietary modifications. This has been shown in regional studies to result in negative outcomes. Findings from a facility based study of 236 women with no preconception care or counseling showed: 36.4% of pregnancies had unfavorable outcomes. [84] The presence of an existing Traditional ante-

natal care due to the pattern of late presentation for first visits i.e. greater than 4 months of gestation is inadequate to substitute a lack of pre-conception screening.

Risk factors found significantly associated with adverse outcomes in this study are: Height <1.5 meters (OR 0.2; 95% CI 0.1-0.7), Commencement of Ante-natal care < 4 months (OR: 0.4; 95% CI 0.2-0.99) and Number of pregnancies > 4 (OR: 5.6; 95% CI 2.6-12.6). Multivariable logistic regression analysis to evaluate adjusted odds ratios (AORs) of risk factors according to age-groups after adjustment gave the following findings: ANC attendance < 4 months (OR: 0.32; 95% CI 0.12-0.81) and Number of pregnancies > 4 (OR: 5.02; 95% CI 1.97-12.82).

Based on the data above it is clear that the significantly associated factors in this community can be prevented by behavioral modifications. Early antenatal visits and utilization of family planning services to reduce frequent pregnancies will greatly improve pregnancy outcomes. This agrees with the new model of ante-natal care and its manual recommended by the World health organization (WHO) requiring 4 antenatal visits .The first should be in the first trimester, 75% of women at low risk of complications are recommended for this focused ante-natal care proven to prevent adverse outcomes by numerous descriptive studies. This also agrees with research which reveals only 60.1% of mothers received ANC from a trained health provider. Utilization of ante-natal care is lower among teenage mothers compared with older women, and teenagers are likely to have received no ante-natal care at all.[80] Based on the data on age distribution above, majority of our cases are teenagers which may account for the late commencement of ante-natal care services.

These findings agree with a study to ascertain the influence of antenatal care on pregnancy outcome. Results showed that majority of the subjects attended antenatal care in the 3rd month and 4th month of pregnancy. Eleven percent of the women attended <4 ANC visits. In an

unadjusted model, these women had an increased likelihood of experiencing an adverse outcome (OR 2.27; 95 % CI 1.30-3.94; p = 0.0038). High parity (>5 children) was also associated with adverse birth outcomes. Pregnant women who received antenatal care and were on multivitamin and mineral supplements for more than 5 months had better outcomes. After adjusting for confounders, attending <4 antenatal visits was associated with adverse pregnancy outcome compared with ≥4 ANC visits (Adjusted OR 2.55; 95 % CI 1.16-5.63; p = 0.0202). Attending <4 antenatal visits and high parity were associated with adverse pregnancy outcomes for uncomplicated pregnancies. It was concluded that early antenatal care is crucial to favorable outcome of pregnancy in this population.[85]

The findings on Body mass index (BMI) are in concordance with a study in south-eastern Nigeria on the prevalence and characteristics of obesity in pregnancy. Obesity was significantly more prevalent among women residing in urban areas. Also with a National prevalence of Obesity currently at 8% based on data from facility based studies, an elevated BMI is not an expected risk factor for a rural community. Early age at first marriage and extended reproductive period into >40s have been implicated in deliveries in an advanced age bracket.[71-73] This accounts for the low average ages of our respondents at first pregnancies, multiple pregnancies and high ages at last pregnancies. Age < 35 years being protective agrees with studies which found older women > 35 years were 4 times more likely to die than younger women and develop conditions such as hypertension, hemorrhage and embolism in pregnancy.[86] Maternal deaths were significantly more among multiparous women with eclampsia than primigravidae in a study on hypertensive disorders of pregnancy.[30]

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

From the information obtained in this study: There was an absence of Pre-conception care and counseling from health care personnel to study subjects. The risk factors significantly associated with adverse pregnancy outcomes are; number of pregnancies ≥4 and early commencement of antenatal care <4 months. These outcomes did not have a significant effect on current maternal health status as ill-health was not peculiar to cases neither were health conditions related to the outcomes studied.

The study also showed respondents have adequate knowledge on the effect of known risk factors for negative outcomes of pregnancy. The inability to make their own health based decisions and a lack of adequate and well equipped health facilities have maintained the status quo i.e. poor state of maternal health over time. They expressed a discernable willingness to learn relevant pre-conceptional information and practices. The identified risk factors might have been responsible for persistent adverse outcomes, but the cultural embargo on gender equity coupled with low socio-economic status and lack of formal education is enabling the problem.

6.2 Recommendations

Due to the above findings, preventive measures are necessary to improve the outcomes of pregnancy in this rural community. The following recommendations are therefore made:

The State Government:

1. Introduce reproductive and conception health training in the district secondary schools. To enable young Girls who marry prior to completing secondary education have basic knowledge on how to stay healthy while pregnant.

2. Improve drug supply and upgrade maternal health and family planning services at the rural hospital.
3. Introduce training of healthcare personnel and their trainers in pre-conception care and counseling to enable effective ‘’step-down’’ of training and service provision to rural communities.

The Local Government:

1. Strengthen periodic house to house visits by health care personnel to interact with women on health issues especially conception and pregnancy (outreach).
2. Establish and sustain regular community health talks on maternal health. Efforts should be made to arrange a suitable and secluded venue to enable the conservative female majority interact fully during sessions.
3. Design and distribute information materials in the local language on pre-conception care, pregnancy care and relevant delivery information.

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Plate 1: Focus group discussion (Teenagers)

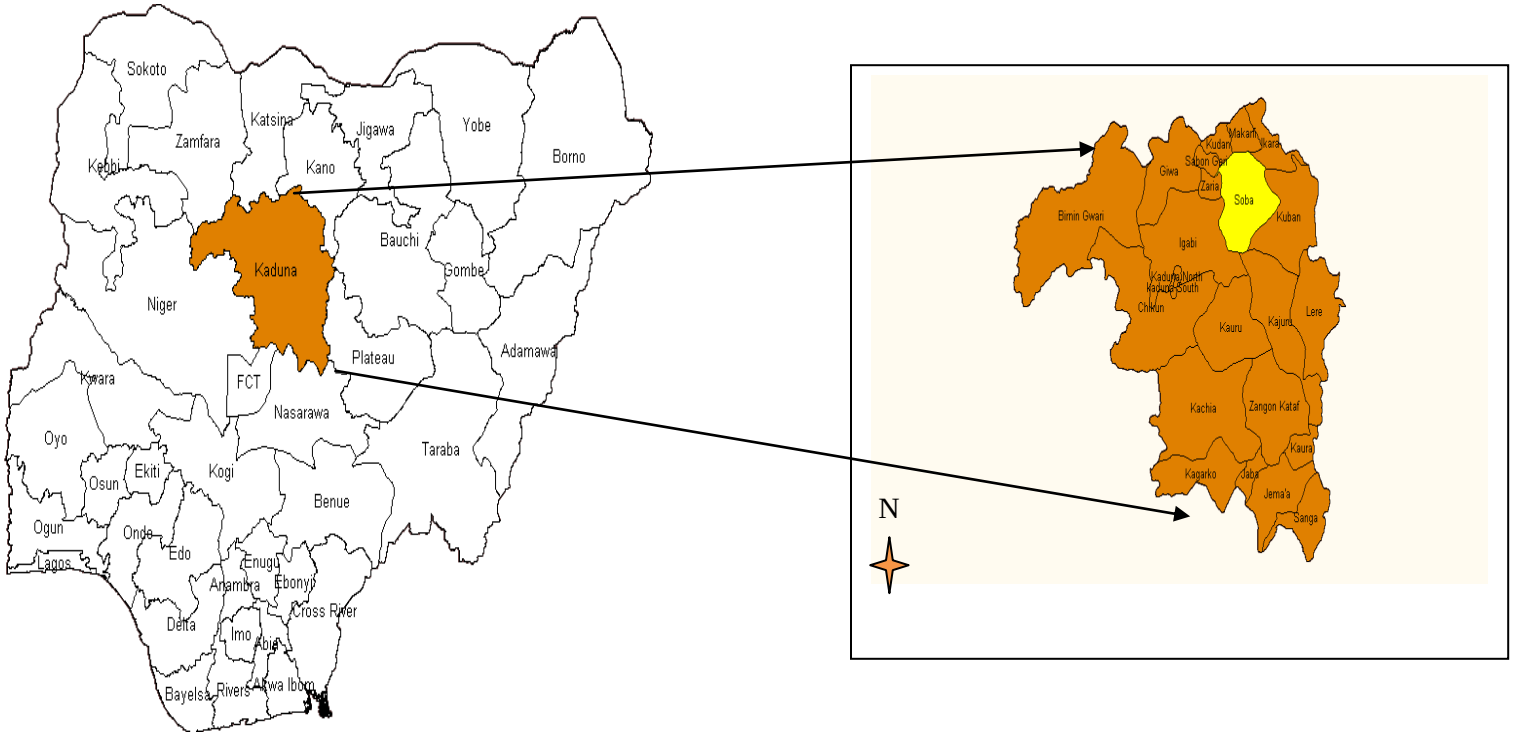
Plate 2: Quantitative Data collection

Plate 3: Focus group discussion (Mothers)

Plate 4: Data collection

APPENDICES

Appendix 1: Map of Nigeria highlighting Kaduna state and Soba L.G.A



Appendix 2

(CONSENT FORM)

My name is Dr Aishatu Abubakar-Sadiq, a Resident Doctor with the Nigeria Field Epidemiology Training programme (N-FELTP). I work with the Kaduna State Government; we are conducting a study titled: Risk factors associated with adverse pregnancy outcome in Soba Local government area. I will be grateful if you can participate as a respondent.

All that is required of you as a participant is to answer some select questions and if necessary have your weight and height measured. Everything you say will be confidential and anonymous- no one will know what you personally said, and we will only share the summary of your combined responses.

If you agree kindly sign in the space below, Participation is entirely voluntary. Refusal to participate will not affect you in any way. You should be willing to provide us with all the necessary information required from you in the course of the study.

The outcome of the study will be used to improve healthcare delivery to your community.

Thank you

Name of participant: Sign/ Thumbprint_____

Date: _____

Name of researcher Sign/Thumbprint_____

Date_____

Appendix 3

RISK FACTORS ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES

QUESTIONNAIRE

PERSONAL INFORMATION (SECTION A)

1. Identification number_____
2. Date_____
3. Status: Case ☐ Control ☐
4. Telephone number_____
5. Weight_____
6. Height_____
7. BMI_____
8. Age_____
9. Occupation: Civil servants ☐ Farmers Traders ☐ Craftswomen/artisans ☐ Unemployed ☐
10. Education level: Primary ☐ Secondary ☐ Tertiary ☐ Informal ☐
11. Marital status: Single ☐ Married ☐ Widowed ☐ Divorced ☐
12. Religion: Islam ☐ Christianity ☐
13. Tribe: Hausa ☐ Ibo ☐ Yoruba ☐ Other ☐
14. Are you a permanent resident in this village? Yes ☐ No ☐
15. Where do you receive treatment when sick? -Traditional healer ☐
    - Hospital/clinic ☐
    -Chemist ☐
    - Both ☐

SELECTED RISK FACTORS:

SECTION B

16. How old were you at your first pregnancy? _____

17. Was it a normal pregnancy? YES☐ NO☐

18. How old were you during your last pregnancy?_____

19. How many times have you been pregnant?_____

20. Have you ever had an abnormal pregnancy? YES ☐ NO ☐

21. If yes, what was the problem?_____

22. Have you ever been told you are overweight? YES ☐ NO ☐

23. Were you overweight or obese during any pregnancy? YES ☐ NO ☐

24. What was your level of education at marriage? Primary ☐

Secondary ☐

Tertiary ☐

Informal ☐

25. Are you currently employed? YES☐ NO ☐

26. If YES, what is your average monthly income? <5,000 naira ☐ 5,000-9,000 ☐ naira

10,000-15,000 naira ☐ >15,000 naira ☐

27. How many hours were you working daily while pregnant?_____

28. Have you ever received pre-conception care or counseling from a health professional?

Yes ☐ No ☐

PREGNANCY OUTCOMES OF INTEREST

SECTION C

29. Have you ever had a miscarriage? YES ☐ NO ☐

30. How many months pregnant were you?_____

31. Were you hypertensive during any pregnancy? YES ☐ NO ☐

32. Did you receive treatment? YES ☐ NO ☐

33. Were all your pregnancies booked at a health facility? YES ☐ NO ☐

34. If NO, which one was un-booked?_____

35. When do you normally commence Ante-natal (ANC)? : < 4months ☐ >4 months ☐

CURRENT HEALTH STATUS

SECTION D

36. Do you currently have any health problem? YES ☐ NO ☐

37. If YES, what health condition?_____

38. Are you currently receiving treatment? YES ☐ NO ☐

39. If YES, where do you receive treatment? Hospital/clinic ☐

Chemist ☐

Traditional ☐

Both ☐

Thank you for your participation

Appendix 4

FOCUS GROUP GUIDE

Target audience: Reproductive age women 15-49 years

Part 1: Introduction (5-10 minutes) statement of purpose, goals, informed consent

Introduce your-self, other observers and participants: We are doing some research on maternal health issues to help us serve the health needs of Nigerian women better. Researchers from the Nigerian government, WHO, CDC and other partner agencies are working on this project

Introduce format of focus group: Over the next 45 minutes we want to find out what you think about various health issues so we can design health education programs that fit your needs. We want everyone to feel free to say exactly what he or she thinks-there is no right or wrong answers

Everything you say here will be kept confidential and anonymous- no one will ever know your names

Please speak if you disagree with what is being said- we want lots of different ideas and opinions. We will start with general questions; answers will be written down and taped. Any questions before we start?

Start questions…

Question 1; what are the four most significant female health issues in your community?

1----------2----------

3----------4----------

You have listed some general ones; now I want you discuss some specific ones and how to prevent them.

Question 2: Are pregnancy related problems common in your community?

If yes, why……

If no, Why…….

Question 3; what do you think are the best way to protect against them

1……. 2…….

3…….

Question 4: Are you willing to have yourself or your female relations receive pre-conceptional counseling and testing?

If yes, why……..

If no, why not…….

Question 5: Are pregnancy induced hypertension and miscarriages a significant health problem in your community?

If yes, Why……

If no, Why not……

Question 6: Who in your community is at risk of PIH and miscarriages?

Answer……..

Question 7; what are the best ways to improve female health?

Answer…….

Question 8: Have you ever heard of genetic testing for babies?

If yes, where……..

Question 9: Do you attend Ante-natal for all your pregnancies?

If yes, why…….

If no, why not……

Question 10: Do you deliver all your babies in the hospital?

If yes, why……..

If no, why not……

Part II: Protective measures

There is a vaccine which protects against cervical cancer and saves life, also there are others which protects against some miscarriages and congenital anomalies

Question 11: If vaccine such as Human papilloma virus/ rubella vaccine and genetic testing and were provided free, would you take them?

If yes, why…….

If no, why not…….

Question 12: What do you think can be done to improve maternal health in your community?

Answer……

Part III: Legislation for health

Question 13; Do you agree with planned legislation to increase minimum age of marriage to 18 years?

If yes, why…….

If no, why not…….

Question 14: Do you think people in your community will accept limiting age of first marriage to 18 years?

If yes, why……..

If no, why not…….

Conclusion 15 minutes: Thank you for your participation. Your answers will remain confidential and help us to design health campaigns that better serve your needs.

Do you have any additional questions before we go? Record questions

Appendix 5

WORK PLAN

TASKS PERFORMED	2013												2014					
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
1.Finalized research proposal and submitted for clearance																		
2.Designed questionnaires and made copies																		
3. Obtained ethical clearance and informed ministry of health and local government.																		
4. identified and trained research assistants																		
5. pre-tested questionnaires																		
6.collected and entered data																		
7. Analyzed data and wrote report																		
8. Feedback, discuss and disseminate research findings.																		

Appendix 6

Ethical Clearance

MINISTRY OF HEALTH, KADUNA STATE

All Communications to be Addressed to:
THE HON. COMMISSIONER
Quoting Reference and Date
Tel: (062) 248084
(062) 248252

Independence Way,
P.M.B. 2014,
Kaduna.
Kaduna State, Nigeria

MOH/ADM/744/VOL.I/ **23rd September, 2013**

THE CHAIRMAN
SOBA LOCAL GOVERNMENT AREA
SECRETARIAT SOBA
KADUNA STATE

PERMISSION TO CONDUCT RESEARCH

I have been directed to convey the Ministry's approval to **Dr Aishatu Abubakar Sadiq,** a student of Nigeria Field Epidemiology and Laboratory training programme on the Topic: **"RISK FACTORS ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES AMONG REPRODUCTIVE AGE WOMEN IN SOBA LOCAL GOVERNMENT AREA KADUNA STATE, OF NIGERIA"** for the award of MPH. in Field Epidemiology.

It is expected that necessary assistance be accorded him/her in the process of the research, please.

However, it is mandatory for the researcher to submit a copy of his/her research finding(s) to the office of the Honourable Commissioner, Ministry of Health, as soon as it is concluded.

Accept the assurances of the Honourable Commissioner's highest regards.

F. A. KURAH (MRS)
SECRETARY, ETHICAL COMMITTEE