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Predictors of Poor Pregnancy Outcomes Among Pregnant Women in Island Maternity, Nigeria

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2019

Abstract

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by

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MBA, Webster University, 2010

BS, Columbia College, 2007

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Pregnancy outcomes have improved tremendously in developed countries. Notwithstanding, it is still a huge challenge in developing countries, especially Sub-Saharan Africa. In 2015 in Nigeria, about 145 women died daily from pregnancy-related causes. Similarly, nearly 2,300 children under 5 years were lost in the same year. Nigeria consistently underperformed in some of the critical pregnancy indicators such as maternal and neonatal mortality, second worst only to India in the world. Studies on poor pregnancy outcomes are scarce in Nigeria. The purpose of this quantitative, retrospective cross-sectional study was to use local evidence to ascertain the risk factors that predict poor pregnancy outcomes for women of childbearing age (15-49 years old) in Nigeria. The theoretical framework for this study was the social cognitive theory. Secondary data from 400 pregnant women from Island Maternity Hospital, Nigeria, was used for this study. Five central research questions were analyzed through univariate and multiple logistic regressions. The results indicated moderate to strong statistically significant associations between outcomes of last pregnancy, gestational age at delivery, mode of delivery, and the timing of antenatal care booking with maternal mortality, neonatal mortality, and low birth weight, even after controlling for other covariates. Findings from this study may foster positive social change by further enhancing the understanding of poor pregnancy outcomes, especially in Nigeria. It will help public health practitioners, policymakers, community leaders and other stakeholders to design strategies and interventions that will take advantage of cultural and religious norms and educational status of women of childbearing age in promoting reproductive health in Nigeria.

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Dedication

First and foremost, I dedicate this project to Almighty God for His protection, blessing, and guidance and, for making it possible for me to reach this height. To my late parents, Mrs. Helen Lelookubia Nwi-ue and Chief Apollos Serekara Nwi-ue for their unwavering support and for teaching me the real ABCs of life (Discipline, Integrity and Honestly). May their souls rest in perfect peace, Amen. Also, to my late grandmother Mrs. Barizorghe Waa Nwi-ue for always being there for me. Finally, to my brother Suanu, sister Leyii Nwi-ue and uncle Mr. Edward Nwi-ue for always seeing light in me, even in the darkest times, as well as to my wife Mrs. Angela Nwi-ue and my children Chamberlain, Desmond and Vanessa Nwi-ue for their motivation and tolerance for the countless absence and being passive from family activities to complete school assignments and projects.

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Chapter 1: Introduction to the Study

Introduction to the Problem

Globally, pregnancy and its associated poor outcomes such as maternal mortality (MM), neonatal mortality (NM), and low birth weight, are still a major public health concern. About 25% of maternal mortalities occur during pregnancy. This is likely due to unsafe abortion, violence, and diseases (World Health Organization [WHO], 2013). Nearly 830 women die daily from preventable pregnancy and childbearing related causes (WHO, 2016a). The global maternity mortality ratio continued to reduce by 2.3% annually between 1990 and 2015; Sub-Saharan Africa, Asia, and North Africa also witnessed similar reduction in maternity mortality ratio (WHO, 2016a).

However, in 2015 alone, it was estimated that 303,000 women died from pregnancy and childbearing related causes. Sub-Saharan Africa and South Asia accounted for nearly 88% of these deaths globally. The greater percentage of MM happened in Sub-Saharan Africa with 546 maternal mortalities per 100,000 live births translating to 201,0000 maternal deaths annually (WHO, 2017). In the same year (2015), NM was projected to be 2.7 million worldwide and stillbirth was 2.6 million (WHO, 2016a). Although it is noted that neonatal death accounted for approximately 45% of all deaths among children under the age of five, an estimated 75% of these neonatal deaths took place during the first seven days of life, with 25% to 45% occurring in the first 24 hours of life (WHO, 2016b). In 2016, 99% of total maternal deaths took place in developing countries, and only 1% occurred in developed countries. Disparities also exist in adverse pregnancy outcomes between rural and urban women, between communities

with different economic statuses, and between adolescent and older women (WHO, 2016a).

In 2015, in Nigeria, nearly 7,100,000 babies were born, translating to about 19,500 babies every day. Among these, approximately 660 babies died daily before their first month of life and another 859 were stillbirths (United Nation International Children Economic Fund [UNICEF], *n.d.*). In the same year, neonatal mortality rate (NMR) in Nigeria was estimated at 34 deaths per 1,000 live births. The NMR for rural and urban areas of Nigeria was estimated at 44 deaths per 1,000 live births and 34 deaths per 1,000 live births respectively. Among the Nigerian women with low socioeconomic status, the NMR was 45 deaths per 1,000 live births compared to 30 deaths per 1,000 live births among wealthy women in developed countries (UNICEF, *n.d.*). NM has been attributed to preterm birth, low birth weight, infection, and asphyxia. In Sub-Saharan Africa, neonatal deaths were estimated to be 1,026,860, of which Nigeria contributed 240,106 (WHO, 2016b; UNICEF, 2015).

According to UNICEF (2016a), about 145 women of childbearing age died daily of pregnancy-related causes in Nigeria in 2015. This is the second position globally after India for maternal and NM. Nigeria's NMR in 2012 was 39, while infant mortality for those less than 1 year was estimated at 78 (UNICEF, 2016b). Three years later, the NMR had reduced to 34, the infant mortality rate was 69, and the MM rate was 814 (UNICEF, 2015). It is also documented that for every maternal death, there were about 30-50 morbidities, either chronic or interim (Global One, 2015). An estimated 30%-40% of the nearly 180 million pregnant women worldwide on an annual basis reported some form of

pregnancy associated disabilities, and about 15 million reported some form of chronic illnesses from complications due to obstetric fistula, uterine scarring, severe anemia, pelvic inflammatory diseases, and infertility (Global One, 2015). Recent publications from the International Federation of Gynecology and Obstetrics (FIGO) also added that exposure to toxic chemicals in food, water, and air causes millions of deaths and costs billions of dollars and is responsible for poor pregnancy outcomes such as miscarriage and stillbirth in Nigeria (All Africa, 2015). It is also noted that the probability of women dying from pregnancy and childbirth in Nigeria is 1 in 13 (UNICEF, 2016a).

Worldwide, an estimated 30 million babies are born annually with low birth weight (LBW). LBW is considered a primary contributor to infant mortality, morbidity, and disability. The consequences of LBW extended beyond babies and childhood into adulthood (WHO, 2017). LBW inflicts considerable costs on the healthcare system and a huge burden on society in general (WHO, 2017). In 2013, about 22 million babies were born with LBW, roughly 16% of all infants born globally. This might not reflect the accurate figure of children born with LBW as the majority of babies born worldwide were not weighed at birth (UNICEF, 2016b). However, it is documented that South Asia has the highest number of LBW babies, where nearly one in every four newborns weighed less than 2,500 grams, followed by Sub-Saharan Africa (13%). In Nigeria, between 2009 and 2013, 15% of infants were born with LBW (UNICEF, 2014; UNICEF, 2016b).

Sub-Saharan Africa, including Nigeria, continuously experiences maternal deaths, NM, LBW, and related morbidity and disability compared to most other countries in the

world, except India (Ezeh, Agho, Dibley, Hall, & Page, 2014; Mojekwu & Ibekwe, 2012). It is also documented that the lifetime risk of maternal death in Sub-Sharan Africa is 1 in 36 compared to 1 in 3,300 in the high-income countries. The increased risk in the African region is attributed to limited access to and low quality of maternal health services (Fawole et al., 2012; UNICEF, 2017). MM occurred due to lack of antenatal care, low level of education, and abortion (Odeyemi et al., 2014; Yilgwan, Hyacinth, & Utoo, 2012). In addition, short intervals between pregnancies for babies born to mothers younger than 20 years, as well as babies born to mothers who reside in rural areas are considered risk factors for NM in Nigeria (Ezeh, et al., 2014). The above research underscored the need for a study that will independently predict the factors that contribute to poor pregnancy outcomes in Nigeria. Knowing these factors will help public health practitioners, policymakers, community leaders and other stakeholders to design strategies and interventions that will promote reproductive health in Nigeria.

Background for the Study

Poor pregnancy outcomes such as MM and related disability, as well as LBW and NM, pose public health challenges in Nigeria (Kana, Doctor, Peleteiro, Lunet, & Barros, 2015). In 2015, MM rate was 814 per 100, 000 live births, stillbirths' rate was 43 per 1,000 total births, and NMR was 34 per 1,000 live births. In 2010, the preterm birth rate was 12.2 per 1,000 (UNICEF, *n.d.*). Worldwide, about 80% of maternal deaths are due to four principal factors: infection, severe bleeding, hypertension, and obstructed labor. Complications from abortion contribute 13% of maternal deaths (Mojekwu & Ibekwe, 2012). Secondary causes include HIV/AIDS, anemia, sickle cell anemia, meningitis,

malaria, hepatitis, and anesthetic death (Mojekwu & Ibekwe, 2012). Furthermore, MM in developing countries including Nigeria is a reflection of the lack of development in these cultures (Fawole et al., 2012).

LBW in Nigeria presents an economic and financial challenge to the family. To care for LBW babies in Nigerian societies, from birth to discharge from the hospital costs an estimated $211.10 to $1,573.90. The direct median cost of care is between $80 to $105.5 US dollars. This translates to 22.8% to 3,966.3% of the collective income of affected families. This level of spending is relatively high considering the nature of the Nigerian economy and the financial situation of affected families (Tonga, Orimadegun, Ajayi & Akinyinka, 2009). LBW has been considered a strong determinant of infant morbidity and mortality (Dahlui, Azahar, Oche, & Aziz, 2016). According to Dahliu et al. (2016), improving LBW in Nigeria required increasing antenatal care services through a sophisticated technique that includes health education, maternal nutrition, and increased socioeconomic indicators. A history of LBW, bleeding in pregnancy, and preterm rupture of membranes were significantly associated with LBW as well as increasing the odds of LBW deliveries in Nigeria (Awoleke, 2012). Other risk factors for LBW in Nigeria include malaria and its related complication in pregnancies, maternal education, and socioeconomic status (Ukibe, et al., 2014; Yilgwan, et al., 2012).

Nigeria is second to India in NM, worse than most other Sub-Saharan African countries (Ezeh, et al., 2014). Nearly 700 newborns die daily in Nigeria. Some of the dominatant factors that contribute to NM in Nigeria include infections, the gender of the neonate, newborns delivered through caesarean section, neonates born to mothers

younger than 20 years old, mother residing in rural areas of Nigeria, and a short interval between pregnancies (Ezeh, et al., 2014).

Most of the factors that contribute to MM, NM, and LBW in Nigeria are preventable (Fawole et al., 2012; UNICEF, 2016a; WHO, 2016b). However, Nigeria has consistently performed poorly compared to other Sub-Saharan African countries such as Ghana and Uganda (Ezeh, et al., 2014). One of the common problems in Nigeria is a lack of local research to generate indigenous evidence that will take into account the cultural and religious traditions, the socioeconomic position of Nigerian women and their ethnic background, and the level of infrastructure development. A systematic review of published literature in Nigeria from 1990-2014 showed the need for more maternal and child intervention research in Nigeria to generate relevant local evidence (Kana et al., 2015). Piane (2008) also highlighted the dearth of research evidence in Sub-Saharan Africa including Nigeria, and most studies that investigated poor pregnancy and its related outcomes demonstrated inconsistencies in their findings. For example, Awoleke (2012) reported no significant association between LBW and maternal age, parity, maternal height, the level of education, and occupation. However, Dahlui et al. (2016), Yilgwan et al. (2012) and Ukibe et al. (2014) found significant associations between LBW and maternal age, maternal height, parity, occupation, education, and socioeconomic status.

The primary focus of this study was to provide local evidence that will help advance knowledge in this field. The majority of data on pregnancy-related outcomes and interventions have come from developed countries with effective healthcare systems,

developed infrastructure, adequate resources, and functional health care policies. Indigenous research is needed that is cognizant of the cultural, religious, ethnic, and socioeconomic backgrounds of women of reproductive age in Nigeria. This will help to generate local evidence to better understand why Nigeria consistently underperformed on MM and its related morbidities, NM, and LBW compared to other African countries.

Studies have demonstrated that prior history of poor pregnancy outcomes may likely result in adverse pregnancy outcomes in a subsequent pregnancy (Mahande & Mahande, 2016; Ouyang et al., 2013). Furthermore, this study provided new information that public health practitioners, policymakers, community leaders and other interest groups could use to develop culturally and religiously appropriate interventions and strategies that would help increase positive pregnancy outcomes in Nigeria. It will also assist the Nigerian government in working towards achieving the United Nations Global Strategy for Women, Children's, and Adolescents' Health, 2016-2030 (WHO, 2016b). The declaration strives to end all preventable deaths of women, children, and adolescents by the year 2030 (WHO, 2016b).

Problem Statement

Research studies have provided substantial evidence about the predictors, mediators and, other factors of poor pregnancy outcomes in other parts of the world. However, such research evidence is lacking in Nigeria. For instance, the recent systematic review of published literature in Nigeria from 1990-2014 concluded that there is a need for more maternal and child intervention research in Nigeria to generate locally relevant evidence (Kana et al., 2015). In addition, the few studies that focused on poor

pregnancy outcomes have not adequately addressed the history of previous pregnancy outcomes and some of the underlying factors that contribute to poor pregnancy outcomes such as mode of delivery and preterm birth (Fawole et al., 2011; Mojekwu & Ibekwe, 2012). This highlights the need for indigenous studies that will generate local evidence and sufficiently account for these factors to better understand why Nigeria consistently underperformed on MM and its related outcomes, NM, and LBW compared to most African countries.

The use of a hospital database helped provide the avenue to determine the factors that independently predict MM, NM, and LBW. Such information will contribute to addressing the discrepancies or mixed findings that existed in pregnancy-related studies in Nigeria. Also, this study has the probability of advancing knowledge in this area by adequately addressing the history of previous pregnancies and providing new information that will improve pregnancy outcomes for all women of childbearing age in Nigeria.

Nature of the Study

This study was a quantitative, cross-sectional retrospective design using secondary data. It determined the association between the following independent variables, outcomes of last pregnancy, gestational age at delivery, mode of delivery, the timing of antenatal care, number of antenatal cares received, and socioeconomic factors and the dependent variables of poor pregnancy outcomes such as MM, NM, and LBW. The research study used secondary data from Island Maternity Hospital, Nigeria. Permission to use the data was obtained from Walden University Institutional Review Board (IRB) and the Administrative Office of Island Maternity, Nigeria.

The use of a quantitative cross-sectional retrospective approach in examining the predictors of poor pregnancy outcomes aligns with the core assumption of the theoretical framework of the study discussed below, which explains how people acquire and maintain particular behavioral patterns and at the same time provides intervention methods. Effective behavioral change depends on the environment, people, and behavior (Glanz, Rimer, & Viswanath, 2008).

Purpose of the Study

The goal of this cross-sectional retrospective study was to examine the factors that independently predict poor pregnancy outcomes such as MM, LBW, and NM in Nigeria. Studies conducted in Nigeria have shown an association between sociocultural factors, inadequate health care, and social disparities with poor pregnancy outcomes (Fawole et al., 2011). Nevertheless, there is a gap in the literature in Nigeria that warrants testing other variables such as gestational age at delivery, mode of delivery, last pregnancy outcomes, timing of booking, and the number of antenatal care services received and confounding variables that mediate or indirectly contribute to poor pregnancy outcomes. Knowing the mediators or predictors of poor pregnancy outcomes will help improve reproductive health and pregnancy outcomes for women of childbearing age in Nigeria.

Theoretical Framework

I employed the social cognitive theory (SCT) to assess the predictors of poor pregnancy outcomes (Miller & Dollard, 1941). This theory was first developed by Miller and Dollard (1941) and was initially known as social learning theory. However, Bandura (1997) advanced the theory by incorporating concepts from psychology and renamed it

SCT (Glanz et al., 2008). SCT is widely used in social science research, especially in public health for program intervention, assessment, and evaluation (Wilson, 2012). This theory assumes that the interchange of personal factors, behavior, and environmental factors help impact or shape human behavior. SCT further highlights the abilities of people to amend or build their desired environment through the knowledge of collective actions (Glanz et al., 2008). The theoretical framework provides the following primary concepts: (a) reciprocal determinism, (b), outcomes expectation, (c) self-efficacy, (d) collective efficacy, (e) observational learning, (f) incentive motivation, (g) facilitation, (h) self-regulation, and (i) moral disengagement, which was tailored in this study to explain the relationship between mode of delivery, gestational age of delivering, outcomes of the last pregnancy, timing of booking and number of antenatal care services received, and socioeconomic factors, and poor pregnancy outcomes such as MM, NM, and LBW (Glanz et al., 2008).

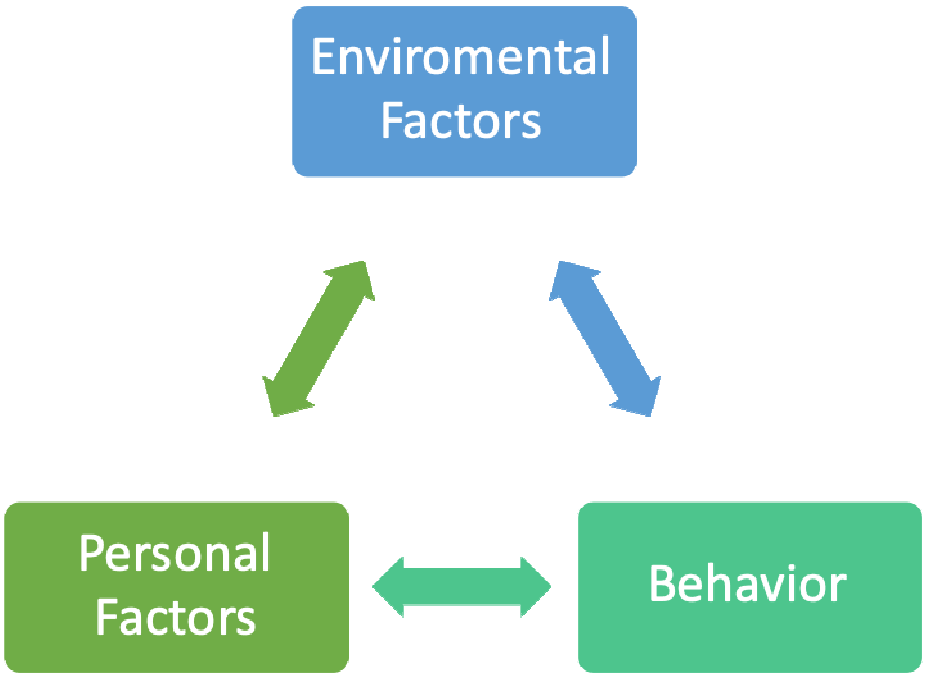

Figure 1: SCT demonstrated.

Reciprocal determinism assumes that behavior can be amended in several ways through interaction with people and the environment, either through changing the personal attitude or making a modification to the environment. In this research, this implies that individual demographic factors such as cultural and religious beliefs, age, female empowerment, socioeconomic factors (education, income, and occupation), and environmental factors, which include availability of health facilities and health professionals, and affordability of care can be influenced to help expectant mothers make positive behavior changes such as early booking and selection of skilled antenatal care to help select the appropriate mode of delivery based on the situation (Glanz et al., 2008; Wilson, 2012). Such positive behavior modifications will translate to improving pregnancy outcomes in Nigeria.

Outcome expectation is the anticipated outcome of a behavioral choice or model leading to positive outcomes of healthful behavior. In this research context, every pregnant woman expects a positive pregnancy outcome, which is paramount to personal factors such as early antenatal booking, use of antenatal services and proper nutrition to reduce chances of preterm delivery, adherence to medical advice and instruction to mitigate history of poor pregnancy outcomes, and the use of skilled professional attendants during vaginal delivery

Self-efficacy is the capability or confidence in a person's own ability to take action and overcome obstacles. The concept of self-efficacy is task-specific; either increase or decrease depends on the task. In this research, self-efficacy refers to the

ability of a pregnant woman to take a concrete step or action towards improving her pregnancy outcomes. For example, such steps include not becoming pregnant until after 20 years of age, avoiding unwanted pregnancy and unnecessary abortion, booking early for antenatal care services when pregnant, using trained professionals during labor, and using dietary supplements and proper nutrition to reduce the chances of preterm delivery. Taking such steps during pregnancy and in the postnatal period will improve pregnancy outcomes (Glanz et al., 2008; National Cancer Institute, 2005; Shorey, Chan, Chong, & He, 2015; University of Twente, *n.d.*).

Collective efficacy implies the capability or confidence of groups or communities to become involved in bringing about the desired change. In this research, desired behavior changes to reduce MM, NM, and LBW to improve pregnancy outcomes in Nigeria can be accomplished through collective actions of community members by promoting and educating pregnant women and women of childbearing age on the importance of early booking and the use of antenatal care services, hospital facilities, and skilled attendants during labor and delivery. Instead of utilizing untrained personal or delivery at home, collective actions of the community can also include educating pregnant women and women of childbearing age on how to cut across ethnic, religious, and cultural barriers to embrace modern medicine. Likewise, governments at all levels can bring about the desired changes by developing and implementing appropriate interventions and policies that will be tailored toward positive behavior changes, thereby improving pregnancy outcomes for women of reproductive age in Nigeria (Glanz et al., 2008).

Observational learning suggests that behavior can be acquired by observing or watching the actions and outcomes of the behavior of others or the behavior of a role model. In this research context, several behaviors that increase the risk of poor pregnancy outcomes can be overcome by allowing pregnant women or women of childbearing age to observe the actions and outcomes of other women who have successfully changed their behaviors and improved their pregnancy outcomes. Therefore, an aggressive health campaign, education, and promotions featuring women who have adjusted or modified their behaviors and improved outcomes would motivate other pregnant women or women of reproductive age to do the same (Glanz et al., 2008; NCI, 2005; University of Twente, *n.d.*).

Incentive motivation involves the use of rewards and punishments to amend behavior. Studies conducted in Nigeria had demonstrated that women who reside in rural areas in the northwest region and those with lower socioeconomic status, some cultural and religious barriers, and less than 20 years of age are consistently noted for poor pregnancy outcomes (Awoleke, 2012; Fawole et al., 2011; Yilgwan et al., 2012). To improve pregnancy outcomes for these women, local, state, and federal governments as well as community programs need to provide incentives and rewards. For example, cash assistance, transportation services to and from the hospital for antenatal care related services, skilled attendant home visits during pregnancy and postnatal period, provision of vitamin and other nutritional supplements, and educational programs that help reduce MM, NM, and LBW and improve pregnancy outcomes for these women (Glanz et al., 2008).

Facilitation indicates provision or availability of resources, tools or changes within the environment that foster behavioral change. Resources can be provided through knowledge and skill-based training intervention programs aimed at improving the socioeconomic status (education, income, and occupation) of reproductive age women. Furthermore, childbearing age women could be empowered to foster an environment where they can strive to make an independent decision regarding their reproductive health, such as when to get pregnant, the number of children to bear, use of contraceptives for proper spacing of pregnancies, and to become pregnant only after 20 years of age (Glanz et al., 2008).

Self-regulation or self- control implies self-monitoring, setting goals, self-reward, accepting feedback, self-instruction, and seeking social support when necessary. In this context, it implies reproductive age women setting personal goals of when to becomes pregnant, the number of children to bear, and the use of contraceptives for adequate spacing of children. Such realistic goal setting and monitoring to ensure the success desired will improve pregnancy outcomes and reduce MM, NM and LBW among childbearing age women in Nigeria (Glanz et al., 2008; University of Twente, *n.d.*).

Moral disengagement indicates the process of thinking relating to dangerous behavior. A person can learn the moral standard for self-regulation, and violation of this moral standard is considered moral disengagement (Glanz et al., 2008). In this research context, engaging in a moral standard for self-regulation involved pregnant women or women of childbearing age engaging in healthy behaviors such as avoidance of alcohol, smoking, and use of illegal drugs or entirely abstain from behaviors that will be harmful

to fetuses. This includes the use of antenatal care services, early booking, and the use of skilled personnel during labor and delivery, all of which will help minimize fatal pregnancy outcomes.

I used the SCT theoretical model to explore the process of interaction between personal and environmental factors that shape the behavior of reproductive age women and how it influences pregnancy outcomes. In this study I used secondary hospital data from May, 2015, to June, 2017, to determine the predictors of poor pregnancy outcomes among Nigerian women in relation to SCT and how that influenced the behavior of women of childbearing age (15-49 years).

Definition of Terms

Socioeconomic status: The social position of a group or individual, usually measured through the sequence of education, income, and occupation (American Psychological Association, 2016)

Low birth weight (LBW): The weight of a baby born weighing less than 5.5 pounds 8 ounces (March of Dimes, 2014).

Preterm delivery/birth: Delivery of a newborn baby between 20 and 37 weeks of gestation (American College of Obstetricians and Gynecologist, 2013).

Preterm labor: Labor starting with contraction of the uterus before 37 weeks of pregnancy, and often resulting in preterm birth (American College of Obstetricians and Gynecologists, 2013a).

Cesarean delivery: Deliveryof a newborn baby through surgical operation or procedure (American College of Obstetricians and Gynecologists, 2012).

Poor pregnancy outcome: Classified as pregnancy complications, illness or injury, MM (death), infant morbidity, and infant mortality (Centers for Disease Control and Prevention [CDC], 2014).

Stillbirth: Infant born with no life signs after nearly 24 weeks conception (March of Dimes, 2015b).

Infant mortality: Death of infant that occurred within the first 12 months after birth (American Academy of Pediatrics, 2011).

Maternal mortality (MM): Death of a mother immediately after or during delivery (American College of Obstetricians and Gynecologists, 201d).

Neonatal Mortality Rate (NMR): The proportion of newborns who died within the first 28 days of life per 1,000 live births (WHO, 2017).

Life time Risk: A woman's risk of dying or the probability that a 15-year-old girl dies due to the complication of pregnancy and childbirth over her lifetime (WHO, 2017).

Assumptions

I assumed that the Island Maternity Hospital data was free of or contained reduced random or systematic error or an instrumental error through the use of suitable sampling techniques. However, the sample data set may still be vulnerable to error.

Strengths and Limitations

The Island Maternity Hospital data were collected through uniform prevalidated data collection instruments (WHO, 2010). Secondary data presents several advantages for researchers. It is cost effective, less time consuming, and above all, easy to generalize due to large sample sizes with true representation of the local population and with lower risk

to the study subjects (Aponte, 2010; Doolan & Froelicher, 2009; Smith et al., 2011) Additionally, the larger sample size and true representation of the target population subgroups increases the study precision, as well as its external and internal validity (Carlson & Morrison, 2009).

As is the case with most studies, this study was not without limitations. Retrospective cross-sectional studies are useful in providing first-hand assessment information and in setting the stage for prospective studies. They also contain several shortcomings, such as only demonstrating an association between outcome variables and independent variables, and not causality. Secondly, such studies only determine the prevalence of the outcomes and not the incidence (Carlson & Morrison, 2009). Another limitation of the study was not being able to assess all outcome variables. For instance, small or large infant size for gestational age and premature birth were not assessed in this study, even though socioeconomic factors may impact these outcomes. I used the Statistical Package for Social Sciences (SPSS) version 25, Walden University edition to maneuver the variables of the raw data set and to compensate for the inherent deficiencies associated with the use of secondary data and cross-sectional study designs,

Delimitations

The scope of this study is limited to women of reproductive age 15-49 years old. This age group was chosen to enable me to assess information on relevant subgroups that are of interests, such as the adolescent age, reproductive age, and advanced age. Specifically, the adolescent age group and advanced age group are important as studies consistently recognized these subgroups as the most vulnerable to adverse pregnancy

outcomes. The scope is further limited to women who attended or obtained antenatal care services through Island Maternity Hospital, Nigeria, and delivered a singleton, regardless of the outcomes of the pregnancy (live/die).

Research Questions

RQ1: What is the association between outcomes of last pregnancy and MM, LBW and NM in Nigeria?

$H_0$1: There is no statistically significant association between outcomes of last pregnancy and MM, LBW and NM in Nigeria

H_a1: There is a statistically significant association between outcomes of last pregnancy and MM, LBW and NM in Nigeria

RQ2: What is the association between gestational age at delivery and MM, LBW and NM in Nigeria?

$H_0$2: There is no statistically significant association between gestational age at delivery and MM, LBW and NM in Nigeria?

H_a2: There is a statistically significant association between gestational age at delivery and MM, LBW and NM in Nigeria.

RQ3: What is the association between mode of delivery and MM, LBW and NM in Nigeria?

$H_0$3: There is no statistically significant association between mode of delivery and MM, LBW and NM in Nigeria.

H_a3: There is a statistically significant association between mode of delivery and MM, LBW and NM in Nigeria

RQ4: What is the association between timing of booking of antenatal care and MM, LBW and NM in Nigeria?

$H_0$4: There is no statistically significant association between timing of booking of antenatal care and MM, LBW and NM in Nigeria.

H_a4: There is a statistically significant association between timing of booking of antenatal care and MM, LBW and NM in Nigeria.

RQ5: What is the association between the number of antenatal care services received and MM, LBW and NM in Nigeria?

$H_0$5: There is no statistically significant association between the number of antenatal care services received and MM, LBW and NM in Nigeria.

H_a5: There is a statistically significant association between the number of antenatal care services received and MM, LBW and NM in Nigeria.

Significance of the Study

There is lack of adequate literature on poor pregnancy outcomes in Nigeria. This study contributed to the existing literature by focusing on the predictors of MM, LBW, and NM. Nigeria continuously records higher rates of maternal deaths, LBW, and NM compared to other countries in the world, except India (Ezeh, et al., 2014; Mojekwu & Ibekwe, 2012).

The challenges and impacts of MM and its related outcomes are enormous for the family, community, and the nation at large. Families that experienced maternal death are often forced to liquidate their assets and borrow money to settle incurred hospital and funeral costs. Most families spend nearly one-third of their yearly per capita expenditure

on health care access during pregnancy and delivery (Kes et al., 2015). After maternal death, the husband, mother-in-law, or relative assumes the responsibility for most of the tasks performed by the deceased (Pande et al., 2015). The surviving children are often confronted with financial hardship, dropping out of school, forced into farm labor, suffering malnutrition, and experiencing early partnership or pregnancy (Bazile et al., 2015; Molla, Mitiku, Worku, & Yamin, 2015). In order to address these challenges and to reduce the economic and financial burden on family and the community as a whole, an aggressive, comprehensive educational campaign is required that will tailor resources to children who are affected (who have experienced MM) and at the very least guarantee nutritional adequacy and continuation of education and housing. These steps can help reduce some of the physiological, psychological, economic, and financial pains associated with adverse pregnancy outcomes, specifically, maternal and neonatal death, as well as related morbidities.

Implications for Positive Social Change

This study has the possibility of further enhancing understanding of poor pregnancy outcomes in Nigeria. It will help public health practitioners, policymakers, community leaders, and other stakeholders design strategies and interventions that will take advantage of the cultural and religious norms and educational status of women of childbearing age in promoting reproductive health in Nigeria.

Organization of the Dissertation Chapters

For clarity and recognition, the study contains five chapters. Chapter 1 offers an overview of the scope of MM, NM and LBW at the national, regional, and global levels

that generated the research questions and hypotheses. Chapter 2 provides a systematic review of the existing literature on the research topic indicating the strengths and weaknesses that warrant further studies to address some of the recognizable literature gaps. Chapter 3 contains the methodology that I used to answer the research questions and hypotheses. Chapter 4 provides information on the findings of the research questions and hypotheses. Finally, Chapter 5 offers the discussion, conclusions, and recommendations of the findings.

Chapter 2: Literature Review

Overview

As noted earlier, indigenous research to generate local evidence is limited in Nigeria, including those that adequately addressed previous pregnancy outcomes and relevant confounding variables. Furthermore, there are inconsistencies in findings regarding some of the pregnancy outcomes, for example, LBW (Kana et al., 2015). This underscored the need for indigenous studies that would address those factors. The focus of this study was to examine the risk factors that independently predict or mediate poor pregnancy outcomes for pregnant women in Nigeria. This study also provided strategies that may reduce the incidence of poor pregnancy outcomes.

Sub-Saharan Africa is noted for poor pregnancy outcomes. In Nigeria, nearly 2,300 of infants and children of less than 5 years old died daily, as well as 145 women of reproductive age. This makes Nigeria one of the highest contributors to NM, MM and LBW in the world (UNICEF, 2016a). The risk of dying from pregnancy and childbirth in Nigeria is 1 in 13 (UNICEF, 2016a).

The Strategy Used in Literature Search

The review of the literature consisted of articles on sociodemographic, socioeconomic, lifestyle, and behavioral factors. It also included studies on existing medical/obstetric conditions, environmental factors, history of adverse pregnancy outcomes, and infectious and sexually transmitted diseases, as well as how each of these factors independently predicts or mediates poor pregnancy outcomes. The literature review articles were retrieved from the Walden library databases that included Academic

Search Complete, CINAHL Plus with full text, ProQuest Health, PubMed, and Nursing and Allied Health Source. Also, I used Google Scholar, Centers for Disease Control and Prevention website, the World Health Organization website, and the United Nations International Children Economic Fund websites. Specific keywords used in retrieving the review articles included:

- *predictors of poor pregnancy outcomes,*
- *pregnant risk factors,*
- *poor pregnancy outcomes,*
- *adverse pregnancy outcomes,*
- *pregnancy outcomes,*
- *predictors of adverse pregnancy outcomes,*
- *preterm birth,*
- *low birth weight,*
- *stillbirths,*
- *cesarean labor and delivery,*
- *spontaneous abortion,*
- *alcohol and illicit drug use (before and during gestation),*
- *social cognitive theory and pregnancy outcomes,*
- *maternal mortality,*
- *maternal death,*
- *antennal care and pregnancy outcomes,*
- *neonatal mortality,*

- *newborn death,*
- *neonatal death,*
- *infant mortality,* and
- *infants in death.*

The articles used in this literature review were limited to articles published in the last 5 years, and I selected them based on the applicability of contents to the research topic, questions, and hypotheses.

Theoretical Foundation

Assessment of the predictors of adverse pregnancy outcomes requires accounting for multiple factors that include personal, behavioral, and environmental factors. Social cognitive theory addresses both personal and ecological elements of positive behavior change. This theory was originally developed by Miller and Dollard (1941) as social learning theory. However, Bandura (1997) advanced the theory by incorporating a concept from psychology and renamed it SCT (Glanz et al., 2008). This theory assumes that human behavior is shaped by the interchange of personal, behavioral, and environmental impacts. SCT further highlights the abilities of people to amend or build their desired environment individually or through the ability of collective actions (Glanz et al., 2008). SCT has been widely applied in public health in predicting positive health behavior changes, self-efficacy, health intervention, and self-control (Chen, Wang, & Hung, 2015; Elmore & Sharma, 2013; Lee, et al., 2015; Shorey, et al., 2015). This theoretical framework was appropriate in predicting the factors that contribute to poor pregnancy outcomes considering the interplay among personal, environmental,

biological, sociodemographic, and socioeconomic factors that influence adverse pregnancy outcomes among women of childbearing age. Also, it provided adequate constructs to determine the association between obstetric factors (gestational age at delivery, mode of delivery, the timing of booking, and number of antenatal cares received), sociodemographic factors, socioeconomic factors, and poor pregnancy history for women of reproductive age in Nigeria.

Social interactions can sway personal thoughts, beliefs, and behaviors, which best explains the construct known as reciprocal determinism. The tenet that new knowledge and attitude as well as adjusting environmental factors may be necessary to effect positive behavior change as shown in Figure 1. Moreover, this change produces both individual and social change (Glanz et al., 2008). According to Bandura (1986, 1997), people learn by observing others, acquiring new experience, and performing the new behavior (learning by observation) or being reinforced for performance. Behavior is also influenced by the expected outcomes (results expectation), as well as the capability of demonstrating mastery of the behaviors (self-efficacy) through a regulatory process (self-regulation; Basen-Engquist et al., 2013; Hasking, Boyes, & Mullan, 2015; Ng & Lucianetti, 2016).

Personal, Social, and Environmental Factors

As mentioned above, the constructs of SCT theory have been selectively applied in research studies to predict behavior change, especially in health promotion intervention studies. Personal factors such as individual resources, maternal age, socioeconomic status (income, education, and occupation), previous experience, emotional stage and women's

autonomy; environmental factors such as marital happiness, family functioning, social support (peer group, political system and family members); and factors such as ethnicity, religion, and cultural background impact improving self-efficacy (Shorey et al. (2015) investigated the predictor of maternal parental self-efficacy among first-time mothers in the early postnatal period and found a significant positive relationship between social support and self-efficacy.

Women of reproductive age who are confident and believe in their capabilities to perform given tasks such as booking early for antenatal care services or use of professional skilled services during labor and delivery demonstrated higher self-efficacy and self-control, which means the ability to set realistic goal-directed behaviors that will create valuable opportunities for problem solving, goals monitoring, decision making, and self-rewards that can eventually improve their pregnancy outcome (Wilson, 2012). Studies have demonstrated that practical mastering of self-efficacy can enhance pregnancy outcomes. For example, Tilden, Caughey, Lee, & Emeis (2016), found childbirth self-efficacy associated with numerous types of perinatal outcomes. The authors further noted that self-efficacy reduced labor pain and suffering that are linked to birth. Self-efficacy can either enhance pregnancy outcomes or worsen pregnancy contingent on the levels of confidence and beliefs (lower self-efficacy or higher self-efficacy; Tilden et al., 2016). Self-efficacy has also been shown to reduce the risks associated with cesarean delivery. In a prospective study of nearly 770 first-time pregnant women in Taiwan, Kuei-Hui, Ai-Chieh, Li-Yin & Mei-Hwa (2014) showed that self-efficacy is linked to lower risks of delivering through cesarean section.

However, the risk reduction was greater in the third trimester compared to the second trimester. It was also shown that self-efficacy increased outcomes expectation. Another study to determine the relationship between maternal self-efficacy, compliance, and outcomes in a trial of vitamin D supplementation in pregnant women with higher self-efficacy showed fewer problems with compliance in taking study medications compared to pregnant women with lower self-efficacy who demonstrated greater difficulty complying with the study protocol and in taking their medications. These findings suggested that there is a relationship between differences in self-efficacy that impacts trial outcomes Barker et al., 2017). The SCT construct self-efficacy also mediates cognitive-behavioral counseling interventions to enhance smoking cessation for pregnant and postnatal women. Lee et al. (2015), demonstrated a significant positive association between expanded self-efficacy and better results in smoking cessation. The authors highlighted that the process was mediated through higher quitting self-efficacy and lower negativity regarding quitting, which depends on the positive outcomes expectation by smokers and confidence in their capability to accomplish the expected results.

Literature also indicated the interactions between social support and self-efficacy in encouraging smoking cessation. A study by Ochsner et al. (2014) to determine the chemistry between social support and self-regulatory factors in smoking cessation indicated that social support regulated the relationship between self-efficacy and smoking cessation. The study further underlined the significance of employing both self-efficacy and self-regulation constructs in smoking cessation intervention studies. The use of self-

regulatory activities (goal setting and self-monitoring) influenced by self-efficacy had also been found to regulate gestational weight for pregnant women. However, positive outcome expectancies of the effects of mothers' weight on the health of the newborn was a motivational factor for self-regulatory behaviors (Kim, Niederdeppe, Guillory et al., 2015). Similarly, a study that examined the effects of online self-regulatory behaviors on physical activity among pregnant women suggested that intervention strategies should include self-efficacy and safety information aimed at encouraging physical activity during pregnancy. Once the correct intention is developed, it is easier to provide pregnant women the chance to practice self-regulatory behaviors, for instance, self-monitoring through an online setting that will enhance positive behaviors implementation (Kim, Niederdeppe, Graham, Olson, & Gay, 2015).

The literature review regarding the selected SCT constructs used in this study demonstrated how the concepts had been previously applied. However, the review highlighted the fact that self-efficacy, self-regulatory, outcomes expectancies, as well as reciprocal determinism, can best be adapted to improve behavior changes and increase pregnancy outcomes. The review further underscored the significant association between the particular constructs and positive behaviors changes, as well as increase in the expected results. More so, the review indicated that these constructs were not acted on in isolation; rather, there is a constant interplay between the concepts and positive behaviors change. For example, self-efficacy influenced or moderated self-regulatory activity, which often depends on the expected outcomes. This constant interaction between personal and environmental factors in impacting positive behaviors is what gives SCT its

uniqueness. The persistent interactions between individuals, behaviors and environmental factors were explored to fully understand the factors that independently predict or mediates poor pregnancy outcomes. This is needed to develope strategies for positive behavior change that will help overcomes these barriers and improve pregnancy outcomes for women of reproductive age in Sub-Sahara Africa, especially Nigeria.

Sociodemographic Factors

Presently, there is increasing evidence indicating that sociodemographic factors such as age, race, ethnicity, language and culture and socioeconomic factors for example income, education and occupation impacts health outcomes (America's Essential Hospital, 2016).

Age

Age has been recognized as a risk factor for poor pregnancy outcomes. However, most women of childbearing age in advanced countries increasingly deferred pregnancy after 30 years (Waldenström, et al., 2014). Studies have demonstrated a statistically significantly difference among young maternal age, advanced maternal age and reproductive age in connection with adverse pregnancy outcomes. Kuyumcuoglu, Guzel, and Celik (2012), showed that women at advanced maternal age were more prone to pregnancy risks and may have adverse pregnancies outcomes compared to young maternal age and reproductive age. There were statistically significant differences between the outcome measures such as Apgar scores 1 and 5 minutes, LBW, gestational age at birth. The finding further showed that there was a negligible risk in gestational age

at birth for the adolescent age group and, not in the advanced maternal age group (Kuyumcuoglu, et al., 2012).

It is also documented that adolescent pregnancies and childbirth are susceptible to the expanded risk of poor pregnancy outcomes, especially in low and middle-income countries. Approximately, 10% of young women have a child at age 16years old, specifically in Sub-Sahara Africa including Nigeria. Furthermore, 90% of teenage birth occurred in low and middle-income countries (Ganchimeg, et al., 2014; Traisrisilp, Jaiprom, Luewan, & Tongsong, 2015). A multi-country study by the WHO (2014) that compared adolescents age (10-19 years) to that of reproductive age (20-24 years) revealed that adolescents maternal age (10-19 years) are at progressively higher risk of adverse pregnancy outcomes such as eclampsia, puerperal endometritis, infection, LBW, preterm delivery and neonatal with undesirable health conditions. After controlling for gestational age, LBW, mode of delivering and maternal features, neonatal death to adolescent mothers becomes non-significant (Ganchimeg, et al., 2014). Similarly, Traisrisilp et al. (2015), compared pregnancies outcomes among adolescent ≤ 15 years of age to teenage girls (16-19 years) and adults (20-30 years). The study showed that early adolescents' pregnancies outcomes in comparison with the control groups (20-30 years) were significantly at greater risk of adverse outcomes such as preterm birth, LBW, and growth restriction. The adult's group indicated an extended level of medical disease complications, for instance, diabetes mellitus and severe hypertension. In comparing early adolescents group to late adolescents group (16-19 years), early adolescents group still exhibited significantly greater risks of poor outcomes (Traisrisilp, et al., 2015).

Similar to adolescents maternal age, advanced maternal age also presents considerable risks of adverse pregnancy outcomes especially when there is an underlying medical condition or extremely advanced age (greater 40 years old at the time of first pregnancy). Advanced maternal age is described as greater than 35 years or older at the time of first pregnancy and, it is increasingly becoming a standard practice in developed nations for the past decades (Khalil, Syngelaki, Maiz, Zinevich, & Nicolaides, 2013). Studies have found a statistically significant association between advanced maternal age and a variety of adverse pregnancy outcomes. Khalil et al. (2013), investigated the relationship between advanced maternal age and numerous adverse pregnancy outcomes and, reported that advanced maternal age (≥40 years old) was associated with compounded risks of miscarriage, pre-eclampsia, gestational diabetes mellitus (GDM), small for gestational age (SGA) and cesarean section. However, the risk of stillbirth, gestational hypertension, spontaneous preterm delivery and large for gestational age (LGA) was not linked to advanced maternal age. Though, the authors noted that the findings suggested a rapid increase in risk factors and poor pregnancy outcomes after 40 years (Khalil, et al., 2013).

A multi-country assessment of advanced maternal age and poor pregnancy outcomes also revealed a substantially expanded risk of poor pregnancy outcomes. Laopaiboon et al. (2014) found that advanced maternal age increasingly contributed to adverse pregnancy outcomes such as near maternal miss, maternal death, SGA, stillbirth and perinatal mortalities. A similar finding was documented between advanced maternal age and poor pregnancy outcomes that include stillbirth, preterm birth, very preterm

birth, macrosomia, extremely large for gestational age and cesarean delivery (Kenny, et al., 2013).

Studies have shown that the risk of adverse pregnancy becomes double when there is an underlying medical condition or in extremely advanced maternal age ≥ 45 years. Grotegut et al. (2014), examined the risk of obstetric and medical complications among pregnant women 45 years or older and, found that pregnant women in this sub-group are prone to medicals and obstetric risk factors that include maternal death, transfusion, myocardial infarction, cardiac arrest, heart failure, acute renal failure, pulmonary embolism, deep vein thrombosis, acute kidney failure, cesarean delivery, gestational diabetes, fetal demise, fetal chromosomal anomaly, as well as placenta previa. The reports further highlighted that the risk of adverse pregnancy outcomes is considerably reduced for women under the age of 35 years old.

Advanced maternal age when combined with a dangerous lifestyle such as smoking during pregnancy increased the risk of adverse outcomes. A study that compared poor pregnancy outcomes in connection with older maternal age, smoking, and overweight found significant differences among these variables. Waldenström et al. (2014), compared the risks associated with older maternal age to that of smoking and overweight during pregnancy and, discovered that NM, very preterm birth, moderately preterm birth, SGA, low Apgar score, and stillbirth are progressively linked to advanced maternal age. Older maternal age is more associated with a higher risk of maternal death than overweight/obesity or smoking. Though, the outcomes do not indicate any interaction effects among the lifestyles variables; maternal age, overweight, and smoking,

there is an indication that the risk of adverse pregnancy outcomes started increasing before 35 years. The authors reaffirmed that advanced maternal age is an independent risk factor for adverse pregnancy outcomes, greater than overweight and smoking altogether. These lifestyle factors present a considerable risk of poor pregnancy outcomes (Waldenström, et al., 2014).

Age as a factor that contributes to poor pregnancy outcomes is well studied. Although, there are consensus findings that adolescents' age and advanced maternal age increased the risks of adverse pregnancy outcomes, there are conflicting findings regarding some of the outcomes variables, as well as the particular periods when the advanced maternal age increased the risk of adverse outcomes. While a study indicated that the risk of adverse pregnancy outcomes expanded after ≥40 years, another documented that the risk of adverse pregnancy outcomes increased before ≤35 years of aged (Khalil, et al., 2013; Waldenström, et al., 2014). The likely causes of these conflicting findings may be due to differences in age classification and not adequately accounting for all confounders or mediating variables. New research is needed that will sufficiently address these contradictory findings by accounting for all significant confounders and mediating variables as well as assessing the particular period when the risks of advanced maternal risks started.

Targeted intervention strategies are needed to address these risk factors in each of this population sub-group. In Sub-Sahara Africa including Nigeria, adolescents pregnancy are higher due to early marriage, unwanted pregnancy, low socioeconomic status, inadequate education to promote the use of condom and contraceptives, as well as

religious beliefs and practices. Government at all levels should take cognizance of adolescents' cultural and religious norms to create interventions aimed at promoting the use of condom and contraceptive as well as quality education to halt teenage pregnancies. The intervention strategies should also include educating young women about the danger of early marriage and improving their economic status through youth employment programs.

Race/Ethnicity

Research findings have shown racial/ethnic background as a risk factor for poor pregnancy outcomes though disparities exist in adverse pregnancy outcomes in the world. A study conducted in the United States to determine if maternal race/ethnicity contributed to poor pregnancy outcomes revealed that maternal race and ethnicity of infants from Black, Hispanic, and Asian women suffered the risk of adverse pregnancy outcomes between 10% - 210% higher compared to White women (Borrell, Rodriguez-Alvarez, Savitz, & Baquero, 2016). The potential for adverse pregnancy outcome becomes greater between interracial married couples. For instance, between Asian men and White women, or Black men and Hispanic women, and Asian women and Black or Hispanic men (Borrell, et al., 2016).

Another study of singleton pregnancies also reported maternal racial origin as a determinant of poor pregnancy outcomes. In a retrospective study by Khalil, Rezende, Akolekar, Syngelakgoi, and Nicolaides (2013) found a significant association between racial foundations and a broad range of adverse pregnancy outcomes. For example Afro-Caribbean women had a progressive risk of miscarriage, stillbirth, pre-eclampsia,

gestational hypertension, spontaneous preterm delivery, gestational diabetes mellitus, SMA, and cesarean section (CS). Although, women from South Asian origin were noted for increased risk of GDM, SGA, and CS. Other women from the East Asian race had a progressive risk of GDM and SGA (Khalil, et al., 2013).

Racial/ethnicity as a significant predictor of poor newborn outcomes has also been documented. Wilson, Gance-Cleveland, and Locus (2011) examined the relationship between ethnicity and neonatal outcomes and established that ethnicity was a statistically significant predictor of adverse pregnancy outcomes after accounting for hospital setting and physicians characteristics. The researchers noted further that newborn born to African-American women were associated with lower Apgar score or required admission to NICU compared to Native-American women, even with better insurance, education or perinatal visits.

Racial/ethnic origin also contributed to the risk of miscarriage. A prospective study by Mukherjee, Velez Edwards, Baird, Savitz, and Hartmann (2013) to determine the risk of miscarriage among White and Black women showed that Black women are at an increased risk of miscarriage compared with White women. Although the risk of miscarriage in gestational week10 was narrowed between the racial groups, an alarming rate of miscarriage was noticeable for Black women in 10-20 weeks (Mukherjee, et al., 2013). Literature also revealed that the incidence of spontaneous abortions is linked to racial/ethnic foundations. For example, a retrospective study to assessthe association between race and spontaneous abortions among European, Black African, Black Caribbean, and South Asian women demonstrated that prior spontaneous abortions are

amplified in Black African and Black Caribbeans women. Though, the potencies of the relationship with Black women increased with age and, that of South Asian women increased with age, as well as body mass index (BMI). The adverse pregnancy outcome of preterm birth was associated with spontaneous abortion in all races, nonetheless, it is commonest in Black African women (Oliver-Williams & Steer, 2015).

Literature provides substantial evidence regarding race/ethnicity as predictors of poor pregnancy outcomes. The black race is noted for poor pregnancy outcomes even after controlling for confounders variables such as socioeconomic status and age. This is followed by Hispanic women or South/East Asian women thus suggesting that besides, culture and diet, the genetic make-up of black women suppressed them to adverse pregnancy outcomes. Studies are needed that will uncover the genetic mechanism that subjected some racial/ethnic groups to poor pregnancy outcomes.

Culture/Language

Culture is defined or described as a combined array of human behaviors that represent language, thoughts, communications, actions, customs, beliefs, values, as well as institutions of racial, ethnic, religious and social groups (CDC, 2014). A broader understanding of cultural knowledge is necessary to strengthen and widen the healthcare delivery system through the suitable process of identifying illness and development of treatment models (Esienumoh, Akpabio, Etowa & Waterman, 2016). Culture in most parts of the world, as well as Sub-Sahara Africa, including Nigeria influenced women reproductive health and pregnancy outcomes. There is an association between culture and adverse pregnancy outcomes. Ajiboye and Adebayo (2012) found a statistically

significant association between socio-cultural factors and adverse pregnancy outcomes among the Ugu community in Nigeria. However, regardless of the current stage of civilization, cultural beliefs and practices are still responsible for the people in making an informed decision about their reproductive health.

Cultural practices and beliefs in addition to religious dogmas have been found to contribute to pregnant women refusal or delayed acceptance of emergency obstetric care including cesarean section. A mixed-methods analysis to determine gender role, religious views, and socio-cultural factors indicated that nearly 22% of pregnant women and 90% of cesarean sections are due to delay in accepting cesarean services. The study findings affirmed that delayed or rejection of cesarean section by pregnant women is impacted by socio-cultural, gender and religious philosophy (Ugwu & de Kok, 2015). Cultural factor has also been recognized as contributing to differences in perinatal periods experienced by women of low socioeconomic status. A qualitative analysis shared light on how women of different racial, ethnic and socio-economic backgrounds understood the stressor associated with perinatal periods experienced through their environments. The study affirmed further that what women experienced during the perinatal periods are informed by a complex interplay of sociocultural and environmental factors (King, 2013).

Cultural beliefs and practices, religious dogmas and limited English Language proficiencies are still a central issue that influenced pregnancy outcomes in Sub-Sahara Africa, including Nigeria. These factors are more pronounced in the rural areas in Nigeria, as in most African countries, there is an interchange of local cultures and the nursing and midwifery cultures during pregnancy and childbirth, these interplays provide

the diversity in childbirth that is eminent in Nigeria (Esienumoh, et al., 2016). As mentioned above, certain cultural and religious beliefs and practices affect pregnancy and birth outcomes negatively. To enhance pregnancy outcomes for women of reproductive age in Nigeria, governments at federal and state levels need to provide resources that will enable healthcare organizations offers culturally and linguistically appropriate services, including prenatal care and all related services. Public health practitioners and other stakeholders need to provide interventions services that are culturally competent to shrink the gap that exists between rural and urban women of reproductive age in Nigeria. Such strategies will help to reduce the incidence of MM, NM, and LBW. According to U.S. Department of Health and Human Services (*n.d.*, p. 1) "health care services that are respectful of and responsive to the health beliefs, practices, and cultural and linguistic needs of diverse patients can help bring about positive health outcomes".

Socioeconomic Factors

Socioeconomic status is defined typically as measures of three distinct but related status such as economic, social, and work status. Economic status is measured through income, social status measured through educational level, and employment status measured through the type of occupation (CDC, 2014). Socioeconomic position which is considered the social, education and economic factors that affects an individual position within the context of the society is linked to a variety of health outcomes that include mortality, morbidity, and individual health through a life course, specifically during childhood development and pregnancy (Azooz & Youzbaki, 2012; CDC, 2014).

Socioeconomic variables influence pregnancy outcomes, either negatively (low socioeconomic status) or positively (high socioeconomic status). A study conducted in the United Kingdom to determined maternity care outcomes, utilization, and experience, does not show any statistically significant finding but revealed that pregnant women of low socioeconomic status are 25% less likely to have received antenatal care, 15% less likely to have received routine postnatal check-up, 4% more likely to received antenatal hospital admission, 7% more likely to have been transferred during labor, and 4% more likely to have had a cesarean birth (Lindquist, Kurinczuk, Redshaw, & Knight, 2015). The disparity in adverse birth outcomes exists between rural and urban residence due to socioeconomic status. The study demonstrated statistically significant findings among rural mothers and adverse pregnancy outcomes. Bertin, Viel, Monfort, Cordier, and Chevrier (2015) found an association between neighborhood poverty in rural mothers and increased risk of small for gestational age (SGA) and small for gestational age head circumference (SGC). The finding suggested that neighborhood poverty had statistically significant effects on SGA and SGC on the rural and urban position of maternal residence (Bertin, et al., 2015).

Education

In developing countries such as Nigeria, women are disproportionality educated compared to their male counterparts. A growing body of research has demonstrated how education benefited girls and women both in eliminating maternal and child mortalities, enhancing health and fertility, increasing the use of contraception, delaying marriage, limiting the number of children, increasing knowledge about child nutrition and other

related needs (Population Reference Bureau [PRB], *n.d.*). In Mali, women that obtained secondary education or greater have an average of three children, while those without secondary education gave birth to an average of seven children. In Guatemala, a 35years prospective study revealed an association between years young women spent in school and the spacing of children. For an extra year women spent in school, the age at which she had her first child was extended for approximately six to ten months (PRB, *n.d.*).

A similar trend was observed in Burkina Faso, the probability of women of reproductive age with secondary education delivering in health facilities is twice those without secondary education. Also, an extra year of schooling for 1,000 women may likely avert two maternal mortalities (PRB, *n.d.*). It is documented that the probability of educated women in 32 countries having primary knowledge about HIV increased five times than those without education. In Zambia and Uganda, studies showed that HIV multiplies rapidly among the uneducated women and for each added year in school the possibility of contacting HIV reduced by 6.7 percent (PRB, *n.d.*).

Inadequate education has also been found to be responsible for severe maternal outcomes in developing countries. A multicountry cross-sectional survey showed a significant relationship between the low level of education and severe maternal results that include near miss and death. These observed results were more pronounced in countries with medium to low income compared to those of high-income countries. It is also found that low education contributed to the odds of organ malfunction on arrival at the hospital or within the first day. Furthermore, the probability of a woman receiving magnesium sulfate for eclampsia or cesarean section increased tremendously with an

increased level of education (Tunçalp, et al., 2014). Additionally, studies have shown that insufficient education is linked to adverse neonatal outcomes and the receipt of maternal health care. Azooz and Al-Youzbaki, (2012), Kaplan, Fang, and Kirby, (2017) found an association between adverse newborn outcomes such as preterm birth, stillbirth, post-term, LBW, congenital anomalies and low level of education, as well as the impact on the receipt of maternal health care services.

There is no doubt that education is essential in preparing women not only for positive reproductive health outcomes but also for social and economic well-being. As stated above, literature consistently demonstrated that poor education is associated with a wide range of adverse pregnancy outcomes and that these findings are aggravated in low-medium income countries like Nigeria. Education empowers women to make independent decisions about their reproductive health, economic freedom and to resist domestic violence. Research has shown that the probability of women using modern contraception, delivering in a health facility and having a skilled attendant at birth increased with the more she is empowered and educated (Corroon, et al., 2014). To enhance pregnancy outcomes in Nigeria requires full collaboration of all stakeholders in the form of a participatory/community research and intervention aimed at promoting girls education by highlighting the short and long term benefits of girls education to include rejection of early marriage, avoidance of unwanted or early pregnancies, avoidance of transmitted diseases, boosts of economic and social autonomy, and increasing knowledge about reproductive health that consist of contraception use, child spacing and limited number of children.

Income

Income is another measure of socioeconomic status that affects pregnancy outcomes. Research has indicated that pregnant women at the low-income level were more vulnerable to the increased risk of poor pregnancy outcomes compare to those with middle to higher incomes. A weak association has been established for household income and preterm birth and small for gestational age (Mortensen, 2013). The influence of lower income on pregnancy outcomes cut across both developed and less developed country. A cross-country research study conducted among pregnant women in the United Kingdom (UK) and Brazil between 1982-2004 provided information on the increased risk for adverse outcomes for mothers and infants belonging to the poorer income and less educational levels in both U.K and Brazil (Matijasevich, et al., 2012). The study highlighted an inverse association between the poorer and the least educated with all the outcomes variables measured such as smoking during pregnancy, delivery without the services of skilled personnel, preterm birth, intrauterine growth retardation, and less than three months of breastfeeding. Positive association was only observed in cesarean section (Matijasevich, et al., 2012).

The disparity in income has also been documented as linked to poor perinatal outcomes. Shankardass et al. (2014) found a relationship between increased risk for SGA, spontaneous preterm birth, and low-income status. Though, the author remarked that the risk for large for gestational age was relatively reduced among lower incomes group, as well as other measurable indicators of socioeconomic position, postnatal mortality was associated with one or more of the socioeconomic indicators, and neighborhood maternal

poverty was equally associated with increased risk of perinatal death, and SGA. Literature also demonstrated the relationship between income inequality (parental socioeconomic position) and birth outcomes. A study by Fujiwara, Ito, and Kawachi, (2013) offered information regarding the association between income inequality and poor birth outcomes.

Socioeconomic status was operationalized through the use of the Gini Coefficient index. Gini Coefficient Index is described as a mathematical measurement that considered half of the absolute difference between two incomes randomly chosen from the target population, normalized to the mean. In the operation of the Gini Coefficient Index, 0.0 implied perfect equality, while 1.0 indicates perfect inequality (Fujiwara, et al., 2013). The results after sensitively analysis showed that income inequality is linked to z score for gestational age and SGA, for middle Gini vs. low Gini, OR = 1.23, 95% CL:1.04, 1.46; for high Gini vs. low Gini, OR= 1.21, 95% CL:1.00,1.46. Greater income inequality was linked with z score for birth weight and SGB birth; no association was found between higher income inequality and preterm birth, and gestational age (Fujiwara et al., 2013).

Pregnant women within the lower income bracket suffered a considerable increase in the risks of adverse outcome. Though, it is clear that income inequality impacted pregnancy outcome negatively among the lower income group, the literature presented conflicting findings regarding some of the outcome variables measured such as small for gestational age and preterm birth. Almost all the literature reviewed above showed that the study samples were relatively significant enough to have warranted detection of

effects if one indeed exists. Possible explanations for the inconsistencies in findings may be due to 1.) the way information on income variable was collected, measured and operationalized 2.) most countries do not have reliable data or collect adequate data on income earning on it residents and 3) in some study settings, only few households engaged in regular employment where reliable records could be found, others were involved in manual labor where it 's hard to keep track of their earnings. Further studies are needed to understand better the mechanism through which income influenced adverse pregnancy outcomes. Such studies should consider the biological, genetic and life course of the mother before becoming pregnant.

Occupation

Occupation is among the socioeconomic indicators that have been taken into consideration as a predictor or mediator of adverse pregnancy outcomes. Globally, there is disparity between the participation rate of men and women in the workforce. Statistics have shown that only 50% of working-age women are in the labor force compared to 77% of men. These disparities are even wider in areas such as Northern Africa, Western Asian and Southern Asian (United Nations, 2015). In the U.S, Canada, and France, the percentage of women in the workforce averages 46.8%, 47.3%, and 48.0% respectively. However, in five countries in Sub-Sahara Africa, women make-up of about 50% of the workforce. These include Zimbabwe, Malawi, Gambia, Liberia, and Tanzania. The only country outside African countries where women accounted for almost 50% of the workforce is Lithuania and, in many European countries, women in the labor force are at about 45%. In North Africa and Middle East women in the workforce are relatively low,

except Israel where they account for 47.3% of the workforce (Pew Research Center, 2017). In Nigeria, women in the labor force were about 38.7% in 2007, and from 38.1% in 2005 and 37.0% in 2000 respectively (Onyejeli, 2010).

Presently, increasing numbers of women are employed during pregnancy and the postpartum period. Statistics showed that about 67% of first-time mothers worked during their pregnancies and, around 87% of these women worked until the final trimester (Kozhimannil, Attanasio, McGovern, Gjerdingen, & Johnson, 2013). Studies have discovered a link between parental occupation and adverse pregnancy outcomes. Thirteen European birth cohorts studies that examined the relationships between maternal occupation and birth weight and length of gestation revealed that women employed during pregnancies are vulnerable to the risk of adverse pregnancy outcomes such as LBW, small for gestational age and lower risk of preterm delivery compared to unemployed women (Casas, et al., 2015). The study further indicated that being employed in most occupations is not associated with adverse pregnancy outcomes. However, working as a nurse was linked to lower risk of SGA infants, and being employed in the food industry increased the risk of preterm delivery (Casas, et al., 2015).

A link between preterm birth and prenatal maternal occupation have also been documented about ethnicity and nativity. von Ehrenstein, Wilhelm, Wang, and Ritz (2014), found an association between increased risk of preterm birth and women employed in the healthcare and technical occupations. They noted that the risk was more severe for Hispanics, and Hispanic foreign-born women in the building, cleaning, and maintenance trade. Interestingly, US Hispanic-born in a shift and physical demand work

are at increased risk of adverse birth outcomes, but not foreign-born Hispanic (von Ehrenstein et al., 2014). Heavy lifting has also been recognized as a potential factor for poor pregnancy outcomes. The study by Juhl et al. (2014), documented a possible relationship between pregnant women who engaged in occupations that regularly involved lifting such as nursing and nursing assistant, and small-for-gestational-age infants. Though warned that the results were not statistically significant, there is an increased possibility of risk of SGA for women who lifted between 501-1,000 per day or > 1,000 per day compared to women without a history of lifting. Researchers have attempted to establish a relationship between full-time or part-time employment and adverse pregnancy outcomes compared to those not employed during pregnancies through propensity scores matching. Though the results produced no statistically significant association between full-time employment or part-time jobs and preterm birth and LBW compared to those unemployed, theystressed that black women were at increased risk for LBW babies irrespective of the job type. Overall, the authors affirmed that maternal employment was not an independent predictor of LBW or preterm birth even after accounting for possible confounding variables (Kozhimannil, et al., 2013).

Certain occupations significantly increase the hazards of poor pregnancy outcomes. However, as noted above. being employed full-time or part-time is not an individual predictor of adverse pregnancy outcomes. Rather, conditions of work or work characteristic, ethnicity, and place of birth may moderate or mediate the effects of adverse pregnancy outcomes through the occupational pathway. To better understand how occupations predict or influenced poor pregnancy outcomes in Nigeria among

women of childbearing age, new research is necessary to adequately address the effects of work conditions or characteristic and race/ethnicity so as to better understand the pathways through which these variables impact pregnancy outcomes. Additionally, a targeted intervention is needed that will be tailor toward addressing the risk factors for people working in occupations with more predictable hazards of adverse pregnancy outcomes.

Existing Medical/Obstetric Factors

Certain medical conditions are responsible for pregnancy complications resulting in bad pregnancy results for millions of pregnant women throughout the world. The most common medical conditions are hypertension, diabetes, depression, obesity, preeclampsia, and asthma. These conditions causepregnancy complications that lead to MM and related morbidities, NM, preterm birth, cesarean section, as well as LBW (Kiely, et al., 2011). It is observed that in the past few decades, the prevalence of maternal depression, diabetes, obesity, asthma, hypertension, and preeclampsia had intensified (Kiely, et al., 2011).

Hypertension

Hypertension is defined as the systolic blood pressure of more than140 mm Hg or diastolic blood pressure of more than 90 mm Hg on two occasions within 24 hrs (Merck Manual, *n.d.*). Hypertension is one of the recognizable factors of pregnancy complications affecting nearly 10% of pregnancies globally. It is associated with maternal and perinatal mortality and morbidity. Hypertension in pregnancy manifests in many forms such as chronic hypertension, pre-eclampsia, and eclampsia which have been

linked with death and morbidity (Browne et al., 2015). Most of the maternal death and related morbidities in Asia, Africa, and Latin America have been connected to pre-eclampsia and eclampsia, as well as 8% in West Africa. Studies have established an association between very LBW and perinatal death, and gestational hypertension, as well as between pre-eclampsia and LBW (Kiely et al., 2011). The authors added that pregnant women with pre-existing medical conditions are at increased possibility of experiencing adverse pregnancy outcomes compared to issues that arise during pregnancy (Kiely et al., 2011). Studies have also identified a wide range of poor pregnancy outcomes and various forms of hypertensive disorder during pregnancy. For instance, Browne et al. (2015), found a statistically significant association between women with chronic hypertension and increased probability of lower gestational age at birth and an escalated likelihood of preterm birth. Women with pre-eclampsia were noted for the regular aggravated cesarean emergency section, increased risk of LBW babies, and the greater possibility of neonatal death (Browne, et al., 2015).

Research has also shed light on the significant hematocrit of newborn born to hypertensive pregnant women. A case-control study conducted in Nigeria comparing infants of hypertensive mothers to that of normotensive mothers revealed a significantly greater hematocrit of babies born to hypertensive mothers compared to normotensive mothers. The polycythemia, neutropenia, and thrombocytopenia of children of hypertensive mothers were recorded as 8%, 15%, and 38% compared to that of normotensive mothers which were 0%, 2%, and 8% respectively. Additionally, the

neutrophil and platelet counts of the hypertensive mothers were also significantly lower compared to the normotensive mothers (Okoye, Eweputanna, Korubo, & Ejele, 2017).

The link between various forms of hypertension and adverse pregnancy outcomes have also be documented. The research study by (Olusanya & Solanke, 2012), established an association between chronic hypertension, pre-eclampsia and eclampsia and pregnancy-induced hypertension and the escalated risk of preterm birth, LBW, fetal growth restriction, low Apgar score at 1 minute and 5 minutes, but not life-threatening distress. A similar finding was also reported of an association between pre-eclampsia and increased risks of poor pregnancy outcomes. Mbachu et al. 2013, documented an association between eclampsia and an increased risk of stillbirth, cesarean sections, and maternal death. According to the study, there were 24 stillbirths, 138 women delivered through cesarean sections, 76 women and eight maternal death were reported (Mbachu, et al., 2013).

The impact of complications due to maternal hypertension cannot be overestimated. To improve pregnancy outcomes for reproductive age women in Nigeria, comprehensive assessment in the form of screening during regular prenatal care services or visits to identify expectant mothers that are at increased risk of maternal complications due to hypertension should be established. Such testing will help medical providers isolate those at high risks so as to recommend them for treatment and interventions, and subsequent follow-up to postpartum periods. This strategy will aid in halting the incidence of maternal hypertension complications, as a result, reduce the prevalence of the complications of hypertension in Nigeria.

Obesity/Overweight

Obesity and overweight is a growing medical problem worldwide and a public health concern. There is disparity in obesity and overweight between rural and urban residences, as well as between men and women (Fouelifack, et al., 2015). Maternal obesity and overweight are on the rise in both Sub-Saharan Africa and the rest of the world. Research had linked obesity and overweight to poor pregnancy outcomes (Vinturache, Moledina, McDonald, Slater, & Tough, 2014). Maternal obesity and overweight have been linked to pregnancy complications that resulted in a wide range of issues such as miscarriage, gestational diabetes, induction of labor, cesarean section, postpartum, hemorrhage, preeclampsia, slower labor, stillbirth, neonatal death, macrosomia and admission of infants to intensive care unit (Fouelifack, et al., 2015).

Studies have shown that excess body mass index (BMI) strongly predicted poor pregnancy outcomes. Kiely et al. (2011) demonstrated an association between BMI and preterm birth, large-for-gestational-age, cesarean section, and perinatal death. A cohort study conducted in Canada to assess the impact of pre-pregnancy BMI and birth outcomes suggested that pregnant women with pre-pregnancy BMI had an increased risk of developing pregnancy complications especially among women with, pre-eclampsia, and gestational diabetes compared to normal weight women (Vinturache, et al., 2014). Also, 71.2% of women with normal pre-pregnancy BMI had spontaneous labor, overweight and obese women had induced labor, 39.3%, and 49% respectively. Though, maternal pre-BMI was not associated with the mode of delivery, further analysis after

accounting for covariates for women with induced labor showed that obesity was the cause of cesarean sections (Vinturache, et al., 2014).

Studies have also indicated that sociodemographic factors increased the risk of gestational weight gained and obesity. Gaillard et al. (2013) found that sociodemographic factors such as lower maternal education, poor house income, and multiparity were associated with an accelerated risk of maternal obesity. Furthermore, ethnicity, nulliparity, consumption of excessive energy and smoking during pregnancy caused an increase in the risk of gestational weight gained. The reports further highlighted that maternal obesity was linked to escalated risk of gestational hypertension, preeclampsia, gestational diabetes, cesarean delivery, large for gestational age, and childhood obesity, (Gaillard, et al., 2013). No significant associations were recorded between BMI, gestational weight gained, and poor pregnancy outcomes. A retrospective cohort conducted in a tertiary hospital in Cameroon, West Africa, showed that gestational weight increase and maternal obesity were not statistically associated with numerous outcomes variables measured such as LBW, cesarean section, eclampsia, macrosomia, perinatal death, Apgar scores, and admission into intensive care unit (Fouelifack, et al., 2015).

The issue of overweight, BMI and adverse pregnancy outcomes have been well studied worldwide. The core premise of these studies was that overweight and BMI impacted pregnancy outcomes, directly and indirectly, that resulted in poor pregnancy outcomes. However, other studies have presented contradictory findings. Such inconsistent results may be due to differences in methodological design, measurement,

and data collection methods, as well as how these variables were operationalized. Additionally, most studies from medium to high-income countries either demonstrated an association or weak associations. A particular study from Sub-Sahara Africa indicated no relationship in all the outcomes variables measured. This is not surprising, considering the lack of adequate and qualitative data in some developing countries. For example, it was reported that researchers were unable to assess micronutrients intake and energy adequacy due to the absence of data on weight, BMI and gestational age in Nigeria (Lindsay, Gibney, & McAuliffe, 2012). Studies are needed in Nigeria that will use local data to generate indigenous evidence to adequately account for the mechanism through which income, education, ethnicity, and others unhealthy lifestyles mediates overweight/BMI to influence adverse pregnancy outcomes. Secondly, rigorous promotional campaigns are warranted to better inform women of childbearing age and their families about the risks of overweight, excessive BMI, and pregnancy outcomes.

Diabetes

According to the Merck Manual (*n.d.*), as the incidence of obesity increases, the frequency of diabetes also increases. Nearly 6% of pregnant women witnessed diabetes mellitus, and 8.5% gestational diabetes. Preexisting type 1 or type 2 diabetes worsened the risks of preeclampsia, fetal death, fatal malfunction, macrosomia, and fetal growth restriction. Annually, diabetes complications cause substantial economic loss for people with diabetes, their families, and the health systems due to loss of work, wages, and direct medical costs (WHO, 2016a). In 2015, about 1.56 million incidences of diabetes were documented along with 40,815 deaths mostly adults (WHO, 2016a).

Pregnant women are usually screened for gestational diabetes between 24 weeks and 28 weeks, and during the first trimester for potential risk factors (Merck Manual, *n.d.*). Sweeting et al. (2016) shared light on the association between women with preexisting diabetes and preterm birth, cesarean section, neonatal jaundice. Women with gestational diabetes mellitus (GDM) had an increased risk of macrosomia, large for gestational age, preterm birth and infants intensive care admission (Kiely, et al., 2011; Sweeting et al., 2016). However, the authors concluded that the risk of adverse outcomes is still feasible in high-risk women, despite early detection and treatment (Sweeting et al., 2016).

Studies on the prevalence of diabetes indicated that certain factors triggered the incidence of GDM in pregnant women. Research to determined the prevalence and risk factors of gestational diabetes among Saudi women showed that advanced maternal age, higher BMI, higher blood pressure, history of GDM, history of poor pregnancy, and family history of diabetes are risk factors for GDM (Alfadhli, et al., 2015). The authors noted that family history of diabetes was the central factor for developing GDM and that GDM amplified the potential for neonatal, low Apgar score, induction of labor. In comparison, the birth weight of infants born to mothers with GDM was higher than that of non-GDM mothers (Alfadhli, et al., 2015). It is necessary to develop targeted interventions and treatment aims at pregnant women with the above existing factors, as well as developing strategies that will provide a guideline for screening reproductive age women before conceptions to recognize those with high risk for effective treatments and interventions in Nigeria.

Asthmas

Asthmas is a common chronic condition that affects nearly 235 million peoples worldwide. Almost 239,000 people die annually due to asthma related diseases with increased disability and financial burdens (Goldie & Brightling, 2013). Asthma is an inflammatory disease that affects the airway resulting in wheeze, shortness of breath, tightness in chest and cough. The situation is always worse at night and certain factors triggers the incidence of asthmas such as allergens including house dust, mite, pollen, smoking, exercise, occupational exposures, drugs, food, drink, additive and some medical conditions (Goldie & Brightling, 2013). Asthmasis the most common disease in pregnancy affecting about 10% - 12% of pregnant women. If poorly controlled, it could have a severe adverse effect on mothers and babies (Goldie & Brightling, 2013).

Mendola et al. (2013) demonstrated that asthmas in pregnancy increases the risk of adverse outcomes including preeclampsia, gestational diabetes, placental abruption, placenta previa, increased odds of preterm birth, reduced possibility of spontaneous labor and vaginal delivery, and also, compounded risks of breech presentation (Mendola, et al., 2013). A population-based study of pregnancy complications and poor perinatal outcomes also indicated an increased risk of adverse outcomes due to maternal asthma. Rejnö et al. (2014) showed an association between maternal asthmas and pregnancy complications. It also compounded the risk of perinatal outcomes including preeclampsia, premature contractions, emergency cesarean section, LBW and small for gestational age (Rejnö, et al. 2014). The authors highlighted that the risk of LBW increased with the

severity of asthma, and there are differences in outcomes between controlled and uncontrolled asthma in pregnant women (Rejnö et al., 2014).

The consequences of maternal asthma extend beyond birth outcomes. The link between maternal asthma and a wide range of offspring diseases have also been documented in a National Cohort study. Tegethoff, Olsen, Schaffner, and Meinlschmidt (2013), found a statistically significant association between maternal asthma and parasite, infectious diseases, a disease of the nervous system, ear, respiratory infections, digestive system, and malformations. However, no link was found between maternal asthma and mental disorders, neoplasm, blood disease, circulatory system, immune system, and musculoskeletal system. To reduce the financial and economic burdens, and the risks and related disability associated with asthma during pregnancy, educational programs specific to asthmas patients and their families is required. This program should highlight effective management and control of asthmas during pregnancy and the postpartum periods.

Depression

Most pregnant women experience depression during pregnancies. About 18% of women suffer depression during pregnancies, and the situation becomes alarming for those with a prior history of depression (Szegda, Markenson, Bertone-Johnson, & Chasan-Taber, 2014). According to Connelly, Hazen, Baker-Ericzén, Landsverk, and Horwitz (2013), nearly, 7%-20% of women suffer minor to significant symptoms of depression during pregnancie. This, rate is considerably higher in low-income countries which are estimated to be between 35%-40%.Perinatal depression also comes with a lot of issues that put the mothers and the unborn babies in extreme danger including but not

limited to intimate partner violence, tobacco, alcohol, and drug dependence Connelly et al., 2013). Depression during pregnancy has been deemed potential risk factors for adverse pregnancy outcomes include LBW, small for gestational age, preterm delivery, and is the primary cause of infants mortality and morbidity (Connelly, et al., 2013; Szegda, Markenson, Bertone-Johnson, & Chasan-Taber, 2014).

Studies of maternal depression demonstrated an association between depression during pregnancy and poor pregnancy outcomes (Smith, Huber, Issel, & Warren-Findlow, 2015). A statistically significant relationship between maternal depression and increased odds of preterm birth have been documented, but not with SGA. However, after controlling for confounder variables such as smoking and prenatal care visits the outcomes were statistically insignificant (Smith, et al, 2015). The study findings did not validate maternal depression and adverse pregnancy outcomes (Smith, et al, 2015). A systematic review of the literature equally shared more light on the possible association between maternal depression and adverse pregnancy outcomes. Szegda et al. (2014), showed a possible link between depression during pregnancy and an elevated risk of SGA, PTB, and LBW. However, they noted that there were conflicting findings due to methodological differences, studies limitations, not assessing depression at different time-point in pregnancy or not accounted for relevant confounder variables. Studies also showed that women who suffered depression during pregnancy are likely to engage in other forms of unhealthy lifestyles such as smoking, drinking, substances use, and intimate partner violence. A study by Connelly et al. (2013) revealed that depressive pregnant women may possibly develop other forms of harmful behaviors. For instance,

the study showed that 20.9% engaged in drinking, 4.3% used a drug, 23 % abused substances, and 3.5% were involved in intimate partner violence. Also, Black, Asian, Pacific Islander, and other ethnic and racial groups were at increased odds of maternal depression compared to Hispanic women.

Numerous studies have indicated the relationship between maternal depression and the consequences on the mothers as well as on the neonate. Though studies have shown that some ethnic/racial groups are vulnerable to developing depression during pregnancy, further studies are needed to determine why some ethnic/racial groups are at risks of maternal depression compared to others.

Infections and Sexually Transmitted Disease

Sexually transmitted disease is a serious concern worldwide and is responsible for major pregnancy complications that resulted in miscarriage, stillbirth, preterm delivery, and LBW, infections (gonorrhea, syphilis, bacterial vaginosis, and HIV/AIDS) (Gupta & Bowman, 2012). In Sub-Saharan Africa, HIV/AIDS and malaria infection further complicate pregnancy conditions. This is the primary cause of mortality and morbidity (Johnbull, 2014). Combined mortality from HIV/AIDS and malaria is estimated at 4 million annually (Johnbull, 2014). Complications due to malaria and HIV infections result in maternal morbidity (fever, severe anemia, abortion, stillbirth, placental) and infants born to these women suffered LBW, premature birth, and intrauterine growth retardation (Johnbull, 2014).

Bacterial Vaginosis

Bacterial vaginosis (BV) is a common reproductive tract infection globally. It is a possible cause of premature rupture of the membranes and preterm labor, and very common in African countries. The prevalence among these population is estimated to be between 20% - 50% (Friel, 2016; Shayo, et al., 2012). Though, BV might be common among African populations, studies in Tanzania to determined the prevalence of BV and its associated factors found no statistically significant association and adverse pregnancy outcomes among the dependent variables tested including but not limited to gestational age <37 weeks, vaginal practices and HIV infection (Shayo, et al., 2012).

HIV and Malaria

Coinfections with HIV and malaria can further confound pregnancy complications. Studies have documented a high prevalence of malaria infection in HIV-positive pregnant women to be about 49.8%, and the increased odds of contracting malaria during pregnancy is elevated for women residing in rural areas (Johnbull, 2014). Additionally, women on HIV-ART therapy are at higher odds of contracting malaria while in HIV-positive women with higher CD4 counts, the risk for contracting malaria is reduced compared to those with lower CD4 counts (Johnbull, 2014). Maternal malaria infection has also been found to mediate socioeconomic pathways that influence adverse pregnancy outcomes. A study conducted in Ghana highlighted maternal malaria infection as a possible mediator of socioeconomic deprivation to increase the risk of LBW and preterm birth among poor mothers (Amegah, et al., 2013). Maternal malaria is also

recognized to independently predict or compound the risk of preterm delivery (Mahande & Mahande, 2016).

Tuberculosis

Tuberculosis (TB) is another infection that causes adverse pregnancy outcomes. In 2013, an estimated 3.3 million women were identified as infected with TB, and nearly 510, 000 mortality were recorded globally (Sugarman, Colvin, Moran, & Oxlade, 2014). Presently, TB explains about 28% of maternal death and contributes to severe adverse pregnancy outcomes which doubled the risk of premature birth, LBW, intrauterine growth retardation, as well as six-folds compounded risk of perinatal mortality (Sugarman, et al., 2014). In 2011, worldwide, there were about 216,500 cases of maternal TB. Similarly, 89,400 cases of maternal TB were identified in Africa (Sugarman, et al., 2014). Furthermore, South East Asian recorded 67, 500 cases of maternal TB, while 10,900 cases were identified in Nigeria (Sugarman, et al., 2014).

Research had demonstrated a positive association between maternal TB and greater risk of LBW. However, pregnant women with pulmonary TB produced offspring with reduced extra-birth weight compared with pregnant women with extra-pulmonary TB (Asuquo, et al., 2012). Sugarman et al. (2014) in a systematic review of an estimate of the global burden of maternal TB, concluded that in low-middle income countries, the burden of the disease is considerably higher in pregnant women. The authors opined that it is best to initiate and screen women of reproductive age for TB during regular antenatal care services to uncover incipient cases (Sugarman, et al., 2014). Published studies have also shed light on the higher mortality rate due to TB in HIV-positive pregnant women.

This is linked to increased mortality during pregnancy, as well as during the postpartum period (Bates, et al., 2015).

There is no doubt that infections and sexually transmitted diseases are serious risk factors for poor pregnancy outcomes. As mentioned above, studies have demonstrated continuously the negative effects of infectious and sexually transmitted diseases and adverse pregnancy outcomes especially in less developed countries. In order to minimize the incidence of infections and sexually transmitted diseases during pregnancy in a multi-cultural, multi-ethnic and multi-religious country like Nigeria, there is need for a religious and culturally competent educational and promotional programs aimed at educating women of reproductive age on the benefits of condom use, testing for sexually transmitted disease prior to conceptions, maintaining one healthy sexual partner, and a recommendation for infected women to go for treatments and where to find relevant resources.

History of Previous Pregnancy Outcomes

Stillbirth, neonatal death, morbidity, preterm delivery, and birth injury are serious public health problems in both developed and developing countries. However, these issues are double or even triple in some part of developing nations (Artal, 2015; Mahande, et al., 2013; Ouyang et al., 2013). There is evidence suggesting that women who had adverse pregnancies outcomes in prior pregnancy have about 50% probability of having poor outcomes in subsequent pregnancies. For example, stillbirth, neonatal death, preterm delivery, LBW and cesarean section (Mahande, et al., 2013; O'Neill, et al., 2014; Ouyang, et al., 2013). Most of the prospective studies conducted in developed countries

highlighted two-to five-fold increased risk of perinatal death due to prior poor pregnancy outcomes (Mahande, et al., 2013; Paul & Robson, 2013). Moreover, pregnancy after stillbirth is symbolized with increased rates of induced labor, both elective and emergency cesarean sections, preterm birth, and LBW (Mahande, et al., 2013; Paul & Robson, 2013). About 97% - 99% of most adverse pregnancy outcomes such as stillbirth and neonatal death occurs in low-middle income countries (Ouyang, et al., 2013).

A multicountry survey of 23 developing countries, including Africa, Asian and Latin America on maternal and perinatal health revealed statistically significant associations between adverse outcomes in the first pregnancy and similar outcomes in the second pregnancies (Ouyang, et al., 2013). According to the study, there were 1,261 stillbirths and 1,052 neonatal deaths in the first pregnancy. The second pregnancy recorded 910 stillbirths, and 398 neonatal deaths respectively. The reports added that among the three groups those with first pregnancy outcomes such as women with stillbirth, women with neonatal deaths or neonatal survival exhibited similar medical conditions in the second pregnanciesafter accounting for relevant confounder variables. Women with previous history of stillbirths were at greater risk of delivering a baby in second pregnancy with very LBW, but with reduced risk of LBW compared to mothers whose first pregnancy were neonatal survivors (Ouyang, et al., 2013). Similarly, compared to women with neonatal survival in the first pregnancy, those with neonatal deaths in first pregnancy were more likely to deliver babies with very LBW (Ouyang, et al., 2013). Likewise, women with stillbirths and neonatal deaths in first pregnancy were susceptible to the elevated risk of intensive care admission in the second pregnancy. The

report further stressed that women with neonatal deaths in first pregnancy were more likely to have a neonatal death compared to those with neonatal survivor (2.4% versus 0.6%) Compared to those with neonatal survival, those with stillbirths were prone to stillbirths again in the second pregnancy (4.6% versus 1.4%) (Ouyang, et al., 2013).

Related studies conducted in Tanzania also reported an association between women who experienced perinatal loss in their first pregnancies are most likely to experience perinatal loss for the second time (Mahande, et al., 2013). The risk of having second perinatal lost was 9.1% versus 2.8% for women with surviving infants in the first pregnancy (Mahande, et al., 2013). The authors further noted that recurrence risk accounted for about 21.2% of perinatal deaths in the second pregnancy, and that adverse outcomes in initial pregnancy such as preeclampsia, placental abruption, placental pelvis, induced labor, preterm delivery, and LBW increased the risk of perinatal mortality in successive pregnancy (Mahande, et al., 2013). Shapiro, Séguin, Muckle, Monnier, and Fraser (2017) documented an association between prior adverse pregnancy outcomes like miscarriage and significant greater pregnancy anxiety in the first trimester. Prior stillbirth was linked to increased pregnancy stress in the third trimester; previous elective abortion was significantly associated with higher anxiety scores in the first, second and third trimesters (Shapiro, et al, 2017). Also, for those with a live birth in earlier pregnancy the anxiety was lower in all three trimesters (Shapiro, et al., (2017).

Previous cesarean section has also been identified as contributing to adverse pregnancy outcomes such as stillbirths, miscarriage and ectopic pregnancy in subsequent pregnancy. O'Neill et al. (2014) found a relationship between the prior cesarean section

and increased hazard of stillbirths of nearly 14%. The risk of stillbirths in subsequent pregnancy for both elective and emergency cesarean section was 11% and 15% respectively (O'Neill, et al. 2014). The report added that elective cesarean section was not statistically significant of adverse pregnancy outcomes as well as previous operative vaginal delivery. Further analysis to uncover the factors that contributed to stillbirths revealed a 10% increased risk of unexplained stillbirths among women with prior cesarean section (O'Neill, et al., 2014). Similar risk increased was observed among women with a previous emergency cesarean and elective cesarean section, which was 10% and 9% respectively. Furthermore, a 14% high hazard was recorded for unexplained stillbirth for all women with previous history of cesarean sections, and the figure doubled to 30% for those with a previous history of emergency cesarean section (O'Neill, et al., 2014).

Literature had also established complete agreements on the linking effects of prior pregnancy outcomes with subsequent pregnancy. However, to the best of my knowledge, studies conducted in Nigeria have not adequately addressed the issue of the history of previous poor pregnancy outcomes on adverse pregnancy outcomes. Hence, future studies are needed to evaluate the roles of previous poor pregnancy outcomes on adverse pregnancy outcomes in Nigeria.

Behavioral and Lifestyles Factors

Behavioral lifestyles during pregnancy pose considerable problems to public health practitioners and policymakers all over the world. Harmful lifestyles and behaviors such as drinking, smoking, substances and drug use, intimate partner violence,

nutritional/vitamins deficiencies can result in adverse pregnancy outcomes or explicitly put the life of the mothers and the offsprings in danger (Bickerstaff, Beckmann, Gibbons, & Flenady, 2012; Kiely, Thornberry, Bhaskar, & Rodan, 2011; Parrish, et al., 2012; Pool, Otupiri, Owusu-Dabo, de Jonge, & Agyemang, 2014).

Alcohol

Governments in most developed countries have warned against the consumption of alcohol during pregnancy. Most pregnant women throughout the world still consume alcohol during pregnancies, and maternal alcohol use caused both long and short time effects on the babies such as miscarriage, stillbirth, preterm delivery, intrauterine growth retardation, and LBW (Kiely, et al., 2011; Onwuka, 2016). There is no safe amount of alcohol during pregnancy, but the effects on the fetus are directly proportional to the amount consumed. Maternal alcohol consumption poses a substantial social and economic burden to family and community. It is noted that Sub-Saharan Africa carries the greater burden of maternal alcohol use, specifically South Africa follow by Nigeria (Onwuka, 2016). A recent study in Bayelsa State, Nigeria indicated that almost 90% of adults used alcohol for celebrations, for oral hygiene and treatment of cold (Ordinioha & Brisibe, 2015).

Murphy, Mullally, Cleary, Fahey, and Barry (2013) in a study on pregnant women who continue to consume alcohol during pregnancy showed that women maternal alcohol consumptions were linked to elevated risk of intrauterine growth retardation compared to non-drinkers (19% versus 13%). This risk was double for women who drink and smoke during pregnancy compared to non-drinkers (32% versus 9%). Also, the study discovered

that specific nationality or ethnic/racial backgrounds, advanced maternal age and smoking were factors that contributed to continuous drinking in early pregnancy (Murphy, et al., 2013). Other factors that encouraged drinking at the beginning-late pregnancy included the history of drug use and private health insurance (Murphy, et al., 2014). It is also reported that women that drink alcohol during first and third trimesters of pregnancy exhibited similar perinatal outcomes as non-drinkers, and there was no considerable variance in terms of preterm birth and intrauterine growth retardation between those that consumed alcohol in first and third trimesters and non-drinkers (Murphy, et al., 2014).

Factors such as maternal age, use of welfare, violence from a male partner, have also been recognized to perpetuate the use of alcohol in the second trimester specifically among the pregnant women within the lower-income status (Murphy, et al., 2014). On the same note, more years of education and a higher level of self-esteem were considered protective factors that discouraged low-income pregnant women from maternal alcohol use (Li, et al., 2012). Research conducted in Nigeria found 22.6% of women consumed alcohol during pregnancy and 35.5% of these women have basic knowledge of the dangerous effects of alcohol on their unborn child (Onwuka, 2016). The report further listed the maternal age of ≤ 30 years old, nulliparity, women without a college education, pre-pregnancy use of alcohol and insufficient knowledge of the dangers of alcohol on the fetus as predictors of maternal alcohol consumptions. According to the report, inadequate or lack of knowledge about the risk of alcohol on the unborn child were the primary predictors of maternal alcohol consumption (Onwuka, 2016). Similar investigation carry-

out in Port-Harcourt Teaching Hospital in Nigeria with about 221 study subjects to determined the prevalence of maternal alcohol consumption revealed that 59.28% of the subject were alcohol drinkers, 62.60% were regular drinkers, 37.40% non-regular drinkers, and 40.72% avoided alcohol altogether during pregnancies (Ordinioha & Brisibe, 2015).

The study added that there were no statistically significant differences between marital and educational status among women who drink during pregnancy compared to those that avoided alcohol during the said period (Ordinioha & Brisibe, 2015). Interestingly, 59.54% of the women that consumed alcohol were less than 30 years old, compared to 35.56% that refused alcohol, 27.48% of women that used alcohol were nulliparous, compared to 18.89% that refused alcohol. Religiously affiliated members, Christian, Muslim and 7th Day Adventist was among women that refrained from maternal alcohol use (Ordinioha & Brisibe, 2015).

Studies on maternal alcohol consumptions presented inconsistent findings on lower dose alcohol consumptions during first and third trimesters of pregnancy. Maternal alcohol consumptions in Nigeria is relatively high compared to developed countries. This is not surprising as there is no government policy against maternal alcohol use in Nigeria. A combination of maternal alcohol education as well as government (state and federal) policy is needed to safeguard maternal alcohol consumption in Nigeria. The studies conducted in Port Harcourt, Rivers state and Bayelsa cannot be generalized to the entire Nigerian populations, it is likely that similar research in the Northern or Western parts of Nigeria may provide lower prevalence of maternal alcohol consumption than what is

presently obtained in Southern Nigeria. Therefore, studies are needed that will use representative samples in the analysis.

Smoking

Statistics showed that nearly 21.9% of reproductive age women smoked and 22% smoked into pregnancies. An estimated 14% smoked throughout pregnancy (Parrish et al., 2012). Smoking is one of the preventable and leading cause of adverse pregnancy outcomes such as LBW, intrauterine growth restriction, preterm birth, infants death, stillbirth, placenta previa, and preterm membrane rupture (Jacobson, Dong, Scheuermann, Redmond, & Collins, 2015; Masho, et al., 2013; Parrish, et al., 2012). It is also noted that majority of women that engaged in maternal smoking are poor, uneducated, resided in poor and violent neighborhoods, and mostly single (Jacobson, et al., 2015; Masho, et al., 2013; Parrish, et al., 2012).

There is evidence linking maternal smoking and adverse pregnancy outcomes. Studies conducted in the U.S. to determine smoking behaviors between rural and urban residents found that belonging to the low-income class and living in the rural areas were significant factors prompting women to smoke before being pregnant, during and eventually after pregnancy (Jacobson, et al., 2015). Alternatively, education above high school, living in urban area, having a healthy body weight, no prior children, currently taking multivitamins or 17 years or younger were factors that limit or reduce smoking for the three months proceeding pregnancy (Jacobson, et al., 2015). The risks of Nicotine-exposed pregnancy has also been examined to include consistent use of drug, previous history of drug or alcohol treatment, clean six months prior to becoming pregnant,

married or living with a partner, multiple partners during the six months proceeding pregnancy, physical abuse and inadequate education (Parrish, et al., 2012). Masho et al. (2013) also documented similar factors that contributed significantly to the risk of maternal smoking to include maternal age, education below high school, unemployment, criminal history, being on welfare, alcohol and drug use.

It has also been documented that maternal smoking caused infant mortality and its related morbidities. Study to ascertain the growth of vital organs of the fetus due to maternal smoking revealed a significant difference between the exposed and unexposed. For instance, the exposed demonstrated the decreased growth of fetal brain, lung, and kidney (Anblagan, et al., 2013). Conversely, after accounting for maternal age, gestational age, and fetal sex, the exposed continues to indicate reduced volumes. Additionally, the size of the fetus and placenta were smaller compared to the unexposed (Anblagan, et al., 2013). Another study to determine if there was a significant difference between passive smokers and active smokers, as well as non-smokers provided information about the relevant association between maternal smoking and adverse pregnancy outcomes (Amasha, 2012). According to the reports, among 223 study subjects, 20.2% were classified as active smokers, 42.1% were considered passive smokers and 37.7% group as non-smokers. The results indicated a statistically significant variance among the three groups, especially labor and preterm birth. Active smokers were more associated with preterm birth than non-smokers. Apgar scores average of five minutes among the active smokers was lower compared to non-smokers (Amasha, 2012). A systematic review to determine the short-long time impacts of parental smoking during

pregnancy and lactation, likewise, affirmed the devastating consequences of maternal smoking on the offspring (Banderali, et al., 2015). The authors underscored the consensus findings regarding parental tobacco use and a wide- range of adverse outcomes that include preterm birth, fetal growth restriction, LBW, sudden infants death syndrome, and neurodevelopment behavioral issues (Banderali, et al., 2015).

Substances Use

Pregnancy outcomes and the characteristics of women that use or abuse drug during pregnancy are very similar to those that smoked or use alcohol during pregnancy. Outcomes such as LBW, congenital disabilities, small head size, premature birth, sudden infant death syndrome, developmental, learning, memory, and emotion problems are common among the two groups. Most women that use drugs or substances during pregnancy also smoke or drink alcohol ("Criminalization of Pregnant Women with Substance Use Disorders," 2015; Forray, 2016; National Institute on Drug Abuse, 2015). Available data in the U.S indicated that 15.8 million women used illicit drugs, 4.6 million women 18 years and older have misused prescription drugs in the past year, and it is estimated that every three minutes, a woman is admitted to the emergency ward for prescription drug abuse (Substances Abuse and Mental Health Services Administration, 2014). Also, in the U.S. nearly 40% of women are classified as having lifetime drug disorder, 26% suffered both alcohol and drugs disorder (Forray, 2016). Besides, it is also stated that women of childbearing age are more vulnerable to experiencing drug use disorder, specifically those between 18-29 years old (Forray, 2016). Globally, nearly 23-96% of women used prescription drugs during pregnancy (Matsui, 2012).

In most developing countries, for example, Nigeria, there is no legal control of most prescription drugs and that makes it accessible to pregnant women and at the same time doubling the risk of prescription drugs abuse during pregnancy. Likewise, many pregnant women in Nigeria still depend on herbs before, during and after pregnancy which can further compound the risks of maternal drugs abuse (Bello, Olayemi, Morhason-Bello, & Adekunle, 2011). Moreover, both the passive and active ingredients of herbals have not been studied, nor required dose established (Bello, et al., 2011). The prevalence of substances abuse during pregnancy in Nigeria is relatively low compared to developed countries such as the United States (Nyango, Daru, Audu, Musa, & Mutihir, 2012).

Maternal prescription drug and substances abuse results in dire consequences for the fetus and the mother. Studies have established associations between maternal drugs and substances used and adverse pregnancy outcomes. For example the use of cannabis during pregnancy has been documented to be associated with several adverse pregnancy outcomes such as preterm labor, LBW, small for- gestational age, and neonatal admission into intensive care unit (Forray, 2016). Maternal cocaine used has been linked to adverse outcomes to include the premature rupture of membranes, placental abruption, preterm birth, LBW, and small-for-gestational-age (Forray, 2016). On the same note, an association between methamphetamine use during pregnancy and poor outcomes has been documented to include shorter gestational age, lower birth weight, fetal loss, and gestational hypertension (Forray, 2016). Maternal opioid exposure is found to be related

to the risk of LBW, respiratory issues, and responsible for the third trimester bleeding, as well as mortality and amplified neonatal self-restraint syndrome (Forray, 2016).

There are consensus findings regarding the devastating effects of maternal smoking and substances use. Nigeria does not have regulatory standards for the utilization of some prescription drugs. Notably, there is no regulatory standard against teenage smoking, drinking, and drug use. Public health practitioners, policymakers, and other stakeholders need to design policies and intervention and awareness campaign about the inherent dangers of maternal smoking and substances use.

Intimate Partner Violence

Physical violence against women is found in every society notwithstanding the level of development or socioeconomic status. It is however more pronounced in some settings than others (Pool, et al., 2014). Statistics put the prevalence of physical violence between 1.2% to 51%, and in some developing countries, it is as high as 71% (Pool, et al., 2014; Rahman, 2015). Also, the prevalence of violence against pregnant women is estimated to be 4% to 29% in developing countries. Violence against pregnant women takes many forms such as sexual abuse, emotional abuse and physical abuse (Rahman, 2015; Martin, Acara, & Pollock, 2012). Several factors have been considered to contribute to domestic violence or violence against women, especially during pregnancies. This includes poor education, being single, younger age, smoking, alcohol, and drug use, depression and stressful life event and poor-quality relationship (Pool, et al., 2014). Domestic or intimate partner violence against pregnant women has been recognized to be associated with a range of adverse pregnancy outcomes such as LBW,

small for.Gestational age, preterm delivery, perinatal death, maternal and perinatal complications (Pool, et al., 2014; Rahman, 2015; Urquia, O'Campo, Heaman, Janssen, & Thiessen, 2011).

Studies have established associations between domestic or IPV and several poor pregnancy outcomes. A study to estimate the experience prior to and during pregnancy and adverse pregnancy outcomes in Canada revealed no significant associations between preterm birth and small-for-gestational-age, before and after accounting for potential confounding variables. The report however documented associations between postpartum depression, and anxiety in the form of threats and physical violence that commenced before, and continued throughout pregnancy (Urquia, et al., 2011). A similar positive statistically significant association was also reported between perinatal mortality and NM but not with early pregnancy loss (Pool, et al., 2014). Study conducted in Bangladesh among married women to determined IPV and termination of pregnancy indicated that amongst 1,875 study subjects, 31.3% experienced physical/sexual IPV, 13.4% experienced sexual violence, 25.8% experienced only physical abuse, 21.0% reported termination of pregnancy, and 5.8% reported termination of pregnancy in the last five years (Rahman, 2015). The above reports underscore the need to empower women of reproductive age in Nigeria, through educational training and necessary development to improve the socioeconomic status of women. Government and community leaders need to lessen those factors that gave absolute decision-making abilities to men to improve women decision-making capabilities. Such steps will allow women to defend themselves against domestic violence and help improve pregnancy outcomes.

Nutritional Factors

Pregnancy is the most sensitive period in women lives and its warrant adequate nutritious in the form of vitamins and other essential elements. Under-nutrition or over-nutrition may impact fetal growth and development (Lindsay, et al., 2012). Deficiencies of any micronutrients such as iron, folate, copper, zinc, magnesium, iodine, calcium, vitamin D and vitamin A, may result in adverse pregnancy outcomes, for instance, anemia, natural tube defects, LBW, NM and MM (Lindsay, et al., 2012; Shen, Gong, Xu & Luo, 2015).

In Nigeria, it has been reported that both pregnant and non-pregnant women lack adequate micronutrients and there is disparity in nutritional intakes between urban and rural residents (Lindsay, et al., 2012). Several factors account for the malnutrition among women of childbearing age in Nigeria. These includes poverty, low status of women, cultural beliefs (prohibiting pregnant women to eat certain foods during pregnancy), and poor educational status (Lindsay, et al., 2012). The most important reasons women of reproductive age absent themselves from certain foods during pregnancy is fear of cesarean section due to costs and religious beliefs, as well as to avoid giving birth to large babies (Lindsay, et al., 2012).

Studies have investigated trace elements in pregnant women to ascertain their relationship to adverse pregnancy outcomes. Shen, et al. (2015) found that deficiencies of some essential elements during pregnancy may lead to undesirable consequences. The study documented that lack of iron and zinc resulted in miscarriage or preterm delivery. Also, premature rupture of membranes was associated with lower zinc level, and

intrauterine growth restriction linked to lower levels of zinc, copper, calcium, and iron. The report highlighted trace elements that were essential during pregnancy for efficient fetal growth and development. A report from Alberta Canada showed that vitamins and nutritional supplements are not necessary for healthy and low-risk nutritional deficiencies pregnant women (Fayyaz, et al., 2014). The report added that only 3% folate deficiency was observed among the cohort of pregnant women. Though 24% of the 599 pregnant women in their first trimester experienced suboptimal Red Blood Cell Folate concentration (RBCF) (<906 nmol. L^{-1}), percentage was reduced in the second and third trimesters to 9% and 7% respectively. Nearly half of the women experienced high-RBCF (>1360 nmoi-L^{-1}), and only 1% of the cohort were considered to have vitamin B_{12} and B_6 deficiencies (Fayyaz, et al., 2014).

Summary and Transition

The above literature reviewed had explained the numerous factors that predict/mediate or associated with adverse pregnancy outcomes. These are sociodemographic, socioeconomic factors, existing medical factors, behavioral/lifestyles factors, history of previous pregnancy outcomes, infections and sexually transmitted diseases. It also relates how each of these influences the occurrence of poor pregnancy outcomes. Besides, most of the literatures reviewed are from studiesoutside Nigeria. This buttresses the need for indigenous studies that will account for the unique cultural, religious, ethnic and socioeconomic backgrounds of women of reproductive age in Nigeria to generate local evidence to better understand why Nigeria consistently underperforms on MM, NM and LBW compared to most African countries. Additionally,

the history of previous poor outcomes had not been addressed by the previous studies. Therefore, this study addressed the above issue properly.

The social cognitive theory provided a clear understanding of personal, social and ecological elements of positives behavior changes. The SCT further demonstrated how human behavior is shaped by the interchange of personal, behavioral and environmental impacts, and allowed individual or groups to modify their behavior positively. The theoretical framework was suitable in recognizing the factors that directly or indirectly contributed to poor pregnancy outcomes through the interplay of personal, environmental, biological, and socioeconomic factors to help reduce the incidence of adverse pregnancy outcomes. Chapter 3 focus on the quantitative analysis used to determine the factors that predict/moderated poor pregnancy outcomes. Secondary data was used to analyze the impacts of independent variables on outcomes variables.

Chapter 3: Research Method

Introduction

I used retrospective cross-sectional quantitative methodology in this study to examine the risk factors that independently predict adverse pregnancy outcome among women of reproductive age in Nigeria. I conducted analysis of hospital-based secondary data from Lagos Island Maternity, Lagos, Nigeria (2015-2017). This chapter focuses on research design and methodology, data cleaning, setting and sample, sample size calculation, instrumentation and materials, data collection methods, and analysis and ethical standards.

Purpose of the Study

The aim of this study was to ascertain the risk factors that independently predict poor pregnancy outcomes such as MM, LBW, NM in Nigeria. Knowing the predictors of poor pregnancy outcomes may help reduce the incidence of poor pregnancy outcomes and improve reproductive health for women of childbearing age in Nigeria.

Research Design and Methodology

This study was done to determine the risk factors that autonomously predict poor pregnancy outcomes among women of reproductive age. Retrospective cross sectional study design was the most suitable approach to be used in this research as it allowed me to explain the events through collection of numerical data that was analyzed through mathematically-based methods (Creswell, 1994). Furthermore, the quantitative design provided an avenue to test research theories and hypotheses, as well as quantifying opinions, behavior, and attitudes (Sukamolson, *n.d.*).

Creswell (2009) stated that quantitative survey research permits numerical explanations of trends, attitudes, or opinions through a targeted sample from a population. It makes it easier to draw an inference about the sample results, as well as generalizing the study to larger populations. Additionally, surveys are generally cost-effective, usually with rapid data collection periods, and present an appropriate media to recognize the population characteristics of the sample studied (Creswell, 2009).

The independent variables for this study were outcomes of last pregnancy, gestational age at delivery, mode of delivery, timing of antenatal care booking, number of antenatal care services received, and socioeconomic variables, while the dependent variables were MM, NM and LBW. Cross-sectional study design provides several benefits that include collecting data at one point in time. It offers the opportunity to estimate the degree of knowledge about health behaviors, attitude, opinion, and beliefs, as well as the ability to determine the relationships between variables of interest in a target population (Creswell, 2009; Crosby, DiClemente, & Salazar, 2006; Frankfort-Nachmias & Nachmias, 2008). Additionally, the use of secondary survey data offers the advantages of simulteneously testing a large quantity of data, being cost-effectiveness, consuming less time, and providing the ability to generalizes from the sample to the broader population. In most cases, it is usually approved by the IRB as it poses reduced or no risk to study subjects (Doolan & Froelicher, 2009; Smith, et al., 2011).

Study Setting and Sample

The study utilized secondary data from Island Maternity, Lagos, Nigeria. Below is a brief overview of the city of Lagos.

Overview of Lagos, Nigeria

Lagos is geographically located in the Southwestern Nigeria with an estimated population of 21 million people. It is considered the largest city in Africa and the most populated town in Nigeria (Lagos State Government, 2017). Lagos is also regarded as the second fastest growing city among African municipalities and the seventh fastest growing in the world. (Lagos State Government, 2017).

Lagos is Nigeria's largest commercial center, contributing a considerable portion of the country's gross domestic product (Lagos State Government, 2017). Most commercial businesses, including headquarters of financial institutions, are situated in Lagos. This city offers one of the highest standards of living in Nigeria and in Africa. Lagos city is home to most of Nigeria's pioneer colleges and universities that are currently recognized to meet international standards. It is increasingly becoming a global city with a significant increase in the number of people who visit the city annually for businesses, leisure, or recreational activity (Lagos State Government, 2017).

Study Setting

Lagos State, Nigeria was chosen for this study due to its diversity. It is the most diverse city in Nigeria (Lagos State Government, 2017). The population is made up of about 32.4% children aged 0-14 years, and 65.3% of those aged between 15-64 years considered the working class. Another 2.3% of the population comprises those who are 65 years and above designated as senior citizen (Lagos State Government, 2016). Lagos state comprises of 20 local government areas and about 2,116 health facilities of which 300 are public health facilities and 1,816 are designated as private health centers (Lagos

State Government, 2016). Island Maternity Hospital, Nigeria, was an appropriate facility for the study. The hospital was established in1960 and currently has about 215 beds. It is one of the premier hospitals in West Africa with all the departments functional including family planning, intensive care unit, and operational surgical unit. The hospital is presently considered a secondary facility serving central Lagos and its metropolitan area (Fawole et al., 2012).

Participants

I utilized hospital-based secondary data from Island Maternity Hospital, Lagos, Nigeria, from May, 2015, to June,2017, of pregnant women aged 15-49 years for this study. The participants included residents of central Lagos, including both urban and rural regions and neighboring metropolitan areas. The study also included participants from the 20 local government areas of the state who delivered or received antenatal care services at the hospital.

Participants in the study were classified as Yoruba, Igbo, Hausa-Fulani, Ijaw, Kanuri, Ibibio, Tiv, Non-Nigerian, and others. They were selected through a systematic random sampling based on certain inclusion criteria that included being a resident of Lagos State, attended antenatal care, and delivered their babies at the Hospital. This study excluded women who delivered twins and those who delivered their babies outside of Island Maternity Hospital despite having their antenatal care at the hospital.

Sample Size Estimation

I conducted two power analyses to determine the appropriate sample size for this study. First, I used the Raosoft online sample size calculator to derive a sample size of

374 (Raosoft, 2004). The sample size for the project was estimated to be 374 (this was by using an alpha of .5, response distribution of 50%, power = .95 and an estimated population size of 14,000). Secondly, a I also performed a G*power multivariable linear regression analysis based on the number of predictive variables. The outcome indicated a minimum sample size of 178 (two tail tests, effect size = 0.15, power = 0.95 at 0.05 significance level). Following the committee advice I decided to use a sample size of 400 participants to ensure adequate power for the study so as to detect effects if one truly exists. Additionally, as stated by the central limit theorem, the estimation of normality is enhanced as the sample size increases, and the central limit theorem is applied to any distribution in as much as the mean and standard deviation are identified. A large sample size also helps to control type II error (Forthofer, Lee, & Hernandez, 2007).

I used systematic random sampling in selecting 400 participants from an estimated total population of 14,000 patients. The 400 participants were systematically sampled as follows: N = population size, n = sample size, and K= the sampling interval. Therefore $K = N/n$ 14,000/400 = 35, the sampling interval is 35, and the 400 participants were sampled through 1-in-35 systematic sample 35, 70, 105, 140, 175, 210, 245, 280, 315, 350, 385, 420, 455, 490, 525, 560, 595, 630, 665, 700 . . . to 14,000. The sample sizes of most studies that investigated the risk factors for poor pregnancy outcomes ranged from as low as 200 to over 22,000 thousand (Ameh et al., 2016; Fawole et al., 2011; Mahande, et al., 2013).

Procedures

The secondary data from the hospital was made up of data collected by their medical team from different sources including (a) inpatient data via bed standard statement form; (b) the health and vital statistics data collected via Accident and Emergency, Consultative Clinic, Outpatient department and Primary Healthcare (Island Maternity Hospital, 2017). The instruments used by the hospital for data collection is the International Classification of Disease, Vol. 10 (ICD-10). The ICD-10 consists of three volumes and 21 chapters (anatomical axis, alphabetical axis, and epidemiological axis). This was used for coding and indexing, as well as for classification, processing, collection, and presentation of data, including reporting of diseases and health conditions (WHO, 2010).

To ensure that the quality of the data was enhanced, trained research assistants were used for the data extraction from the original case notes. Also, the team performed quality checks on every 10 cases recorded. After this, I conducted the final quality check to ascertain accuracy and that no blank question, error, or inconsistencies were noted.

Management of Missing Data

Missing data pose a serious threat to study precision, affecting the sample size and thus resulting in biased findings (Langkamp, Lehman, & Lemeshow, 2010; Meeyai, 2016; Wang, Sedransk, & Jinn, 1992). The issue of missing data is inevitable in research. However, according to Walden University (*n.d.*), missing data that is less than 5% may not have any influence on the study results, but researchers are cautioned against missing data that is above 10% as it will hinder the ability of the investigator to generalize the

study outcomes. There are several instrumentalities of missing data such as missing completely at random, missing at random, and missing not at random (Meeyai, 2016). Studies have documented ways of addressing missing data to include listwise deletion, pairwise deletion, prior knowledge, mean insertion, regression analyses, and expectation maximization (Langkamp et al., 2010; Wang et al., 1992). It is suggested that choosing the appropriate method of handling missing data is contingent on the sample size, percentage of the data missing, and the type of statistical technique the investigator intends to use for the analysis (Meeyai, 2016).

Instrumentation/Analysis

I obtained a completed case file (patient caseload) from Island Maternity Clinic electronically containing data from pregnant women who received antenatal care and postnatal care at the hospital from May, 2015, to June, 2017. Trained research assistants extracted data from the medical record library and patient's case notes that were considered complete. The following information were derived from patients' case notes and the medical record library: sociodemographic data, including age, marital status, religions, ethnic affiliation, place of residence, income, educational level, and occupation, and information involving obstetric history (past/present) and medical conditions during pregnancy.

Data collection process for this study also included review and de-identification of the data that was acquired from Island Maternity Hospital. The information extracted was organized and entered into a particular excel spreadsheet formatted for the research

purpose. The researcher secured and stored the information on the spreadsheet on a personal computer protected with a password in which only the investigator had access.

All statistical analyses in this study were performed using the Statistical Package for Social Sciences (SPSS) version 25. The analysis was conducted in two stages; first, a descriptive analysis to explore the socio-demographic variables such as age, marital status, religion, educational background, place of residence, occupation and income level. Secondly, an inferential analysis was done to test the study hypotheses through logistic regression, specifically multiple logistic regression analysis. Multiple logistic regression helped to determine the predictor variables that independently contributed to poor pregnancy in the studied population and also allowed for adequate control ofpotential confounder variables that could influence the study findings (Forthofer et al., 2007).

The choice of logistic regression was appropriate for this research study as it provided the medium to ascertain the association between the predictor's variables and the outcome variables if only one truly exists. Additionally, the Odds ratio from logistic regression was used to test the probability of the event occurring. In this case, poor pregnancy outcomes, and more importantly, the odds ratio offered the opportunity to determine the effects of a unit change in the independent (IVs) on the dependent variables (DVs) (Forthofer et al., 2007).

Research Questions

This study answered the following questions and hypotheses

RQ1: What is the association between outcomes of last pregnancy and MM, LBW and NM in Nigeria?

*H0*1: There is no statistically significant association between outcomes of last pregnancy and MM, LBW and NM in Nigeria

H_a1: There is a statistically significant association between outcomes of last pregnancy and MM, LBW and NM in Nigeria

RQ2: What is the association between gestational age at delivery and MM, LBW and NM in Nigeria?

$H_0$2: There is no statistically significant association between gestational age at delivery and MM, LBW and NM in Nigeria?

H_a2: There is a statistically significant association between gestational age at delivery and MM, LBW and NM in Nigeria.

RQ3: What is the association between mode of delivery and MM, LBW and NM in Nigeria?

$H_0$3: There is no statistically significant association between mode of delivery and MM, LBW and NM in Nigeria.

H_a3: There is a statistically significant association between mode of delivery and MM, LBW and NM in Nigeria

RQ4: What is the association between timing of booking of antenatal care and MM, LBW and NM in Nigeria?

*H0*4: There is no statistically significant association between timing of booking of antenatal care and MM, LBW and NM in Nigeria.

H_a4: There is a statistically significant association between timing of booking of antenatal care and MM, LBW and NM in Nigeria.

RQ5: What is the association between the number of antenatal care services received and MM, LBW and NM in Nigeria?

$H_0$5: There is no statistically significant association between the number of antenatal care services received and MM, LBW and NM in Nigeria.

H_a5: There is a statistically significant association between the number of antenatal care services received and MM, LBW and NM in Nigeria.

Description of Research Variables

There are two groups of variables in this study: the outcomes/dependent variables (MM, NM, and LBW) and the predictors/independent variables consist of socioeconomic variables (age, education, income), obstetric variables (outcomes of last pregnancy, mode of delivery, gestational age at delivery, timing of booking, and number of antenatal care services receive). Further detail about the dependent and independent variables is provided below.

Table 1

Dependent/Outcome Variable

Classification	Variables	Measure	Value
Maternal Outcome	Maternal Mortality	Nominal	Dead=0, alive =1
Neonatal Outcome	Neonatal Mortality	Nominal	Dead=0, alive =1
Birth Outcome	Low Birth weight	Nominal	Low Birth Weight = 0, Normal Birth weight = 1

Table 2

Independent/Predictor Variables

Classification	Variable	Measure	Value
Attribute	Age	Interval	≤19yrs=0, 20-24yrs =1, 25-29yrs=2,30-34yrs=3,35-39yrs=4, ≥40yrs=5
Attribute	Marital status	Nominal	Married=0, single=1, divorced/separated=2, widow=3, not stated=4
Attribute	Religions	Nominal	Christianity=0, Islam=1, African tradition=2, Atheist=3, other=4, not stated=5
Attribute	Ethnicity	Nominal	Yoruba=0, Igbo=1, Housa/Fulani=2, southern minority=3, Northern minority=4, Non-Nigerian=5, not stated=6
Attribute	Place of residence	Nominal	Urban=0, Rural=1, Not stated=2
Attribute	Education	Ordinal	None=0, primary=1, secondary=2, Tertiary=3, Not stated=4
Attribute	Occupation	Nominal	None=0, Farming=1, Fishing=2, Trading=3, Civil servant =4, Not stated=5
Attribute	Income	Ordinal	Highest=0, Middle-high=1, Middle=2, Middle-low=3, Lowest=4
Obstetric	Outcomes of Last Pregnancy	Nominal	Live birth=0, Dead=1, Stillbirth=2, LBW=3, Preterm Birth=4, Miscarriage=5, other congenital disabilities=6
Obstetric	Mode of delivery	Nominal	Normal=0, Breech=1, Cesarean section=2, Vacuum=3
Obstetric	Timing of ANC	Nominal	First trimester=0, Second trimester=1, Third trimester=2, Unhooked=3
Obstetric	Gestational Age at delivery	Ordinal	≤ 37weeks=0, 38-41weeks=1, ≥ 42weeks=2
Obstetric	Number of ANC receive	Ordinal	≤ 2=0, 3-4=1, ≥ 4=2

Ethical Considerations

This study adhered to ethical requirements. Permission to use this data was obtained from Nigerian Institute of Medical Research, as well as Walden University IRB (approval number is 05-31-18-0453510).The hospital data did not include participants names or nonpersonal identification., All the information was held in absolute confidence by the researcher and the data was stored in a personal computer and protected with a password only the researcher had access to.

Summary and Transition

This retrospective cross-sectional quantitative research study used hospital based secondary data from a Nigerian hospital to ascertain the risk factors for poor pregnancy outcomes in the studied population. The predictor variables and outcome variables, as well as the control variables, were discussed with their respective coding for statistical analyses. All statistical analyses were conducted with SPSS version 25, and the results provided in Chapter 4.

Chapter 4: Results

Introduction

The objective of this study was to determine the predictors of poor pregnancy outcomes among women in Island Maternity Hospital, Lagos, Nigeria. I analyzed hospital-based secondary data of 400 pregnant women aged 15-49 years from May, 2015, to June, 2017, in Nigeria, and I discuss the results in this chapter along with the theoretical framework.

This chapter presents a descriptive statistic of the socioeconomic variables (income, education, and occupation), as well as the demographic variables such as age, marital status, religion, ethnicity, place of residence of the study participants, and some of the selected biological attributes of the participants. Finally, I performed univariate logistic regression and multivariate logistics regression to assess the risk factors that contribute to or are associated with poor pregnancy outcomes at a large delivery center in Nigeria. I conducted all statistical analyses using the Statistical Package for the Social Sciences (SPSS) version 25, and I present the results of both descriptive analysis and inference statistics below.

Missing Data

There were no significant missing values in both the dependent and independent variables. It is noted earlier that missing data of less than 5% usually does not negatively impact the study results in any way (Walden University, *n.d.*).

Table 3

Operational Definitions

Number	Abbreviation	Definition
1	M	Mean age
2	SD	Standard deviation
3	N	Number
4	MM	Maternal mortality
5	NM	Neonatal mortality
6	LBW	Low birth weight
7	CI	Confidence interval
8	OLP	Outcome of last pregnancy
9	GAD	Gestational age at delivering
10	R^2	Nagelkerke pseudo R^2
11	H-L	Hosmer & Lemeshow Test
12	MD	Mode of delivering
13	TACV(Booking)	Timing of antenatal care visits
14	N. ANCR	Number of antenatal care receive
15	P & D	Pearson & Devine Test

Results

Descriptive Statistics

Demographic attributes of participants. The women were aged 15 to 49 years ($M = 29.41$, $SD = 6.16$). Most (89.3%) of the women were married, as depicted in Table 4. The most common ethnic group in the study population was Yoruba (73.8%) followed by a combination of minor ethnic groups from Southern Nigeria (10.7%)., Other demographic details are as shown in Table 4.

Table 4

Demographic Attributes of Sample

Variables	*N*	%
Age (years)		
< 19	19	4.6
20-24	83	20.1
25-29	94	22.8
30-34	124	30.1
35-39	70	17
>39	22	5.3
Marital status		
Married	368	89.3
Single	26	6.3
Divorced	10	2.4
Widow	8	1.9
Religion		
Christianity	230	55.8
Islam	178	43.2
Other	2	0.5
Ethnicity		
Yoruba	304	73.8
Igbo	40	9.7
Hausa/Fulani	6	1.5
Southern Minority	44	10.7
Northern Minority	18	4.4
Place of residence		
Rural	37	9
Urban	321	77.9
Semi-urban	54	13.1

Note. ($N = 412$).

Socioeconomic Attributes of Participants

The tests also revealed that about half of the pregnant women (51%) had completed secondary school education. Similarly, about half (52.7%) were within the lowest income group while 37.9% were unskilled. The socioeconomic trends exhibited above were not surprising as studies had established that the problem facing women of childbearing age in Nigeria also include poverty and lack of education, specifically in the case of those residing in rural communities in Nigeria (Ameh et al., 2016).

Table 5

Sociodemographic Attributes of Sample

Variables	*N*	%
Educational level completed		
Less primary	22	5.3
Primary	78	18.9
Secondary	210	51.0
Tertiary	102	24.8
Occupation		
Artisan	100	24.3
Business/Professional	34	8.3
Civil Servant	66	16
Military/Paramilitary	6	1.5
Housewife	16	3.9
Student	18	4.4
Unemployed	16	3.9
Unskilled	156	37.9
Monthly income		
Lowest	217	52.7
Low	113	27.4
Middle	54	13.0
Middle-High	23	5.6
High	5	1

Note. ($N = 412$).

Biological Attributes of Participants

The greater proportion (61.9%) of the women booked for antenatal care in the second trimester (13-26 weeks); less than 10% booked earlier at 12 weeks and below. Most (78.6%) of the women delivered at 38-40 weeks, while 7.8% had postterm (> 40 weeks) deliveries. One hundred and fifty-eight participants made 7-9 visits during antenatal care, while 27% made 10-15 visits. Most (84%) of the women had their babies to be between 2.5-3.99 kg at birth. It is interesting to note that the bulk of the pregnant women in this study had no prior pregnancies. About 26% of the women were primigravidas, while 20% had been 3-5 times pregnant, and 10% were 5-6 times pregnant.

Table 6

Biological Attributes of Sample

Variables	*N*	%
Timing of antenatal care (weeks)		
<12	38	9.2
13-26	255	61.9
>26	118	28.6
Gestational age at delivery (weeks)		
<37	56	13.6
38-40	324	78.6
>40	32	7.8
Number of antenatal care visits		
1-3	19	4.6
4-6	120	29.1
7-9	158	38.3
10-12	104	25.2
13-15	10	2.4
Birth weight (Kg)		
<2.49	62	15
2.50-3.99	348	84.5
>4.00	2	0.5
Parity		
0	169	41
1	106	25.7
2	69	16.7
3	40	9.7
4	24	9.7
5	2	5
6	2	5

Risk Factors Associated with Poor Pregnancy Outcomes

I conducted Pearson chi-square tests to ascertain if there was an association between the independent variables and dependent variables for the five research questions and the corresponding hypotheses. The outcomes of the tests are presented below. Also, I constructed logistic regression and multivariate logistic regression models to determine which independent variables and their subgroups were significantly associated with the dependent variables while controlling for covariates such as age, income, and educational level for the five research questions. The odds ratio, *p*-value, as well as the corresponding confidence interval is as shown below.

Outcomes of Last Pregnancy

RQ1. I constructed a two-way chi-square contingency table to determine if there was an association between the outcomes of last pregnancy and the dependent variables. Each of the outcome variables MM, NM, and LBW and the corresponding predictor variables were entered separately. There was a statistically significant association between the outcomes of last pregnancy and MM, NM and LBW. The chi-square test statistics were found to be X^2 (N = 412) = 7.25, p = .03, Cramer's V = .18, X^2 (N = 412) = 9.15, p = .01, Cramer's V = 14, and X^2 (N = 412) = 6.89, p = .03, Cramer's V = 13 respectively as indicated in Table 7. Based on the significance of the test statistics, the null hypothesis is rejected in favor of the alternative hypothesis that there is an association between the outcomes of last pregnancy and MM, NM, and LBW

Table 7

Association Between Outcome of Last Pregnancy and Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Dependent variables	X^2	*P*	Phi & Cramer's V	Appxo Sig
Maternal mortality	7.25	0.27	18	0.002
Neonatal mortality	9.15[a]	0.01	14	0.01
Low birth weight	6.89[a]	0.32	13	0.32

Gestational Age at Delivery

RQ2. As demonstrated in Table 8, the chi-square test showed that there is a statistically significant association between gestational age at delivery and NM and between gestational age at delivery and LBW but not between gestational age at delivery and MM. X^2 (N = 412) = 123.65, p = .000, Cramer's V = 54 and X^2 (N = 412) = 14.41, p = .000, Cramer's V = 23. The hypothesis that there are no associations between gestational age at delivery and NM and LBW is rejected in favor of the alternative hypothesis that there is an association. However, the hypothesis of no association between gestational age at delivery and MM is accepted.

Table 8

Association Between Gestational Age at Delivery and Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Dependent variables	X^2	*P*	Phi & Cramer's V	Appxo Sig
Maternal mortality	1.448	0.485	0.05	0.663
Neonatal mortality	123.65	0.000	54	0
Low birth weight	14.41	0.000	23	0

Mode of Delivery

RQ3. Table 9 indicates the statistical test between mode of delivery and MM, NM, and LBW. There is a statistically significant association between mode of delivery and NM, as well as between mode of delivery and LBW X^2 (N = 412) = 15.28, p = .000, Cramer's V = 26 and X^2 (N = 412) = 5.90, p = .05, Cramer's V = 14. The test between mode of delivery and MM showed an insignificant statistical association. Based on the test results, the hypotheses of no association between mode of delivery and NM and LBW are rejected, while the alternative hypothesis of an association are favored. Similarly, the test of no association between mode of delivery and MM are favored.

Table 9

Association Between Mode of Delivery and Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Dependent variables	X^2	*P*	Phi & Cramer's V	Appxo Sig
Maternal mortality	393	0.822	2	0.903
Neonatal mortality	15.28	0.000	26	0.000
Low birth weight	5.90	0.052	14	0.021

Timing of Antenatal Care Booking

RQ4. As shown, in Table 10, the chi-square test statistics between the timing of antenatal care booking and MM, NM, and LBW. The results indicated a significant statistical association between LBW and timing of antenatal care booking. X^2 (N = 412) = 5.77, p = 0.05, Cramer's V = 12, but the tests between the timing of antenatal care booking and MM and NM showed no association in favor of the null hypothesis. However, the test between the LBW and timing of antenatal care booking indicated a significant association in favor of the alternative hypothesis.

Table 10

Association between Timing of Antenatal Care Booking and Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Dependent variables	X^2	*P*	Phi & Cramer's V	Appxo Sig
Maternal mortality	1.64	0.441	8	0.313
Neonatal mortality	2.67	0.263	0.08	0.263
Low birth weight	5.77	0.056	12	0.056

Number of Antenatal Care Receive

RQ5. Table 11 describes the test statistics between a number of antenatal cares receive and MM, NM, and LBW. As shown, the statistical test results shown a statistically significant association between number of antenatal care receive and MM, NM, and LBW, X^2 (N = 412) = 10.59, p = .03, Cramer's V = 26, X^2 (N = 412) = 45.90, p = .000, Crime's V = 33, X^2 (N = 412) = 10.58, p = .03, Cramer's V = 16 respectively. Based on the outcomes of this test, the alternative hypotheses were favored indicating that there exists an association between the number of antenatal care receive and MM, NM, and LBW respectively.

Table 11

Association between Number of Antenatal Care Received and Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Dependent variables	X^2	*P*	Phi & Cramer's V	Appxo Sig
Maternal mortality	10.59	0.032	26	0.000
Neonatal mortality	45.90	0.000	33	0.000
Low birth weight	10.58	0.032	16	0.032

Logistic regression was done to determine which independent variable and the sub-group predicted poor pregnancy outcomes such as MM, NM, and LBW for pregnant women in Island Maternity, Nigeria. Each of the independent variables was assessed one at a time with their corresponding outcome variable for the five research questions. As indicated in Table 12, the independent variable of last pregnancy was a better predictor for MM. Overall, the model chi-square was found to be significant ($X^2 = 7.420$, $df = 2$, $p < .02$). Additionally, Nagelkerke Pseudo R^2 indicated high goodness of fit as the model explained about 50% of the variance, as well as the Hosmer & Lemeshow test $p = 1.00$.

Also, in Table 12, the outcome of the last pregnancy was found to predict LBW. The chi-square for the model ($X^2 = 7.212$, $df = 2$, $p < .03$). The Nagelkerke pseudo R^2 showed the moderate goodness of fit as the model accounted for 30% of the variance. In addition, the H-L ($p > 0.5$) was not significant which also implied high goodness of fit.

Table 12

Logistic Regression: Outcome of Last Pregnancy Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Variable	B	Wald	*P*	e^B
	Maternal mortality			
OLP		8.522	0.014	
OLP (1)	0.509	0.88	0.348	1.66
OLP (2)	1.772	7.715	0.005	5.88
	Low birth weight			
OLP		6.6116	0.037	
OLP (1)	-762	5.324	0.021	0.47
OLP (2)	-1.035	0.489	0.034	0.36
	Neonatal mortality			
OLP		7.922	0.019	
OLP (1)	-939	3.172	0.075	0.39
OLP (2)	0.829	2.025	0.155	2.29

Note. e^B = Exponential of B Note : OLP = Outcome of Last Pregnancy

As designated in Table 13, the gestational age at delivery predicted LBW (GAD -1) and NM (GAD -2). The chi-square test was found to be significant ($X^2 = 91.077$, $df = 2$, $p <. 0000$). The Nagelkerke pseudo R^2 demonstrated the moderate goodness of fit as 35% accounted for the variance, and the H-L test was $p > .05$. For the NM the chi-square test was ($X^2 = 17.414$, $df = 2$, $p <.000$). The Nagelkerke pseudo R2 was 13% and the H-L test $p > .05$.

Table 13

Logistic Regression: Gestational Age at Delivery Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Variable	B	Wald	*P*	e^B
	Maternal mortality			
GAD		19.014	0.000	
GAD (1)	2.025	3.581	0.058	7.58
GAD (2)	0.086	0.007	0.936	1.90
	Low birth weight			
GAD		82.286	0.000	
GAD (1)	-2.534	17.661	0.000	0.08
GAD (2)	0.673	1.356	0.244	1.96
	Neonatal mortality			
GAD		17.253	0.000	
GAD (1)	0.293	0.205	0.65	1.34
GAD (2)	-1.73	7.235	0.007	0.18

Note. GAD = Gestation Age at Delivery

Table 14 described the Mode of Delivery (MD) as predicting MM, NM, and LBW. However, as indicated in Table 14, only Mode of Delivery (MD-1) was statistically significant to MM, NM, and LBW**.** The corresponding chi-square test was found to be ($X^2 = 6.479$, $df = 2$, $p <. 04$), Nagelkerke pseudo R^2 accounted for 40% variance and the H-L test $p >.05$, ($X^2 = 5.897$, $df = 2$, $p <. 05$), Nagelkirk pseudo R^2 accounted 20% and the H-L test $p > .05$ and ($X^2 = 15.280$, $df = 2$, $p <. 000$), Nagelkerke pseudo R^2 accounted for 11% and the H-L test $p >.05$ correspondingly. Similarly, the respective odds ratio associated with the above founding's were 0.20, 4.10 and 0.0.10.

Table 14

Logistic Regression: Mode of Delivery Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Variable	B	Wald	*P*	e^B
	Maternal mortality			
MD		8.209	0.016	
MD (1)	-1.631	5.604	0.018	0.20
MD (2)	-0.118	0.013	0.908	0.89
	Low birth weight			
MD		6.719	0.035	
MD (1)	1.411	6.649	0.01	4.10
MD (2)	1.099	1.358	0.244	3
	Neonatal mortality			
MD		19.305	0.000	
MD (1)	-2.268	12.397	0.000	0.10
MD (2)	0.031	0.001	0.973	1.03

Note. MD = Mode of delivery

In Table 15, timing of antenatal care visits (Booking). This variable only significantly predicted birth weight, both category 1 and category 2 for the timing of antenatal care visit was found to be a significant predictor of LBW. The results for MM and NM were statistically insignificant. The chi-square test associated with the test was observed to be ($X^2 = 6.212$, $df = 2$, $p < .05$) Nagelkerke pseudo-R^2 was established as 30% accounted for the variance and the H-L test $p > .05$. The odds ratio for the test was found to be 0.35 and 0.46 respectively.

Table 15

Logistic Regression: Timing of Antenatal Care Visits Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Variable	B	Wald	*P*	e^B
	Maternal mortality			
TACV (Booking)		0.438	0.803	
TACV(Booking) 1	-269	0.11	0.741	0.76
TACV(Booking) 2	-303	0.427	0.514	0.74
	Low birth weight			
TACV (Booking)		5.521	0.063	
TACV(Booking) 1	-1.058	4.181	0.041	0.35
TACV(Booking) 2	-784	4.481	0.034	0.46
	Neonatal mortality			
TACV (Booking)		2.566	0.277	
TACV(Booking) 1	0.164	0.054	0.816	1.18
TACV(Booking) 2	-687	1.894	0.169	0.50

Note. TACV = Timing of Antenatal Care Visits

Table 16

Logistic Regression: Number of Antenatal Care Received Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight

Variable	B	Wald	*P*	e^B
	Maternal mortality			
N.ANCCR		1.39	0.846	
N.ANCCR 1	0.057	0.002	0.965	1.06
N.ANCCR 2	-747	0.434	0.51	0.47
N.ANCCR 3	-609	0.302	0.582	0.54
N.ANCCR 4	-788	0.471	0.493	0.46
	Low birth weight			
N.ANCCR		10.128	0.036	
N.ANCCR 1	0.754	0.48	0.488	2.13
N.ANCCR 2	-197	0.054	0.81	0.82
N.ANCCR 3	0.604	0.532	0.466	1.83
N.ANCCR 4	0.854	0.992	0.319	2.35
	Neonatal mortality			
N.ANCCR		27.076	0.000	
N.ANCCR 1	1.658	2.056	0.152	5.25
N.ANCCR 2	-938	0.667	0.414	0.39
N.ANCCR 3	-1.748	2.105	0.147	0.17
N.ANCCR 4	-1.022	0.761	0.383	0.36

Note. NANCR = Number of Antenatal Care received

Finally, multivariable logistics regression analysis was done to determine how the independent variables (predictor variables) performed when other covariates such age, income and education were controlled. As indicated in Table 17, for MM (MM) educational level completed and outcome of last pregnancy (OLP-1) was statistically

significant. The overall model was found to be significant at (X^2 = 18, 403, *df* = 5, *p* <. 002), Pearson & Devine *p* >.05, and the Nagelkerke pseudo R^2 = 13%. The chi-square test associated with educational level completed and OLP-1 was noticed to be (X^2 = 6, 771, *df* = 1, *p* <. 010; OR =2.08, CI = 1.20-3.60) and (X^2 = 6, 578, *df* = 2, *p* <.037; OR = 0.24, CI = 0.07-0.88). Also, as showed in Table 17, all other independent variables held constant the educational level completed and OLP 1 and OLP -2 were statistically significant to LBW. The model was found to be significant at (X^2 = 12.382, *df* = 5, *p* <.030), P & D = P ,.000, R^2 = 5%, and the individual chi-Square test related to the significant variables were found to be (X^2 = 4.508, *df* = 1, P <. 034; OR = 1.49, CI= 1.02-2.17) and (X^2 = 8.656, *df* = 2, *p* <.013; OR = 2.41, CI = 1.22-4.75 and OR = 3.14, CI = 1.87-8.33). For NM as described in table 15, educational level completed, monthly income and OLP was significant. The overall model was found to be (X^2, 27.632, *df* = 5, *p* <.000), P&D = > .05, and R^2 = 20%, and the chi-Square test associated with educational level completed was found to be (X^2 = 16.168, *df* =1, *p* <.000; OR = 3.84, CI 1.99-7.40), monthly Income (X^2 = 9.050, *df* = 1, *p* <.003; OR = 0.18, CI = 0.06-0.55) and OLP (X^2 = 6.513, *df* = 1, P <.011; OR 5.03, CI = 1.46-17.39).

Table 17

Multivariate Logistics: Outcomes of Last Pregnancy Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight with Controlled Covariates

Variables	B	Wald	*P*	e^B	95% CI of e^B	
					LL	UL
	Maternal mortality					
Intercept	-13.734	165.107	0.000			
Age	-0.197	1.216	0.27	0.82	0.58	1.77
Educational Level completed	0.737	6.758	0.009	2.08	1.2	3.6
Monthly Income	15.43			5.03	5.03	5.03
Outcomes of Last Pregnancy 1	0.087	0.021	0.886	1.09	0.33	3.59
Outcomes of Last Pregnancy 2	-1.422	4.649	0.031	0.24	0.07	0.88
	Low birth weight					
Intercept	-2.888	9.327	0.002			
Age	0.025	0.045	0.822	1.03	0.82	1.29
Educational Level completed	0.398	4.287	0.038	1.5	1.02	2.17
Monthly Income	-716	1.484	0.223	0.49	0.15	1.55
Outcomes of Last Pregnancy 1	0.879	6.453	0.011	2.41	1.22	4.75
Outcomes of Last Pregnancy 2	1.145	5.311	0.021	3.14	1.19	8.33
	Neonatal mortality					
Intercept	0.698	0.439	0.51			
Age	0.012	0.004	0.99	0.99	0.68	1.43
Educational Level completed	1.345	16.168	0.000	3.84	1.2	7.4
Monthly Income	-1.719	9.05	0.003	0.18	0.06	0.55
Outcomes of Last Pregnancy 1	1.615	6.513	0.011	5.03	1.46	17.39
Outcomes of Last Pregnancy 2	-556	0.803	0.37	0.57	0.17	1.94

Note. SE = Standard Error, LL = lower level, UL = upper levels and CI = confidence interval, e^B = Exponential of B

Holding all other independent variables constant gestational age at delivery (GAD) and educational level completed (EDULC) was statistically significant to MM as described in table 16. Generally, the model was found to be a good fit at (X^2 = 36.882, *df* = 5, P <. 000), P&D = >. 05 and R^2 = 21%., and the chi-Square test for EDUCL (X2 = 8.997, *df* = 1, P <. 003; OR = 2.28, CI = 1.33-3.92) and GAD (X^2 = 5.026, *df* = 1, P <. 0.025; OR = 0.09, CI = 0.01-0.74). For LBW, the only significant variable was GAD. The model was found to be a good fix at (X^2 = 94.843, *df* = 5, *p* <. 000), P&D P <. 000 and R^2 = 36% and the chi-Square for GAD (X^2 = 17.353, *df* =1, *p*<.000; OR 12.96, CI = 3.88-43.27). GAD, Monthly income and EDUCL completed was also found to be significant to NM as indicated in table 16. Generally, the model was found to be a good fit at (X^2 = 33.973, *df* = 5, *p* <.000), P&D = *p* <.031 and R2 = 24%. The individual chi-square test related to the significant variables are EDULC (X^2 = 11.826, *df* = 1, *p* <. 001; OR 2.83, CI = 1.56-5.11), Monthly income (X^2 = 9.814, *df* = 1, *p* <. 002; OR 0.6, CI = 0.05-0.50) and GAD (X^2 = 5.955, *df* = 1, *p* <.0.15; OR 5.35, CI = 1.39-20.54) respectively.

Table 18

Multivariate Logistics: Gestational Age at Delivery Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight with Controlled Covariates

Variables	B	Wald	*P*	e^B	95% CI of e^B	
					LL	UL
	Maternal mortality					
Intercept	-13.243	91.46	0.000			
Age	-235	1.642	0.2	0.79	0.55	1.13
Educational Level completed	0.826	8.997	0.003	2.28	1.33	3.92
Monthly Income	15.556		.			
Gestational Age Delivery 1	-2.453	5.026	0.025	0.09	0.01	0.74
Gestational Age Delivery 2	-340	0.1	0.751	0.71	0.09	5.83
	Low birth weight					
Intercept	-2.751	5.298	0.021			
Age	0.107	0.603	0.438	1.11	0.85	1.46
Educational Level completed	0.361	2.644	0.104	1.44	0.93	2.28
Monthly Income	-621	0.809	0.368	0.54	0.14	2.08
Gestational Age Delivery 1	2.562	17.353	0.000	12.96	3.88	43.27
Gestational Age Delivery 2	-679	1.334	0.248	0.51	0.16	1.61
	Neonatal mortality					
Intercept	0.832	0.537	0.464			
Age	0.143	0.519	0.471	1.15	0.78	1.7
Educational Level completed	1.039	11.826	0.001	2.83	1.56	5.11
Monthly Income	-1.851	9.814	0.002	0.16	0.05	0.5
Gestational Age Delivery 1	-556	0.631	0.427	0.57	0.15	2.26
Gestational Age Delivery 2	1.676	5.955	0.015	5.35	1.39	20.54

Note. SE = Standard Error, LL = lower level, UL = upper levels and CI = confidence interval, e^B = Exponential of B

As illustrated in Table 19, the only significant variable to MM was EDULC. The model was considered to be a good fit at (X^2 = 18.047, *df* = 5, *p* <.003), P&D >.05 and R^2 = 12%. The chi-Square test associated with this variable was found to be significant at (X^2 = 6.182, *df* = 1, *p* <. 0.13; OR 1.95, CI = 1.15-3.29). Mode of delivery (MD) and EDULC was statistically significant to LBW and the model was found to be a good fit at (X^2 = 11.548, *df* = 5, *p* <.0.042) P&D = *P* <.05, and R^2 = 5%. The individual chi-square test associated was found to be (X^2 = 3.944, *df* = 1, *p* <. 0.047: OR = 1.47, CI = 1.01-2.16) for EDULC and for MD (X^2 = 8.913, *df* = 1, *p* <.003; OR = 0.18, CI = 0.06-0.56), and EDULC, Monthly Income and MD was found to be significant to NM. The overall model was found to be a good fit at (X^2 = 31.123, *df* = 5, *p* <.000), P&D = >.05, and R^2 = 22% . for EDULC (X^2 = 13.337, *df* = 1, *p* = <.000; OR = 3.07, CI 1.68-5.51), MI (X^2 = 7.551, *df*= 1, *p*<. 010; OR 0.20, CI = 0.06-0.63) and MD (X^2 = 7.913, *df* = 1, *p*<.005; OR 6.71, CI = 1.78-25.24).

Table 19

Multivariate Logistics: Mode of Delivery Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight with Controlled Covariates

Variables	B	Wald	*P*	e^B	95% CI of e^B	
					LL	UL
Maternal mortality						
Intercept	-15.332	188.513	0.000			
Age	-152	0.754	0.385	0.86	0.61	1.21
Educational level completed	0.652	6.182	0.013	1.95	1.15	3.29
Monthly income	15.755					
Mode of delivery 1	1.278	3.028	0.082	3.59	0.85	15.19
Mode of delivery 2	-740	0.441	0.507	0.48	0.05	4.24
Low birth weight						
Intercept	-689	0.442	0.506			
Age	0.087	0.572	0.447	1.09	0.87	1.37
Educational level completed	0.387	3.944	0.047	1.47	1.01	2.16
Monthly income	-850	1.871	0.171	0.43	0.13	1.45
Mode of delivery 1	-1.709	8.913	0.003	0.18	0.06	0.56
Mode of delivery 2	-1.477	2.299	0.129	0.23	0.03	1.54
Neonatal mortality						
Intercept	-645	0.275	0.6			
Age	0.253	1.57	0.21	1.29	0.87	1.91
Educational level completed	1.123	13.337	0.000	3.07	1.68	5.61
Monthly income	-1.622	7.551	0.006	0.2	0.06	0.63
Mode of delivery 1	1.903	7.913	0.005	6.7	1.78	25.24
Mode of delivery 2	-1.046	1.116	0.291	0.35	0.05	2.45

Note. SE = Standard Error, LL = lower level, UL = upper levels and CI = confidence interval, e^B = Exponential of B

Table 20

Multivariate Logistics: Timing of Antenatal Care Visits Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight with Controlled Covariates

Variables	B	Wald	*P*	e^B	95% CI of e^B	
					LL	UL
	Maternal mortality					
Intercept	-14.804	232.031	0.000			
Age	-176	1.129	0.288	0.84	0.61	1.16
Educational Level completed	0.693	7.39	0.007	2.00	1.21	3.23
Monthly Income	16.001					
Timing of Antenatal Care Visits 1	0.583	0.489	0.484	1.79	0.35	9.16
Timing of Antenatal Care Visits 2	0.469	0.978	0.3	1.6	0.63	4.05
	Low birth weight					
Intercept	-3.033	9.673	0.002			
Age	0.057	0.24	0.624	1.06	0.84	1.33
Educational Level completed	0.353	3.19	0.074	1.42	0.97	2.1
Monthly Income	-574	0.992	0.319	0.56	0.18	1.74
Timing of Antenatal Care Visits 1	1.2002	5.155	0.023	3.33	1.18	9.4
Timing of Antenatal Care Visits 2	0.762	4.138	0.042	2.15	1.03	4.51
	Neonatal mortality					
Intercept	0.858	0.657	0.418			
Age	0.181	0.913	0.339	1.2	0.83	1.74
Educational Level completed	1.083	13.618	0.000	2.96	1.67	5.25
Monthly Income	-1.527	7.148	0.008	0.22	0.07	0.67
Timing of Antenatal Care Visits 1	0.05	0.005	0.946	1.05	0.25	4.48
Timing of Antenatal Care Visits 2	0.574	1.2	0.273	1.78	0.64	4.96

Note. SE = Standard Error, LL = lower level, UL = upper levels and CI = confidence interval, e^B = Exponential of B

Table 18 showed that EDULC was significant to MM. The model was considered a good fit at (X^2 = 12.884, *df* = 5, *p* <. 024), P&D = <.05 and R2 = 8%. The chi-Square test associated with EDULC was found to be (X^2 = 7.39, *df*= 1, *p* <. 010; OR 2.00, CI = 1.21-3.23). Additionally, as showed in table 18, Timing of Antenatal Care Visits (1&2) was significant to LBW. and the overall model was found be a good fit at (X^2 = 10.1298, *df* = 5, P & D = *p* > .05 and R2 = 4%. The chi-Square test related to both timing of antenatal care visits (booking) category 1 and 2 was found to be significant (X^2 = 5.155, *df* =1, *p* <.023; OR 3.33, CI 1.18-9.40) and (X^2 = 4.138, *df*= 1, *p* <. .042; OR = 2.15, CI = 1.03-4.51). Finally, on table 18, EDULC and Monthly Income was statistically significant to NM. The general model was found to be a good fit at (X^2 = 18.378, *df* =5, *p* <.003) P&D = >.05, and R^2 = 14%, and the respective chi-Square test for EDULC (X^2 =13.618, *df* = 1, *p* <..000; OR 2.96, CI = 1.67-5.25 and Monthly Income (X^2 = 7.148, *df* =1, *p* <. 010; OR = 0.22, CI = 0.07-0.67).

Holding all other predictor variables constant EDULC was statistically significant to MM as illustrated in table 19. The overall model was found to be a good fit (X^2 = 12.693, *df* = 7, *p* >.05) P&D = >.05 and R^2 = 9%. The individual associated chi-Square was significant (X^2 = 6.865, *df* = 1, *p* <.0.10; OR = 2.02, CI = 1.19-3.41). EDULC and Monthly Income was also considered significant to NM, and the general model was a good match (X^2 = 34.612, *df* = 7, *p* <.000), P&D = >.05, and R^2 = 25%. The related respective chi-square test was found to significant, EDULC (X^2 = 7.323, *df* -1, *p* <. 010; OR = 2.48, CI = 1.28-4.82) and Monthly Income (X^2 = 10.420, *df* =1, *p* <..001; OR = 0.14, CI = 0.04-0.47).

Table 21

Multivariate Logistics: Number of Antenatal Care Received Predicting Maternal Mortality, Neonatal Mortality, and Low Birth Weight with Controlled Covariates

Variables	B	Wald	*P*	e^B	95% CI of e^B	
					LL	UL
	Maternal mortality					
Intercept	-14.962	106.987	0.000			
Age	-179	1.068	0.301	0.84	0.6	1.17
Educational Level completed	0.702	6.865	0.009	2.02	1.19	3.41
Monthly Income	15.851					
N. ANC Receives 1	0.376	0.081	0.777	1.46	0.11	19.35
N. ANC Receives 2	0.545	0.225	0.635	1.72	0.18	16.35
N. ANC Receives 3	0.612	0.299	0.585	1.86	0.21	16.58
N. ANC Receives 4	0.925	0.632	0.427	2.52	0.26	24.68
	Low birth weight					
Intercept	-1.477	1.572	0.21			
Age	0.067	0.399	0.56	1.07	0.85	1.34
Educational Level completed	0.173	0.756	0.385	1.19	0.81	1.76
Monthly Income	-623	1.058	0.304	0.54	0.16	1.76
N. ANC Receives 1	-613	0.312	0.576	0.54	0.06	4.65
N. ANC Receives 2	0.158	0.037	0.848	1.17	0.23	5.91
N. ANC Receives 3	-603	0.528	0.467	0.55	0.11	2.78
N. ANC Receives 4	-833	0.938	0.333	0.44	0.08	2.34
	Neonatal mortality					
Intercept	1.641	1.119	0.29			
Age	0.005	0.001	0.981	1.01	0.68	1.49
Educational Level completed	0.91	7.232	0.007	2.48	1.28	4.82
Monthly Income	-1.949	10.42	0.001	0.14	0.04	0.47
N. ANC Receives 1	-1.029	0.727	0.394	0.36	0.03	3.8
N. ANC Receives 2	0.947	0.658	0.417	0.58	0.26	25.41
N. ANC Receives 3	2.112	2.899	0.089	8.26	0.72	93.97
N. ANC Receives 4	1.485	1.516	0.218	4.41	0.42	46.9

Note. SE = Standard Error, LL = lower level, UL = upper levels and CI = confidence interval, e^B = Exponential of B

Statistical Assumptions

All the relevant statistical assumptions as related to this study were checked prior to conducting the analysis. There were no obvious cases where the assumption were violated. However, there are few instances where the Pearson and Divine Statistics were different suggesting over dispersion. This was ignored it as there were too many expected count cells frequencies below 5, which might contribute to the discrepancy. Also, SPSS does not actually provide any proper test to evaluate multicollinearity. Field (2013), suggested testing the assumption of multicollinearity through Collinearity Diagnostics. This assumption was evaluated using the proposed method, and the results were within the recommended standards — the Tolerance, VIF, Eigenvalue, and the Condition Index, except one of the Condition Index that was above 15, which according to Field (2013) will not bias the study outcome.

Summary

This study sought to ascertain the risk factors that predict or contributed to poor pregnancy outcomes for pregnant women who utilized Island Maternity Hospital, Nigeria for their antenatal and delivery services. Using statistical package, SPSS Version 25 for analysis, four of the null hypotheses were but rejected others.

Question 1: Outcomes of last pregnancy

- There was an association between outcomes of last pregnancy and MM
- There was an association between outcomes of last pregnancy and NM
- There was an association between outcomes of last pregnancy and LBW

Question 2: Gestational age at delivery

- There was an association between gestational age at delivery and NM
- There was an association between gestational age at delivery and LBW
- There was no association between gestational age at delivery and MM

Question 3: Mode of delivery

- There was an association between mode of delivery and NM
- There was an association between mode of delivery and LBW
- There was no association between mode of delivery and MM

Question 4: Timing of antenatal care visits (Booking)

- There was an association between the timing of antenatal care visits and LBW
- There was no association between the timing of antenatal care visits and MM
- There was no association between the timing of antenatal care visits and NM

Question 5: Number of antenatal cares received

- There was an association between the number of antenatal cares receive and MM
- There was an association between the number of antenatal cares receive and NM
- There was an association between the number of antenatal cares receive and LBW

This study analyzed secondary data from Island Maternity Hospital, Nigeria between May 2015 to June 2017 for pregnant women between the age of 15-49 years. The outcomes of this analysis demonstrated that outcomes of last pregnancy, gestational age at delivery, mode of delivery, as well as the timing of antenatal care booking and

number of antenatal cares receives are still critical risk factors for poor pregnancy outcomes for women of childbearing in Nigeria. It is also interesting to note that educational level completed, and incomes are contributing risk factors to poor pregnancy outcomes for pregnant women in Nigeria.

Chapter 5 presented detail findings from the results obtained from chapter 4 as well as providing interpretations for the findings and highlights areas were the findings aligned with previous research and where it disagrees. Also, discussed in Chapter 5 were the study limitations and recommendations for further studies. Finally, the chapter concluded by discussing the study implication for social change and conclusion.

Chapter 5: Discussion, Conclusions, and Recommendations

Overview

Research has demonstrated that poor pregnancy outcomes are serious problems in developing countries, (Mojekwu, & Ibwkwe, 2011;Odeyemi et al., 2014). It is known that adverse pregnancy outcomes are public health challenges that are due to behavioral, personal, and environmental factors (Ezeh et al, 2014; World Bank, 2016).

This quantitative, retrospective cross-sectional study was undertaken to ascertain the risk factors that predict poor pregnancy outcomes among pregnant women in Island Maternity Hospital, Nigeria. The aims were to determine if there is an association between independent variables (outcomes of last pregnancy, mode of delivery, gestational age at delivery, number of antenatal cares received, and timing of antenatal care booking) and the dependent variables (MM, NM, and LBW). Another aim was to use the results obtained to make recommendations on how to enhance pregnancy outcomes for women of childbearing age in Nigeria.

In the study I analyzed secondary data from Island Maternity Hospital, Nigeria, from May, 2015, to June, 2017, for pregnant women aged 15-49 years who received antenatal care and delivered their babies at the hospital. The analysis excluded pregnant women who delivered twins, because owing to inherent biological factors, twins and other multiple pregnancies had increased possibilities of obstetric and perinatal complications like preeclampsia, postpartum hemorrhage, LBW, and preterm birth, which are known risk factors for maternal and perinatal mortality (Vogel et al., 2013).

Interpretation of Research Findings

Eleven of the null hypotheses were rejected for the five research questions relating to the predictors of poor pregnancy outcomes among pregnant women in Island Maternity Hospital, Nigeria.

Outcomes of Last Pregnancy

In this study, pregnant women who experienced poor pregnancy outcomes in their last pregnancy were 76% less likely to survive their subsequent pregnancy compared to those who did not experience any poor pregnancy outcomes. The chances of pregnant women surviving during pregnancy increased nearly 108% for those with primary education or higher compared to those without primary education. Pregnant women who delivered a normal weight baby in their previous pregnancy had about 141% increased likelihood of delivering normal weight babies in their next pregnancy. On a similar note, pregnant women with less than primary education were 49% more likely to deliver LBW babies compared to those with higher educational level. Pregnant women who delivered a live newborn in their last pregnancy were 403% more likely to have a live birth in their subsequent pregnancy compared to those whose babies were stillbirths. Women with primary education or better had about 284% increased chances of delivering live babies compare to those with less than primary education. Also, pregnant women in the lowest income group were about 82% less likely to deliver live babies compared to those in the higher income groups.

The above findings agree with what is already documented that women who had adverse pregnancy outcomes in prior pregnancies had about 50% probability of having

poor outcomes in subsequent pregnancies, for example, stillbirth, neonatal death, preterm delivery, LBW, and cesarean section (Mahande et al., 2013; O'Neill et al., 2014; Ouyang et al., 2013; Shapiro, Séguin, Muckle, Monnier, & Fraser, 2017). The recurrence risk accounted for about 21.2% of perinatal deaths in second pregnancies, and adverse outcomes in initial pregnancies such as preeclampsia, placental abruption, placental pelvis, induced labor, preterm delivery, and LBW increased the risk of perinatal mortality in successive pregnancies (Mahande, et al., 2013). These findings were not surprising as stillbirths, NM, and other adverse pregnancy outcomes remained dominant in developing countries such as Nigeria (Ouyang et al., 2013). It is also demonstrated in this study that there is a strong association between the outcomes of previous pregnancies and subsequent ones as well as evidence of higher educational level and better income in relation to healthier pregnancy outcomes in subsequent pregnancies.

Gestational Age of Delivering

In this study, it was discovered that pregnant women who delivered their babies in the preterm period (< 37 weeks) were 91% less likely to survive during childbirth compared to those women who delivered in the term period. Likewise, pregnant women with primary education or better had about 128% increased probability of surviving during childbirths compared to those with less than primary education. The result also showed that pregnant women who delivered in the preterm period had 1,196% increased odds of delivering LBW babies compared to those who delivered in the full-term period. On the same note, women who gave birth to newborns in the term period (38-40 weeks) were 435% more likely to deliver live babies compared to those who delivered in the

preterm period. Pregnant women with primary education or better had 183% increased probability of giving birth to live babies compared to those with education below the primary school, and pregnant women in the lowest income bracket had about 84% reduced probability of giving birth to live babies compare to those in the high-income rank.

WHO (2018) estimated that nearly 15 million newborns are born preterm every year before 37 weeks of gestation. Preterm birth is considered the leading cause of death for infants and children below 5 years of age and the rate of preterm birth is 5% to 18% among 184 countries. More so, newborns born in late-term, moderate to early preterm carried a severe burden of diseases in their third and fifth years (Boyle et al., 2012). Schieve et al., (2016) noted that very LBW -preterm births, moderate LBW preterm births, and normal birth weight -preterm births were prone to a developmental disorder such as cerebral palsy, autism spectrum disorder, intellectual disability, and behavior conduct disorders. The study also showed that planned delivery below 39 weeks of gestation is associated with renal disease, and those delivered prior to 37 weeks of gestation were linked to adverse neonatal outcomes. Above 39 weeks of gestation was associated with an increase in severe preeclampsia (Harper, Biggio, Anderson, & Tita, 2016).

The above findings in this study agreed with the existing literature that babies born in the preterm period were vulnerable to LBW and that is also linked to another issue such as NM and developmental disorder beyond the infants age (Boyle et al., 2012; Catov et al., 2017; Harper et al., 2016; Schieve et al., 2016). It is also evidence that

preterm birth had a link to LBW and that LBW imposed a substantial financial and economic burden on the affected families, especially in developing countries (Tango, Orimadegun, Ajayi & Akinyinka, 2009; WHO, 2015). Nigeria is also considered among the 10 countries with the greatest number of preterm births. This is not shocking as race/ethnicity have been found to be responsible for LBW and preterm birth particularity among the Black race (March of Dimes, 2014; WHO, 2015).

Mode of Delivery

Pregnant women who had normal vaginal delivery were 82% less likely to have LBW babies compared to those who had breech and cesarean sections and had 570% increased chances of delivering live newborns compared those who had breech and cesarean section. It was also noted that pregnant women with primary education or better had 95% chances of surviving during delivery compared to those with less than primary education. Similarly, pregnant women with education below primary school had 47% increased chances of delivering LBW babies compared those with primary or higher education. Pregnant women with primary education or better were also found to have about 207% more chances of delivering live newborns compared with those whose education is below the primary school. On the other hand, pregnant women in the lowest income group had almost 80% decreased likelihood of delivering or having live babies compared to those in the higher income groups. Pregnant women within the age of 20-34 years old are 29% more likely to deliver live babies compared those in the other age brackets.

Studies had documented that cesarean section is on the rise, especially in advance countries. In addition, there are serious debates as to which mode of delivery is safer. Some researchers favor elective cesarean section while others opt for vaginal delivery (Abebe, Gebeyehu, Kidane, & Eyassu, 2016; Briand et al., 2012; Hou et al., 2017). The cardinal point is that some mode of delivery presents greater risk than others. It had been documented that indeed the mode of delivering an infant is a pregnancy risk factor. For example, Abebe et al, (2016) found that the mode of delivering a baby through cesarean section is prone to low first-minute Apgar score, NM, MM, and respiratory distress syndrome compared to babies born through vaginal delivery. Similarity, Chen et al.(2015) also affirmed that babies born through cesarean section were susceptible to a higher rate of LBW compared to those born through vaginal delivery.

There are statistically significant differences between cesarean and vaginal delivery with better results observed in babies born through vaginal delivery compared to those born via cesarean section (Negrini, Assef, Da Silva, & Araujo , 2015). A study by Briand et al. (2012) also showed that trial labor, intrapartum cesarean section and operative vaginal delivery demonstrated a higher risk of MM and morbidity and NM compared to spontaneous vaginal delivery. Related findings were also acknowledged by Stohl, Szymanski, and Althaus (2011) indicating that cesarean section is vulnerable to estimated blood loss and postpartum infection compared to breech vaginal delivery.

The findings in this study amplified the fact that vaginal delivery posed relatively low risk of MM, LBW, and NM compared to other modes of delivering a newborn

(Abebe et al., 2016; Briand et al., 2012; Chen et al., 2015; Negrini et al., 2015; Stohl et al., 2011).

Timing of Antenatal Care Booking

In this study, it was noted that pregnant women who booked for antenatal care in the first trimester (less than 12 weeks) of being pregnant had about 233% more chances of delivering normal weight babies compared to those that booked later in their pregnancy. On the same note, pregnant women who booked for antenatal care in the second trimester (13-26 weeks) of being pregnant had nearly 115% increased likelihood of delivering a normal weight infant compared to those who booked in the third trimester.

According to WHO (2013), nearly 69% of pregnant African women booked and received at the minimum one antenatal care visit with an increase in the coverage of first-trimester booking. Booking and receiving antenatal care during pregnancy helped alleviate pregnancy complications and reduce maternal and NM (WHO, 2013). Studies had documented that women that do not book for antenatal care during pregnancy are increasingly vulnerable to delivering LBW babies (Awoleke, 2012 Onwuhafua, Ozed.Williams, Kolawole, & Adze, 2016).Booking for antenatal care is a protective factor for maternal death, neonatal death and other pregnancy complications (Fawole et al., 2012). The study also revealed that booking for antenatal care in the second trimester were more likely to result in LBW and preterm birth (Alwan, Roderick, & Macklon, 2016). It is further noted that more pregnant women booked for antenatal care services in the second trimester of their pregnancies; for instance, Parsa (2012), established that 27%

of women booked for antenatal care in the first trimester, 62.9% in the second trimester and 2.7% in the third trimester.

In this study, there were no significant associations between timing of booking and MM or the timing of booking and NM. However, there was a significant association between timing of booking and birth weight (normal birth weight) which supported some of the earlier findings in the literature on this subject. (Fawole et al., 2012; Tuladhar. & Dhakal, 2011; Kuhnt & Vollmer, 2017).

Number of Antenatal Care Received

This test did not produce a significant association between MM, NM, and LBW. Nonetheless, there were clinical lessons learnt from this test for instance the more the number of antenatal care pregnant women received, the more likely they will survive during childbirth. For instance, 1-3 visits the chances increased by 46%, 4-6 visits the chances increased by 72%, 7-9 visits it increased by 85% and 10-12 visits the chances increased by 152% respectively. Similarly, the chances of newborn surviving also increased with the number of antenatal care pregnant women received but decreased after the ninth visits. For example, 1-3 visits the odds grew by 64%, 4-6 visits the odds increased to 158%, 7-9 visits the odds increased to 726% while for 10-12 visits, the odds was 341% accordingly.

The WHO (2013) recommended four essential visits known as focus intervention for healthy pregnant women. Previous literature findings are in agreement with the above assessment. Tuladhar and Dhakal (2011) found that pregnant women who received regular antenatal care had improved maternal and perinatal outcomes. It is also

documented that pregnant women who received one antenatal care visit reduced the odds of NM by 1.04% and 1.07% reduced odds of infants mortality, those that had four antenatal care visits were associated with further reduction of NM and infants mortality by 0.56% and 0.42% respectively (Kuhnt & Vollmer, 2017). Additionally, one antenatal care visit is linked to 3.82% reduced odds of giving birth to LBW baby, and four antenatal care visits were associated with 2.83% reduced chances of giving birth to a LBW baby (Kuhnt & Vollmer, 2017).

Social Cognitive Theory

Social cognitive theory was the framework used in this study. This theory assumes that human behavior is shaped by the interchange of personal, behavioral and environmental impacts. SCT further highlight the abilities of people to amend or build their desired environment through the ability of collective actions. I assumed that Nigerian women of childbearing age would be confronted with poverty, inadequate education, cultural, religious and traditional norms and other obstetric factors which influence some of the undesirable behaviors that lead to poor pregnancy outcomes.

The SCT was the appropriate lens to which to predict poor pregnancy risk factors and to model positive behaviors change in order to enhance pregnancy outcomes for women of reproductive age in Nigeria. There is evidence in the literatures that outcome of previous pregnancy, timing of booking and receiving of insufficient antenatal care, gestational age of delivery, mode of delivery as well as low income and inadequate education are pregnancy risk factors (Abebe, et al., 2016; Awoleke & Gynecol, 2012;

Boyle et al., 2012; Onwuhafua, et al, 2016l Shapiro, Séguin, Muckle, Monnier, & Fraser, 2017),

This study had demonstrated that the risk factors of impoverished pregnancy outcomes are complicated which comprise personal, behaviors and environmental factors. Several SCT constructs can be used to model positive behaviors change among childbearing age women in Nigeria to improve pregnancy outcomes. For instance, the self-efficacy, outcomes expectation, collective efficacy, self-regulation, reciprocal determinism, and observational learning. These study findings showed that SCT is an application framework that would be tailored to create effective strategies to boost pregnancy outcomes for women of reproductive age.

Limitations of the Study Findings

It was a retrospective cross-sectional study which used secondary data for the analysis. Thereby, one can only show the association between the dependent and independent variables and not necessarily causation. The study only uncovered the prevalence of the outcomes and not incidence which could be considered a limitation to the study. Although, the study controlled for socioeconomic variables such as age, income, education, occupation and other obstetric factors were not controlled for in this study. This might likely influence the study outcomes to either direction (positive or negative). Therefore, caution should be exercised when generalizing the results to a larger society.

Another limitation of the study was the disproportionate proportion of married, pregnant women (89.3%), Yoruba (73.8%), those from the urban location (77.9%) and

those with educational level of secondary school and higher (75.8%) compared to the other population. This is not surprising to the researcher considering the fact that the study was conducted in an urban area of Lagos which is one of the major cities in Nigeria. These could possibility influence the study outcomes. It is worthy to note that this is a Hospital data collected in the heart (urban area) of Lagos, Nigeria. Therefore, that hindered the generalizability of the study outcomes.

Recommendations for Further Study

This study demonstrated the predictors of poor pregnancy outcomes as it relates to MM, NM, and LBW in Nigeria for women childbearing age. Nigeria consistently performed poorly in most of the pregnancy outcomes indicators, worse than most African countries. Further studies are needed that will look beyond socioeconomics and obstetric factors alone but also considering environmental factors.

Further studies are needed that will take into account the history of poor pregnancy outcomes, dating back for at least three years. These will help enhance pregnancy outcomes for this population and provide strategies to better equip pregnant women who had experienced adverse pregnancy in their previous pregnancy for the subsequent pregnancy.

Future studies should aim at providing preconception care education and promotion for women of childbearing age in Nigeria. Preparing and educating women in advance is a step in the right direction and will limit or decrease the rate of poor pregnancy outcomes in these populations for the present and next generation.

It is worthy of note that the present study sample included a larger percentage of urban, educated (secondary and higher) and Yoruba pregnant women. Future studies should consider what the results will be if the population of rural, primary or uneducated women or other ethnic population were higher or equal to the urban population. That might likely provide more useful information on how to improve adverse pregnancy outcomes for women of reproductive age in Nigeria.

Booking for antenatal care in the first trimester was more beneficial to pregnant women and produced better birth outcomes compared to those that booked for antenatal care in the second or the third trimester. Yet, the majority of pregnant women booked for antenatal care in the second trimester. Future research should determine reasons why a larger proportion of pregnant women book for antenatal care in their second trimester and how to reverse this trend for better birth outcomes.

The constant interaction between personal factors, behavior, and environmental factors help shape the behavior of pregnant women, and influence pregnancy outcomes positively or negatively. Further studies should consider SCT in examining the interactions pathways between personal factors, behavior and environmental factors in modeling positive behavior change among women in Nigeria. Many of the constructs of SCT can be tailored to change the cultural, religious and traditional beliefs or norms of women in Nigeria. Thus, improving pregnancy outcomes of pregnant women in the population.

Finally, better income and quality education had been documented as positively associated with better pregnancy outcomes. Stakeholders at all levels, federal, state, local

and community should create policies and programs that will place greater emphasis on female education. These policies should also provide provision for educational campaign and promotion to rural communities in Nigeria where they are greatly affected. If possible, government at federal and state levels must provide financial incentives for girls education, especially in the rural communities. This will help avert the trend of early marrige, early and unwanted pregnancy which is a known predisposing factor to poor pregnancy outcomes and toward achieving quality education.

Government policies at all levels must provide adequate and quality employment for females, such that is comparable to their male counterparts. Programs, loans and grant incentives aim at providing working incomes should be established, particularly in the rural areas of Nigeria to benefit women. These will enhance the poverty status of women in Nigeria thereby, reducing some of the adverse pregnancy outcomes connected with poverty.

Implications for Positive Social Change

This study has the likelihood of broadening the understanding of poor pregnancy outcomes especially in Nigeria. The potential impacts of positive social change of this study will be observed on several levels, such as individual, family, organization, and society/policy level. At the individual level, this study provides useful information regarding the benefit of quality education and income especially for women, and how that can help shape positive pregnancy outcomes. It further acknowledged the advantages of booking for antenatal care in the first trimester and receiving the required number of antenatal cares, as well as the benefits of vaginal delivery for the mother and newborn

and how gestational age of delivering influence birth outcomes positively or negatively. Also, how the outcomes of previous pregnancy may help shape the outcomes of subsequent ones. Women should be given access to the relevant information and educational materials that will help them prepare for pregnancy.

At the family and community levels; it is noted that family that experienced maternal or some time neonatal death are often forced to liquidate their assets and borrow money to settled incurred hospital and funeral costs. Most families spent nearly one-third of their yearly per capita expenditure on health care access during pregnancy and delivery (Kes et al., 2015). To reverse this trend demands educational campaign and promotion, as well as open discussion in the communities and families about preparing for pregnancy in advance. This discussion and the promotional campaign should include avoidance of lifestyles and behaviors known to negatively influence pregnancy outcomes, as well as religion, cultural and traditional norms, and other factors that contribute to poor pregnancy outcomes. This strategy will promote positive social change, which will translate to a productive future for the families and communities.

Policymakers should design strategies that will take advantage of the cultural, religious, place of residence, ethnic background and educational status of women in promoting reproductive health in Nigeria. These strategies would underscore the need for preparing for pregnancy in advance which includes quality nutrition, positive behaviors, and positive lifestyles, as well as the use of contraceptive, safe abortion, the benefits for early and adequate antenatal care, safe delivering and postpartum care. Also, the WHO (2015) agenda 2030 should be incorporated as part of these intervention strategies to

ensure Nigeria will achieve this goal by 2030.The Sustainable Development Goals (SDGs) agenda through 2030 aims to reduce the global MM ratio to less 70 per maternal deaths per 100,000 live births. In addition, the agenda also includes newborn health and the effort to reducing the inequalities that are responsible for discrepancies in access, quality, and outcomes of health care within and among countries. The policy at the national level must provide provision for maternal and health-related research, as well as specific action plans to accomplish the SDGs of 2030. Generally, this would trigger positive social change, productive and healthy future for the country.

Conclusion

The study expanded the existing body of knowledge that previous poor pregnancy outcomes, mode of delivering, the timing of antenatal care and gestational age at delivery are pregnancy risk factors. Overall, this study showed the variables that were found to predict poor pregnancy outcomes include the outcome of last pregnancy, mode of delivery, the timing of antenatal care booking, and gestational age at delivery. These variables indicated moderate to strong significant associations with the outcomes variables, even after controlling for selected covariates. The study findings had also shown that poor income and inadequate education are strong risk factors for poor pregnancy outcomes.

As noted by Bandura 1977, SCT believes that behavior is influenced by the interchange of personal, behavioral and environmental impacts and those behaviors are shaped through a combination of positive personal and environmental factors. This study showed that positive personal factors (income and education), positive obstetric factors

(the outcome of last pregnancy, mode of delivering, gestational age at delivering and timing of antenatal care booking produced better pregnancy outcomes.

Adverse pregnancy outcomes are public health challenges, as well as health care issues that requires multidimensional approaches to avert the current trends. Developing strategies at the policy level is needed to create programs and educational campaign that take cognizance of religious, cultural, traditional norms and education status of reproductive age women. It is also, necessary to incorporate family planning, use of contraceptive, safe abortion, planned and unplanned pregnancy, as well as importance of early antenatal care booking and receiving the recommended number of antenatal cares during and after childbirth into high school curriculum, plus counseling regarding mode of delivery. The above methods would help reduce the rate of poor pregnancy outcomes and enhance adverse pregnancy outcomes for women of reproductive age now.

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